ANALYSIS OF RELATED FACTORS WHICH EFFECT THE DECISION OF CHOOSING A HEALTH SCREENING PACKAGE

KANCHANA RACHRUJITONG

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Thematic Paper
entitled

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……..
Ms.Kanchana Rachrujitong
Candidate

……..
Asst. Prof. Panya Kaimuk, M.D.
Major advisor

……...
Asst. Prof. Bovornlak Oonkhanond, Ph.D.
Co-advisor

……..
Asst. Prof. Auemphorn Muchimwong, Ph.D.
Acting Dean
Faculty of Graduate Studies
Mahidol University

……..
Asst. Prof. Rawin Raviwongse, Ph.D. (Engineering Management)
Program Director
Master of Science Program in Technology of Information System Management
Faculty of Engineering
Mahidol University

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on
February 28, 2011

……..
Ms.Kanchana Rachrujitong
Candidate

……
Asst.Prof. Warakorn Charoensuk, Ph.D.
Chair

……
Asst. Prof. Panya Kaimuk, M.D.
Member

……
Lect. Worasit Choochaiwattana, Ph.D.
Member

……
Asst. Prof. Bovornlak Oonkhanond, Ph.D.
Member

……..
Asst. Prof. Auemphorn Muchimwong, Ph.D.
Acting Dean
Faculty of Graduate Studies
Mahidol University

……..
Asst. Prof. Rawin Raviwongse, Ph.D.
Dean
Faculty of Engineering
Mahidol University

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Kanchana Rachrujitong

ANALYSIS OF RELATED FACTORS WHICH EFFECT THE DECISION OF CHOOSING A HEALTH SCREENING PACKAGE

KANCHANA RACHRUJITONG 5036675 EGTI/M

M.Sc. (TECHONOLOGY OF INFORMATION SYSTEM MANAGEMENT)

THEMATIC PAPER ADVISORY COMMITIEE: PANYA KAIMOOK, M.D. (BIOMEDICAL ENGINEERING), BOVORNLAK OONKHANOND, Ph.D. (CHEMICAL ENGINEERING)

ABSTRACT

Nowadays, the health care business is very competitive, especially the medical check up programs. The preventive health care business is getting more attention due to various factors such as the increasing of people who suffer from dangerous disease, cancer found in young people, company policy, family cancer history, or any other disease history, risk due to lifestyle, and personal concern, etc. Therefore, this research is focused on the development of a decision support system for medical check-up program selection.

used as a tool in developing the questionnaire. The data collected were separated into two sets ,i.e., a training set and a test set. The data analysis and related factors analysis were performed using Waikato Environment for Knowledge Analysis (WEKA) which is the software machine learning analyzed in this study. The data were classified by type of health screening package (A, B, C, and D).

The results showed that a questionnaire can be created and distributed online, and the data collected in spreadsheet form. The number of data were 303 and 254 instances for the training set and test set, respectively. The accuracy of both data sets were 91.09% (Training set) and 88.98% (Test set). The precision of both data sets was 1(A), 0.939(B), 0.862(C) and 0.92(D) for the training set and 0.95(A), 0.915(B), 0.853(C) and 0.902(D) for the test set which are close so the WEKA rules can be used with the other data set. The total number of data in this research (557) may not be enough for parameter alternation, therefore the rules should not apply with other data.

KEY WORDS: MACHINE LEARNING/ WEKA/ MEDICAL CHECK-UP PROGRAM/ HEALTH SCREENING

109 pages

การวิเคราะห์ความสัมพันธ์ของปัจจัยต่างๆที่มีผลต่อการตัดสินใจเลือกซื้อแพคเกจตรวจสุขภาพ
ANALYSIS OF RELATED FACTORS WHICH EFFECT TO DECISION OF CHOOSING HEALTH SCREENING PACKAGE

กัญจนา ราชรุจิทอง 5036675 EGTI/M

วท.ม (เทคโนโลยีการจัดการระบบสารสนเทศ)

คณะกรรมการที่ปรึกษาสารนิพนธ์: ปัญญา ไข่มุก, M.D.(BIOMEDICAL ENGINEERING)
บวรลักษณ์ อุณหคานนท์ Ph.D. (CHEMICAL ENGINEERING)

บทคัดย่อ

ปัจจุบัน ธุรกิจโรงพยาบาลมีการแข่งขันกันค่อนข้างสูงดังนั้นในแต่ละโรงพยาบาลจึงต้องหากลยุทธ์วิธีในการดึงดูดความสนใจของลูกค้า โดยที่เห็นได้ชัดได้แก่กลยุทธ์ในการจัดตั้งศูนย์ตรวจเฉพาะทาง แต่ที่เห็นได้ชัดและมีเกือบทุกโรงพยาบาล คือ ศูนย์ตรวจสุขภาพ เนื่องมาจากลักษณะการดำเนินชีวิตที่เปลี่ยนไปของคนในปัจจุบัน ที่ไปพบแพทย์ตั้งแต่ยังไม่มีอาการผิดปกติใดๆด้านสุขภาพ โดยเหตุผลที่ไปตรวจสุขภาพมีหลายปัจจัยด้วยกัน เช่น ความต้องการตรวจสุขภาพประจำปี การทำประกัน นโยบายของบริษัท ประวัติการเป็นโรคของสมาชิกในครอบครัว หรือ ประวัติความเจ็บป่วยส่วนบุคคลเป็นต้น

สาเหตุเหล่านี้เป็นที่มาของการทำงานวิจัยชิ้นนี้เพื่อวิเคราะห์หาปัจจัยที่มีผลกระทบต่อการตัดสินใจเลือกซื้อแพคเกจตรวจสุขภาพของศูนย์ตรวจสุขภาพ ซึ่งในงานวิจัยได้พัฒนาแบบสอบถามโดยนำ Google docs มาเป็นเครื่องมือในการพัฒนา และกระจายแบบสอบถามผ่านทางระบบออนไลน์ โดยนำข้อมูลที่เก็บได้มาแบ่งเป็นสองชุด คือ training set และ test set จากนั้นทำการวิเคราะห์และจัดประเภทของข้อมูลให้อยู่ในรูปแบบของกฎความสัมพันธ์ของปัจจัยต่างๆ และในขั้นตอนนี้ได้นำเอาเครื่องมือที่เป็น machine learning คือ โปรแกรม WEKA มาใช้ในการคลาสสิไฟด์ความสัมพันธ์แบ่งตามโปรแกรมตรวจสุขภาพ (A, B, C และ D)

ผลที่ได้จากการทดลองพบว่า แบบสอบถามถูกพัฒนาและกระจายผ่านระบบออนไลน์ โดยเก็บข้อมูลในรูปแบบของสเปรดชีท จำนวนข้อมูลของ training set เป็น 303 และ test set เป็น 254 โดยมีค่าความถูกต้องเป็น 91.09% และ 88.98% ตามลำดับ และค่าความแม่นยำของข้อมูลชุด training set เป็น 1(A), 0.939(B), 0.862(C) และ 0.92(D) และ test set เป็น 0.95(A), 0.915(B), 0.853(C) และ 0.902(D) ซึ่งมีค่าใกล้เคียงกัน ดังนั้นกฎความสัมพันธ์ที่ถูกสร้างขึ้นสามารถนำไปใช้กับข้อมูลชุดอื่นได้ แต่เนื่องจากจำนวนข้อมูลที่ทำการวิจัย (557) ค่อนข้างน้อย ดังนั้นกฎความสัมพันธ์ที่สร้างได้จึงไม่เหมาะในการนำไปใช้

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CHAPTER I
INTRODUCTION

1.1 Introduction

In the pass, people will go to see the doctor when they got illness or health problem. But nowadays, people lifestyle has been changed they intend in themselves then before. Mostly people go to the hospital at least once a year to do medical check-up cause of many reasons as policy of the company, annual check-up, follow up etc. So the hospitals have to change their strategies to response to people demand by set up special clinics such men center, heart center, check-up center. Especially health screening or check-up center is a selling point of many hospitals.

For health screening center, there are check-up packages or program that people can choose which are mostly defined by people age and sex. For example program for women who are in the age over 40 years, there is a examination of pelvic exam as pap smear ,breast exam as Mammogram or general package for any ages, there is a blood test exam, chest x-ray exam etc.. From these packages, sometimes people choose improper program for themselves because many factors. Such woman who is 30 years choose program for 40 years women because she concern about breast cancer which has to do Mammogram (mostly for people in the age over 40 years) or 18 years old girl choose program which include Upper GI examination (the special x-ray study for exam esophagus, stomach and upper part of small bowel) is unnecessary to do.

From these reason become to be an idea to define related factors which are effected to people decision when they choose health screening program by use an online questionnaire in gathering data and analyze.

1.2 Objective

To model the rule of effected factor of health screening decision by use online questionnaire in gatherimg data.

1.3 Scope of work

1.3.1 Collecting data by distribution questionnaire via online system by the number of sample size is about 500 samples.

1.3.2 This study is about human research which has a limitation in gathering data so the online questionnaire will be developed and adapted by reliance of people understanding that they can do this.

1.3.3 The population or subject who will do this questionnaire should be educated people so they can understand the questions and complete it. Thus if there are uncompleted questionnaires then they will be rejected.

1.3.4 This study is to classify the relation of effected factor by use an feed forward artificial neural network.

1.4 Expected result

1.4.1 Online questionnaire can be created and gathered the data.

1.4.2 Data can be analyzed to model the rule.

1.4.3 Data and rule which analyzed and created can be applied to build up the health screening package.

CHAPTER II
LITERATURE REVIEW

In this research is to study the factors that effect to people decision about health screening package/program via online questionnaire by use decision support system software as a tool for analyzing. The related literatures which are related to this study are defined to articles as described.

2.1 Background

2.2 Questionnaire infrastructure

2.3 Neural network

2.4 Decision support system

2.5 WEGA

2.1 Background

When people come to medical center for objective to have medical check-up or cause of any reasons there is usually questions for first evaluation. In this research is object to find related factors of people decision when they have health screening check-up so the questionnaire to gather their information should be created. In questionnaire, there is many questions which can defined to be groups as

- Physical factors are sex, age, race
- Personal medical history and personal behavior: for example as history of medical treatment, history of operation, history of sexual relation etc.
- Family history of medical treatment : for example as mother had breast cancer, child who born from hepatitis C mother etc.
- Other factors : for example as live with people who have hepatitis B, work in chemical factory etc.

From created questionnaire, when people do their data will be gathered and analyzed .

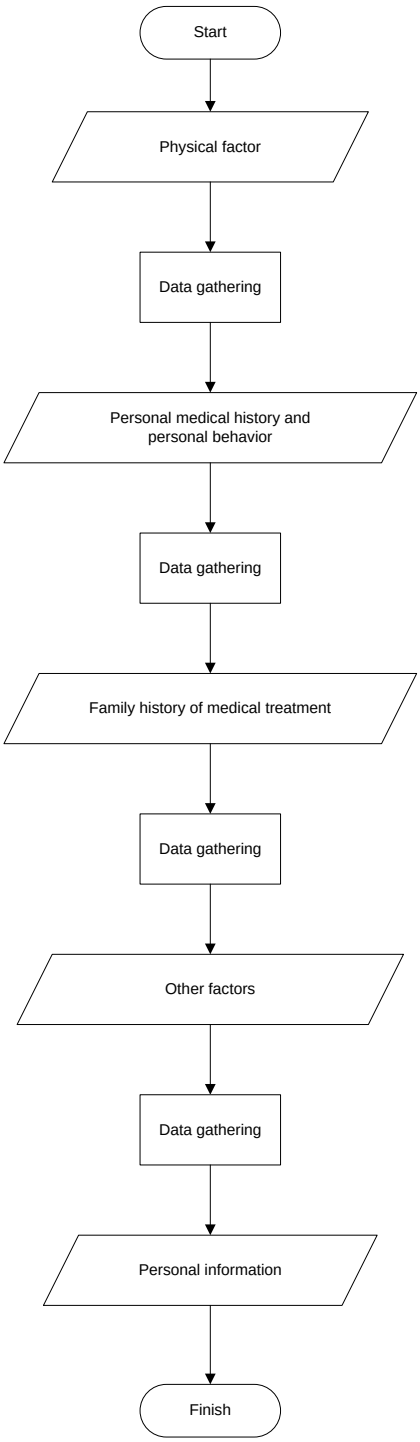


Figure 2.1 :Demonstrate the flow of analyzing personal information

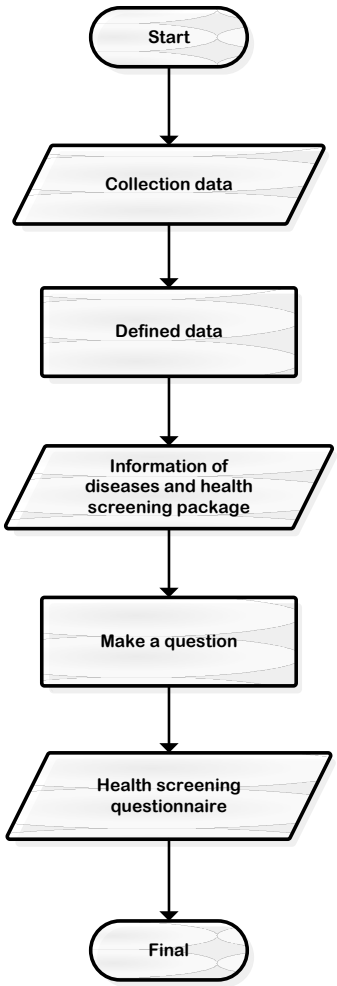


Figure 2.2 : Demonstrated Steps of creating questionnaire

For health screening check up there are many examinations which specific for diseases but can be defined by method as

2.1.1 Physical examination

Physical examination is the process which a doctor investigates the body of a patient for signs of disease.

2.1.2 Eye test

An eye examination is a battery of tests performed by an ophthalmologist, optometrist, or orthopist assessing vision and ability to focus on and discern objects, as well as other tests and examinations pertaining to the eyes. All people should have periodic and thorough eye examinations as part of routine primary care, especially since many eye diseases are asymptomatic. Eye examinations may detect potentially treatable blinding eye diseases, ocular manifestations of systemic disease, or signs of tumors or other anomalies of the brain.

2.1.3 Laboratory test

The laboratory test or generally call “lab test” is medical procedure that provide a major disease process. Lab test can be from blood, urine, sputum, stool or other tissue are taken for interpretation.

2.1.4 Diagnostic radiology

Diagnostic radiology is the branch of medical science dealing with medical imaging which purpose demonstrate the anatomical or parts of human body. This kind of medical imaging is use many modality to image not only x-ray source as a x-ray machine, ultrasound, Computerized tomography, Magnetic Resonance Imaging or Mammogram etc. which is up to purpose of diagnosis . For medical check-up, there are usually examine chest x-ray, Fluoroscopy for upper gastrointestinal, Mammogram or ltrasound of the abdomen etc.

2.1.5 Heart examination

The examination to determine the heart abnormality since no symptom which is mostly examine by Echocardiogram (ECG or EKG) and Exercise stress test .

An EKG is a frequently used tool to establish whether a patient has already experienced a heart attack or whether he/she may be in imminent danger of having one. An EST helps a doctor find out how well of heart workload. As your body works harder during the test, it requires more oxygen, so the heart must pump more blood. The test can show if the blood supply is reduced in the arteries that supply

the heart. It also helps doctors know the kind and level of exercise appropriate for a patient.

2.1.6 Gynecology

Gynecology is the branch of medical science that deals with the care of women, especially with reference to reproduction and the reproductive organs. A typical first gynecological examination begins with a careful medical history. Along with establishing a record of important information, a history-taking gives women the opportunity to become more comfortable with their doctor before the physical portion of the examination begins which mostly is pelvic examination to check physical anatomy and PAP smear to screen for reproductive disease as HPV, infection or cervical cancer etc.

2.2 Questionnaire infrastructure

The questionnaire is a structured technique for collecting primary data in a marketing survey. It is a series of written or verbal questions for which the respondent provides answers. A well-designed questionnaire motivates the respondent to provide complete and accurate information.

The survey questionnaire should not be viewed as a stand-alone tool. Along with the questionnaire there is field work, rewards for the respondents, and communication aids, all of which are important components of the questionnaire process.

2.2.1 Steps to Developing a Questionnaire

The following are steps to developing a questionnaire - the exact order may vary somewhat.

- Determine which information is being sought.
- Choose a question type (structure and amount of disguise) and method of administration (for example, written form, email or web form, telephone interview, verbal interview).

- Determine the general question content needed to obtain the desired information.
- Determine the form of response.
- Choose the exact question wording.
- Arrange the questions into an effective sequence.
- Specify the physical characteristics of the questionnaire (paper type, number of questions per page, etc.)
- Test the questionnaire and revise it as needed.

2.2.2 Required Information

To determine exactly which information is needed, it is useful to construct tables into which the data will be placed once it is collected. The tables will help to define what data is needed and what is not needed.

2.2.3 Question Type and Administration Method

Some question types include fixed alternative, open ended, and projective:

- Fixed-alternative questions provide multiple-choice answers. These types of questions are good when the possible replies are few and clear-cut, such as age, car ownership, etc.
- Open-ended questions allow the respondent to better express his/her answer, but are more difficult to administer and analyze. Often, open-ended questions are administered in a depth interview. This technique is most appropriate for exploratory research.
- Projective methods use a vague question or stimulus and attempt to project a person's attitudes from the response. The questionnaire could use techniques such as word associations and fill-in-the-blank sentences. Projective methods are difficult to analyze and are better suited for exploratory research than for descriptive or causal research.

There are three commonly used rating scales: graphic, itemized, and comparative.

- Graphic - simply a line on which one marks an X anywhere between the extremes with an infinite number of places where the X can be placed.

- Itemized-similar to graphic except there are a limited number of categories that can be marked.
- Comparative - the respondent compares one attribute to others. Examples include the Q-sort technique and the constant sum method, which requires one to divide a fixed number of points among the alternatives.

Questionnaires typically are administered via a personal or telephone interview or via a mail questionnaire. Newer methods include e-mail and the Web.

2.2.4 Question Content

Each question should have a specific purpose or should not be included in the questionnaire. The goal of the questions is to obtain the required information. This is not to say that all questions directly must ask for the desired data. In some cases questions can be used to establish rapport with the respondent, especially when sensitive information is being sought.

Sensitive questions can be posed in ways to increase response likelihood and to facilitate more honest responses. Some techniques are:

- Place the question in a series of less personal questions.
- State that the behavior or attitude is not so unusual.
- Phrase the question in terms of other people, not the respondent.
- Provide response choices that specify ranges, not exact numbers.
- Use a randomized response model giving the respondent pairs of questions with a randomly assigned one to answer. The interviewer does not know which question the person is answering, but the overall percentage of people assigned to the sensitive question is known and statistics can be calculated.

2.2.5 Form of Question Response

Questions can be designed for open-ended, dichotomous, or multichotomous responses.

2.2.5.1 Open-ended responses are difficult to evaluate, but are useful early in the research process for determining the possible range of responses. Dichotomous questions have two possible opposing responses, for example, "Yes" and "No".

2.2.5.2 Multichotomous questions have a range of responses as in a multiple choice test.

The questionnaire designer should consider that respondents may not be able to answer some questions accurately. Two types of error are telescoping error and recall loss.

- Telescoping error is an error resulting from the tendency of people to remember events as occurring more recently than they actually did.
- Recall loss occurs when people forget that an event even occurred. For recent events, telescoping error dominates; for events that happened in the distant past, recall loss dominates.

2.2.6 Question Wording

The questions should be worded so that they are unambiguous and easily understood. The wording should consider the full context of the respondent's situation. In particular, consider the who, what, when, where, why, and how dimensions of the question.

For example, the question,

"Which brand of toothpaste do you use?"

it might seem clear at first. However, the respondent may consider "you" to be the family as a whole rather than he or she personally. If the respondent recently changed brands, the "when" dimension of the question may be relevant. If the respondent uses a different, more compact tube of toothpaste when traveling, the "where" aspect of the question will matter.

A better wording of the question might be,

"Which brand of toothpaste have you used personally at home during the past 6 months? If you have used more than one brand, please list each of them."

When asking about the frequency of use, the questions should avoid ambiguous words such as "sometimes", "occasionally", or "regularly". Rather, more specific terms such as "once per day" and "2-3 times per week" should be used.

2.2.7 Sequence the Questions

Some neutral questions should be placed at the beginning of the questionnaire in order to establish rapport and put the respondent at ease. Effective opening questions are simple and non-threatening.

When sequencing the questions, keep in mind that their order can affect the response. One way to correct for this effect is to distribute half of the questionnaires with one order, and the other half with another order.

2.2.8 Physical Characteristics of the Questionnaire

Physical aspects such as the page layout, font type and size, question spacing, and type of paper should be considered. In order to eliminate the need to flip back and forth between pages, the layout should be designed so that a question at the bottom of the page does not need to be continued onto the next page. The font should be readable by respondents who have less-than-perfect visual acuity. The paper stock should be good quality to project the image that the questionnaire is important enough to warrant the respondents' time. Each questionnaire should have a unique number in order to better account for it and to know if any have been lost.

2.2.9 Test and Revise the Questionnaire

The questionnaire should be pre-tested in two stages before distributing. In the first stage, it should be administered using personal interviews in order to get better feedback on problems such as ambiguous questions. Then, it should be tested in the same way it will be administered. The data from the test should be analyzed the same way the administered data is to be analyzed in order to uncover any unanticipated shortcomings.

Different respondents will answer the same questionnaire differently. One hopes that the differences are due to real differences in the measured characteristics, but that often is not the case. Some sources of the differences between scores of different respondents are:

- True differences in the characteristic being measured.
- Differences in other characteristics such as response styles.
- Differences in transient personal factors such as fatigue, etc.
- Differences in situation, such as whether spouse is present.
- Differences in the administration, such as interviewer tone of voice.
- Differences resulting from sampling of items relevant toward the characteristic being measured.

- Differences resulting from lack of clarity of the question - may mean different things to different people.
- Differences caused by mechanical factors such as space to answer, inadvertent check marks, etc.

2.3 Artificial Neural network

An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The key element of this paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements (neurons) working in unison to solve specific problems. ANNs, like people, learn by example. An ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process. Learning in biological systems involves adjustments to the synaptic connections that exist between the neurones. This is true of ANNs as well.

2.3.1 Historical background

Neural network simulations appear to be a recent development. However, this field was established before the advent of computers, and has survived at least one major setback and several eras.

Many important advances have been boosted by the use of inexpensive computer emulations. Following an initial period of enthusiasm, the field survived a period of frustration and disrepute. During this period when funding and professional support was minimal, important advances were made by relatively few researchers. These pioneers were able to develop convincing technology which surpassed the limitations identified by Minsky and Papert. Minsky and Papert, published a book (in 1969) in which they summed up a general feeling of frustration (against neural networks) among researchers, and was thus accepted by most without further analysis. Currently, the neural network field enjoys a resurgence of interest and a corresponding increase in funding.

The first artificial neuron was produced in 1943 by the neurophysiologist Warren McCulloch and the logician Walter Pits. But the technology available at that time did not allow them to do too much.

2.3.2 Advantages of neural networks.

Neural networks, with their remarkable ability to derive meaning from complicated or imprecise data, can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques. A trained neural network can be thought of as an "expert" in the category of information it has been given to analyze. This expert can then be used to provide projections given new situations of interest and answer "what if" questions.

Other advantages include:

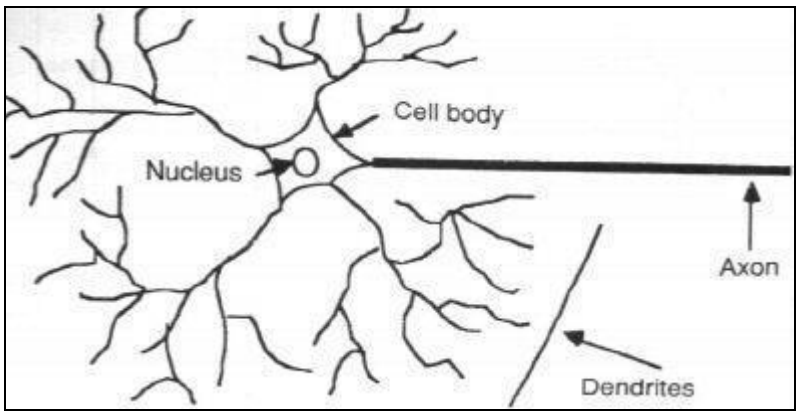
- Adaptive learning: An ability to learn how to do tasks based on the data given for training or initial experience.
- Self-Organization: An ANN can create its own organization or representation of the information it receives during learning time.

- Real Time Operation: ANN computations may be carried out in parallel, and special hardware devices are being designed and manufactured which take advantage of this capability.
- Fault Tolerance via Redundant Information Coding: Partial destruction of a network leads to the corresponding degradation of performance. However, some network capabilities may be retained even with major network damage.

2.3.3 Human and Artificial Neurons - investigating the similarities

In the human brain, a typical neuron collects signals from others through a host of fine structures called dendrites. The neuron sends out spikes of electrical activity through a long, thin stand known as an axon, which splits into thousands of branches. At the end of each branch, a structure called a synapse converts the activity from the axon into electrical effects that inhibit or excite activity from the axon into electrical effects that inhibit or excite activity in the connected neurons. When a neuron receives excitatory input that is sufficiently large compared with its inhibitory input, it sends a spike of electrical activity down its axon. Learning occurs by changing the effectiveness of the synapses so that the influence of one neuron on another changes. As described neural networks are conducted by first trying to deduce the essential features of neurons and their interconnections. Then typically program a computer to simulate these features.

However the knowledge of neurons is incomplete and computing power is limited, this models are necessarily gross idealizations of real networks of neurons.



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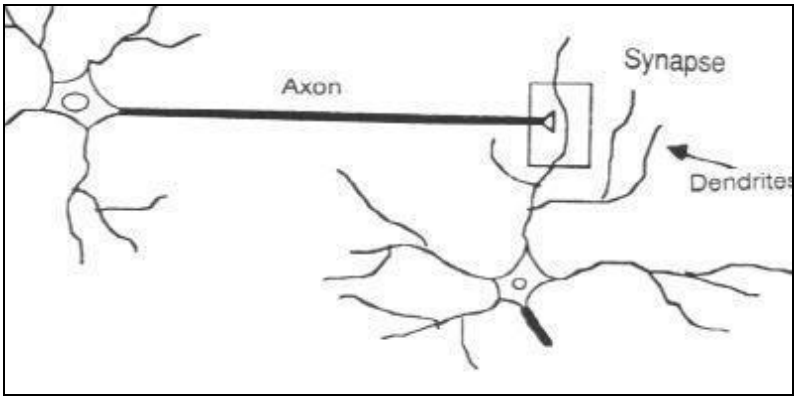
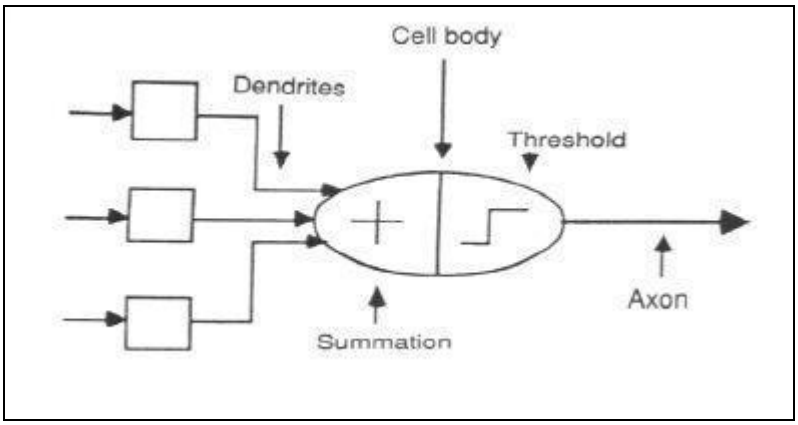


b.



c.

Figure 2.3 a. Demonstrate the neuron model **b**.Demonstrate components of a neuron and **c**. Demonstrate the synapse

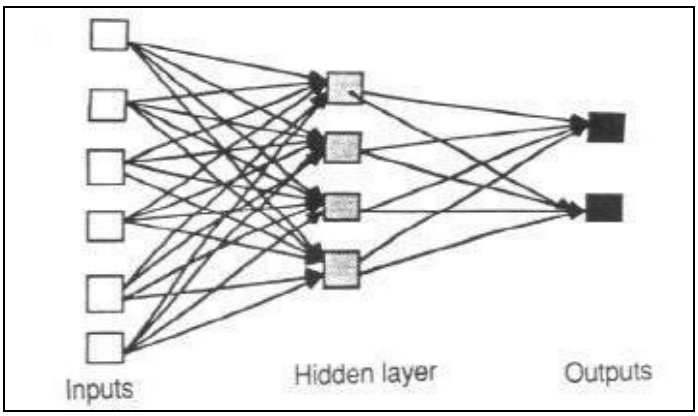
2.3.4 Architecture of neural networks

2.3.4.1 Feed-forward networks

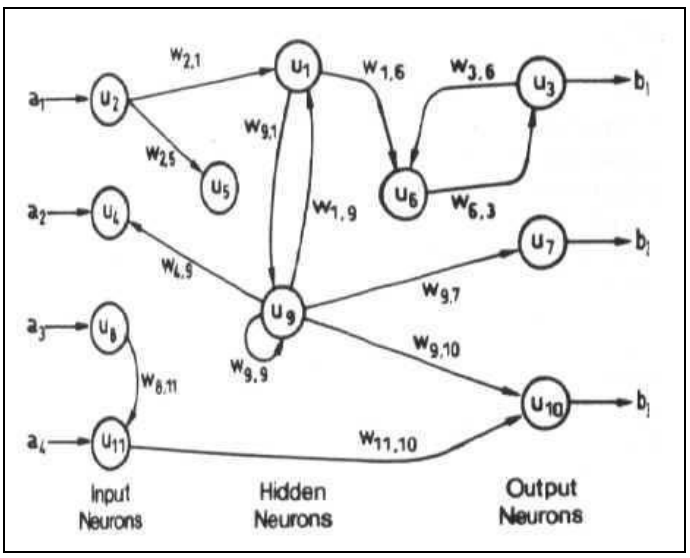
Feed-forward ANNs allow signals to travel one way only; from input to output. There is no feedback (loops) i.e. the output of any layer does not affect that same layer. Feed-forward ANNs tend to be straight forward networks that associate inputs with outputs. They are extensively used in pattern recognition. This type of organization is also referred to as bottom-up or top-down.

2.3.4.2 Feedback networks

Feedback networks (figure 1) can have signals travelling in both directions by introducing loops in the network. Feedback networks are very powerful and can get extremely complicated. Feedback networks are dynamic; their 'state' is changing continuously until they reach an equilibrium point. They remain at the equilibrium point until the input changes and a new equilibrium needs to be found. Feedback architectures are also referred to as interactive or recurrent, although the latter term is often used to denote feedback connections in single-layer organizations.



a



b

Figure 2.4 a. Demonstrate an example of a simple feedforward network **b**.Demonstrate an example of a complicated network

2.3.5 Network layers

The commonest type of artificial neural network consists of three groups, or layers, of units: a layer of "input" units is connected to a layer of "hidden" units, which is connected to a layer of "output" units.

- The activity of the input units represents the raw information that is fed into the network.
- The activity of each hidden unit is determined by the activities of the input units and the weights on the connections between the input and the hidden units.
- The behavior of the output units depends on the activity of the hidden units and the weights between the hidden and output units.

This simple type of network is interesting because the hidden units are free to construct their own representations of the input. The weights between the input and hidden units determine when each hidden unit is active, and so by modifying these weights, a hidden unit can choose what it represents.

The network layer can be devided as single-layer and multi-layer architectures.

- The single-layer organization, in which all units are connected to one another, constitutes the most general case and is of more potential computational power than hierarchically structured multi-layer organizations.
- The multi-layer networks, units are often numbered by layer, instead of following a global numbering.

2.3.6 The Learning Process

The memorization of patterns and the subsequent response of the network can be categorized into two general paradigms:

2.3.6.1 Associative mapping in which the network learns to produce a particular pattern on the set of input units whenever another particular pattern is applied on the set of input units. The associative mapping can generally be broken down into two mechanisms :

2.3.6.1.1 Auto-association: an input pattern is associated with itself and the states of input and output units coincide. This is used to provide pattern completition, i.e. to produce a pattern whenever a portion of it or a

distorted pattern is presented. In the second case, the network actually stores pairs of patterns building an association between two sets of patterns.

2.3.6.1.2 Hetero-association: is related to two recall mechanisms:

- Nearest-neighbour recall, where the output pattern produced corresponds to the input pattern stored, which is closest to the pattern presented.
- Interpolative recall, where the output pattern is a similarity dependent interpolation of the patterns stored corresponding to the pattern presented. Yet another paradigm, which is a variant associative mapping is classification, ie when there is a fixed set of categories into which the input patterns are to be classified.

2.3.6.2 Regularity detection in which units learn to respond to particular properties of the input patterns. Whereas in associative mapping the network stores the relationships among patterns, in regularity detection the response of each unit has a particular 'meaning'. This type of learning mechanism is essential for feature discovery and knowledge representation.

Every neural network posses knowledge which is contained in the values of the connections weights. Modifying the knowledge stored in the network as a function of experience implies a learning rule for changing the values of the weights.

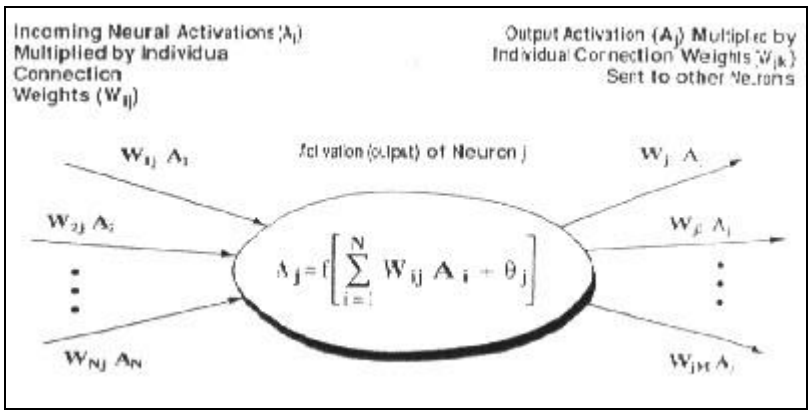


Figure 2.5 Demonstrate of connection weights

Information is stored in the weight matrix W of a neural network. Learning is the determination of the weights. Following the way learning is performed can distinguish two major categories of neural networks as

- Fixed networks in which the weights cannot be changed, i.e.

$$dW/dt=0.$$

In such networks, the weights are fixed a priori according to the problem to solve.

- Adaptive networks which are able to change their weights, i.e.

$$dW/dt \text{ not}= 0.$$

All learning methods used for adaptive neural networks can be classified into two major categories:

- Supervised learning which incorporates an external teacher, so that each output unit is told what its desired response to input signals ought to be. During the learning process global information may be required. Paradigms of supervised learning include error-correction learning, reinforcement learning and stochastic learning.

- Unsupervised learning uses no external teacher and is based upon only local information. It is also referred to as self-organization, in the sense that it self-organizes data presented to the network and detects their emergent collective properties. Paradigms of unsupervised learning are Hebbian learning and competitive learning.

2.3.7 Transfer Function

The behavior of an ANN (Artificial Neural Network) depends on both the weights and the input-output function (transfer function) that is specified for the units. This function typically falls into one of three categories:

- Linear (or ramp) : the output activity is proportional to the total weighted output.

- Threshold : the output is set at one of two levels, depending on whether the total input is greater than or less than some threshold value.

- Sigmoid : the output varies continuously but not linearly as the input changes. Sigmoid units bear a greater resemblance to real neurons than do linear or threshold units, but all three must be considered rough approximations.

To make a neural network that performs some specific task, we must choose how the units are connected to one another, and we must set the weights on the

connections appropriately. The connections determine whether it is possible for one unit to influence another. The weights specify the strength of the influence.

2.4 Decision support system (DSS)

Decision Support System is a class of information systems (including but not limited to computerized systems) that support business and organizational decision making activities. A properly designed DSS is an interactive software-based system intended to help decision makers compile useful information from a combination of raw data, documents, personal knowledge, or business models to identify and solve problems and make decisions.

2.4.1 Development Frameworks

DSS systems are not entirely different from other systems and require a structured approach. Such a framework includes people, technology, and the development approach.

DSS technology levels (of hardware and software) may include:

2.4.1.1 The actual application that will be used by the user. This is the part of the application that allows the decision maker to make decisions in a particular problem area. The user can act upon that particular problem.

2.4.1.2 Generator contains Hardware/software environment that allows people to easily develop specific DSS applications. This level makes use of case tools or systems such as Crystal, AIMMS, and iThink.

2.4.1.3 Tools include lower level hardware/software DSS generators including special languages, function libraries and linking modules.

An iterative developmental approach allows for the DSS to be changed and redesigned at various intervals. Once the system is designed, it will need to be tested and revised for the desired outcome.

2.4.2 Classifying DSS

There are several ways to classify DSS applications. Not every DSS fits neatly into one category, but a mix of two or more architecture in one.

Holsapple and Whinston classify DSS into the following six frameworks as Text-oriented DSS, Database-oriented DSS, Spreadsheet-oriented DSS, Solver-oriented DSS, Rule-oriented DSS and Compound DSS. But the most popular DSS is a compound DSS. It is a hybrid system that includes two or more of the five basic structures.

The support given by DSS can be separated into three distinct, interrelated categories as Personal Support, Group Support and Organizational Support.

DSS components can be classified as

2.4.2.1 Inputs: Factors, numbers, and characteristics to analyze.

2.4.2.2 User Knowledge and Expertise: Inputs requiring manual analysis by user.

2.4.2.3 Outputs are transformed data from which DSS "decisions" are generated.

2.4.2.4 Decisions are results generated by the DSS based on user criteria.

DSS which perform selected cognitive decision-making functions and are based on artificial intelligence or intelligent agents technologies are called Intelligent Decision Support Systems .

The nascent field of Decision engineering treats the decision itself as an engineered object, and applies engineering principles such as Design and Quality assurance to an explicit representation of the elements that make up a decision.

2.4.3 Benefits of DSS

- Improves personal efficiency
- Expedites problem solving (speed up the progress of problems solving in an organization)
- Facilitates interpersonal communication
- Promotes learning or training
- Increases organizational control
- Generates new evidence in support of a decision
- Creates a competitive advantage over competition

- Encourages exploration and discovery on the part of the decision maker
- Reveals new approaches to thinking about the problem space
- Helps automate the managerial processes.

2.5 Waikato Environment for Knowledge Analysis (WEKA)

Waikato Environment for Knowledge Analysis (WEKA) is a workbench for machine learning that is intended to aid in the application of machine learning techniques to a variety of real-world problems, in particular, those arising from agricultural and horticultural domains. Unlike other machine learning projects, the emphasis is on providing a working environment for the domain specialist rather than the machine learning expert. Lessons learned include the necessity of providing a wealth of interactive tools for data manipulation, result visualization, database linkage, and cross-validation and comparison of rule sets, to complement the basic machine learning tools.

Machine learning is a burgeoning new technology with a wide range of applications. It has the potential to become one of the key components of intelligent information systems, enabling compact generalizations, inferred from large databases of recorded information, to be applied as *knowledge* in various practical ways—such as being embedded in automatic processes like expert systems, or used directly for communicating with human experts and for educational purposes. Presently, however, the field is not well placed to do this. Most research effort is directed towards the invention of new algorithms for learning, rather than towards gaining experience in applying existing techniques to real problems. The WEKA project is redressing the balance by applying standard machine learning techniques to a variety of agricultural and horticultural problems. Our goal is to discover and characterize what is required for successful applications of machine learning to real-world data.

To support this effort, a workbench has been developed to provide an integrated environment which not only gives easy access to a variety of machine learning techniques through an interactive interface, but also incorporates those pre-

and post-processing tools that we have found to be essential when working with real-world data sets.

Other systems for machine learning experimentation exist but these are libraries of routines that are intended for use by a researcher who is extending and comparing algorithms. One exception— although still a library of modules—is Consultant , an expert system that allows domain experts to choose a learning algorithm suited to their needs. Consultant assumes that a machine learning algorithm exists that can be applied directly to solve the problem at hand. Our experience has been that although a suitable algorithm may well exist, it is unlikely that its direct application on the domain expert's data will produce a meaningful result. Domain experts, in our experience, need an environment in which they can easily manipulate data and run experiments themselves.

The philosophy behind WEKA is to move away from supporting a computer science or machine learning researcher, and towards supporting the end user of machine learning. The end user is someone—typically, in our applications, an agricultural scientist—with an understanding of the data and sufficient knowledge of the capabilities of machine learning to select and investigate the application of different techniques. In order to maintain this philosophy, we have concentrated on ensuring that the implementation details of the machine learning algorithms and the input formats they require are hidden from the user.

CHAPTER III
METHODS AND MATERIALS

3.1 Method

The steps can be explained and demonstrated as below.

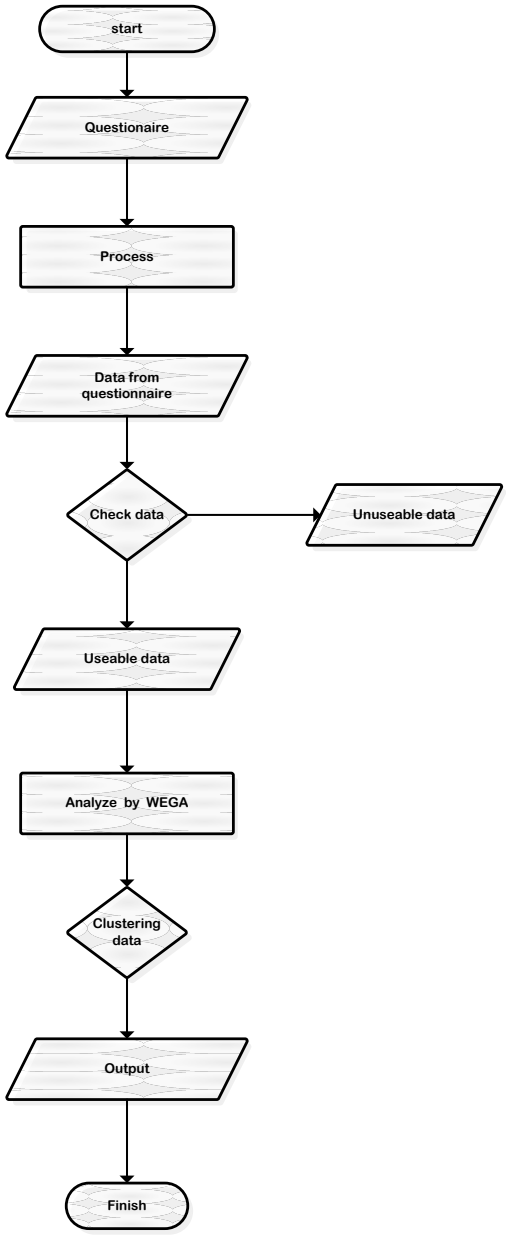


Figure 3.1 Demonstrate workflow of method

1. Data collection
2. System analysis
3. System testing and evaluation
4. Conclusion

3.1.1 Data collection

This step is to distribute questionnaire via online system and collect data by the population is trusted that they can understand and complete the questionnaire. The collected data will be filtered an uncompleted data before analyze.

3.1.2 System analysis

Data from step 1 are analyzed to classify effected factors to population decision.

3.1.2.1 Gather data from step 1 then defined set of data or parameters as groups before input.

3.1.2.2 Input analyzed factors into WEGA software to classify the relation of each factors.

3.1.2.3 Output will be rules which show relation of parameters, accuracy and precision of rules.

3.1.2.4 Conclude the relation of factors.

3.1.3 Testing and evaluation

3.1.3.1 Distribute the online questionnaire to population and gather the data.

3.1.3.2 Analyze the data by use rules from 1st analysis then evaluate the accuracy and precision .

3.1.4 Conclusion

Results from this study will be concluded how accuracy and precision of the related factors of both data .

3.2 Materials

3.2.1 Hardware Specification (Minimum requirement)

- CPU : Pentium IV 2.0 GHz.
- Memory : 1 GB.
- Hard Disk : 80 GB.
- Monitor : VGA
- Peripheral : Mouse and keyboard
- Network Device : 10/100/1000 Ethernet NIC

3.2.2 Software Specification

- Operating System : Microsoft Windows 2007
- WEKA

3.3 Research Schedule

The study consumes time as table below

Table 3.1 Research Schedule

Plan	Month					
	Sep	Oct	Nov	Dec	Jan	Feb
1. Preliminary planning and gather related information						
2. Determine function specification						
3. System Analysis and design						
4. System Development						
5. Test and Document						

CHAPTER IV
RESULTS

The distributed questionnaire via online system was done and collected the data for 2 times. First, the data had collect as a training set data to model the rules which can be happened. Second the same questionnaire was distributed again to collect another data to test that rule or can call test set data. These data are input in WEKA then the tool gave the output which compose of statistics

4.1 Data collection

4.1.1 Questionnaire

The questionnaire which has been created by use Google docs as a tool were distributed via online system . The questionnaire is composed of the questions as shown in figures below.

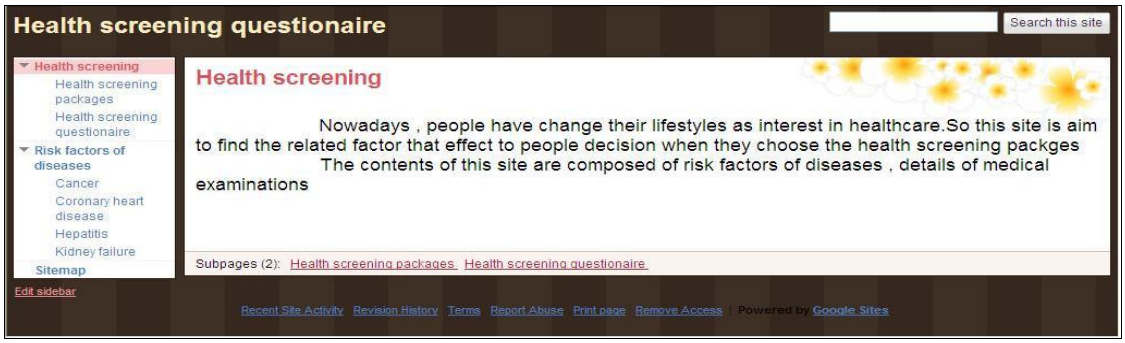


Figure 4.1 Demonstrate the site

Figure 4.2 Demonstrate the general question.

Personal information nad history of medication

Please choose if which one relate to your behavior *
- Smoking
- Dringing alcohol
- Inactivity
- Stress
- Certain chronic condition
- None

Please select which problem(s) do you have. *
- Obesity
- High cholesterol
- High blood pressure/ hypertension
- Non alcoholic fatty liver disease
- Prediabetes
- Insulin resistant
- History of gastational diabetes
- Vitamin D less
- Control of salt
- Heart failure
- Liver disease
- Kidney disease
- Post menopausal hormone therapy
- HIV positive
- Have sexual transmitted disease
- Blockages in the blood vessels in your arms or legs (peripheral artery disease)
- None

Have you ever had these conditions? *
- Inflammatory intestinal conditions
- Colon polyp
- Chronic infection of Hepatiti B
- Chronic infection of Hepatitis C
- Cirrhosis
- Inherited liver disease
- Colon cancer
- Breast cancer
- Ovarian cancer
- Were born to a woman with a hepatitis C infection
- None

Have you had medical treatment as below ? *
- Receive clotting-factor concentrates for hemophilia
- Received a blood transfusion or organ transplant before 1992
- Received clotting factor concentrates before 1987
- Received hemodialysis treatments for a long period of time
- Being hospitalized, especially for a serious condition that requires intensive care
- No

Figure 4.3 Demonstrate the question about personal information and history of medication

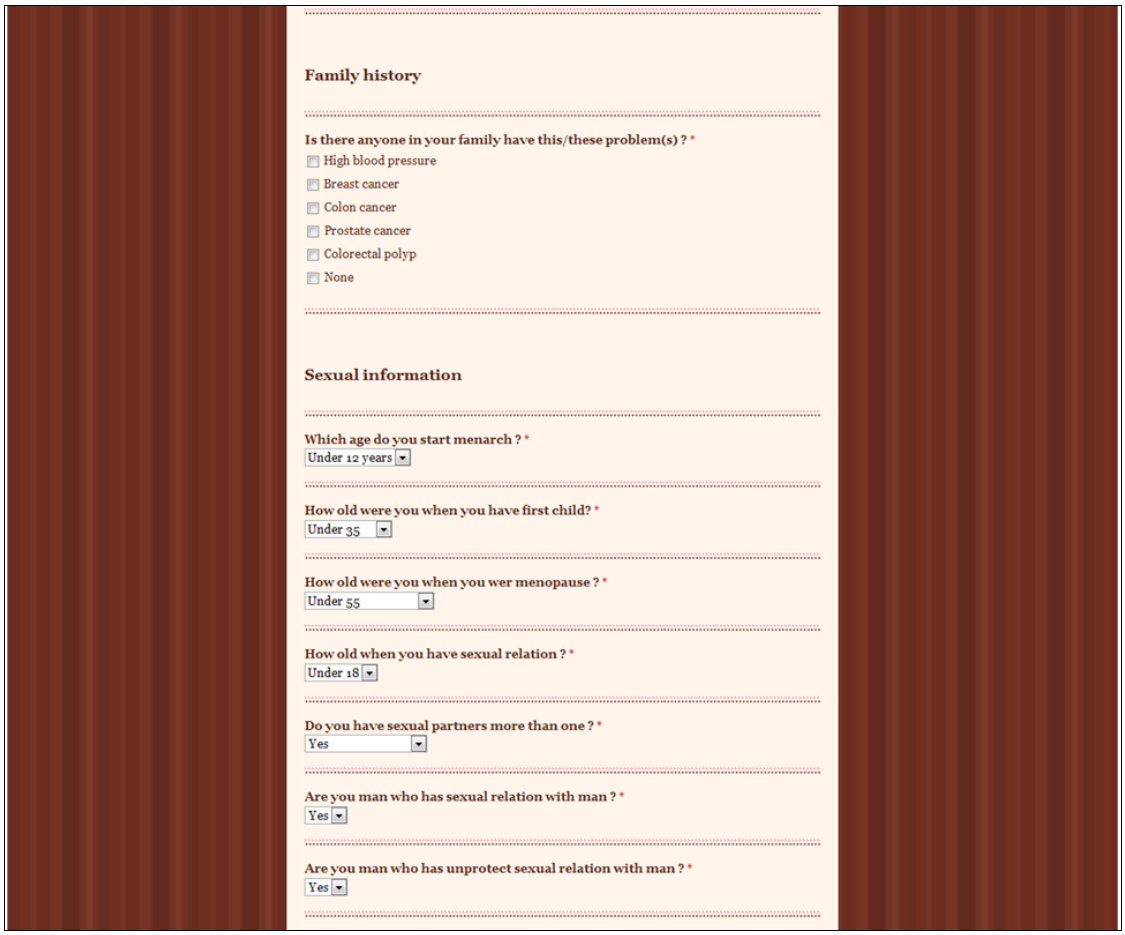


Figure 4.4 Demonstrate the question about family history and sexual information

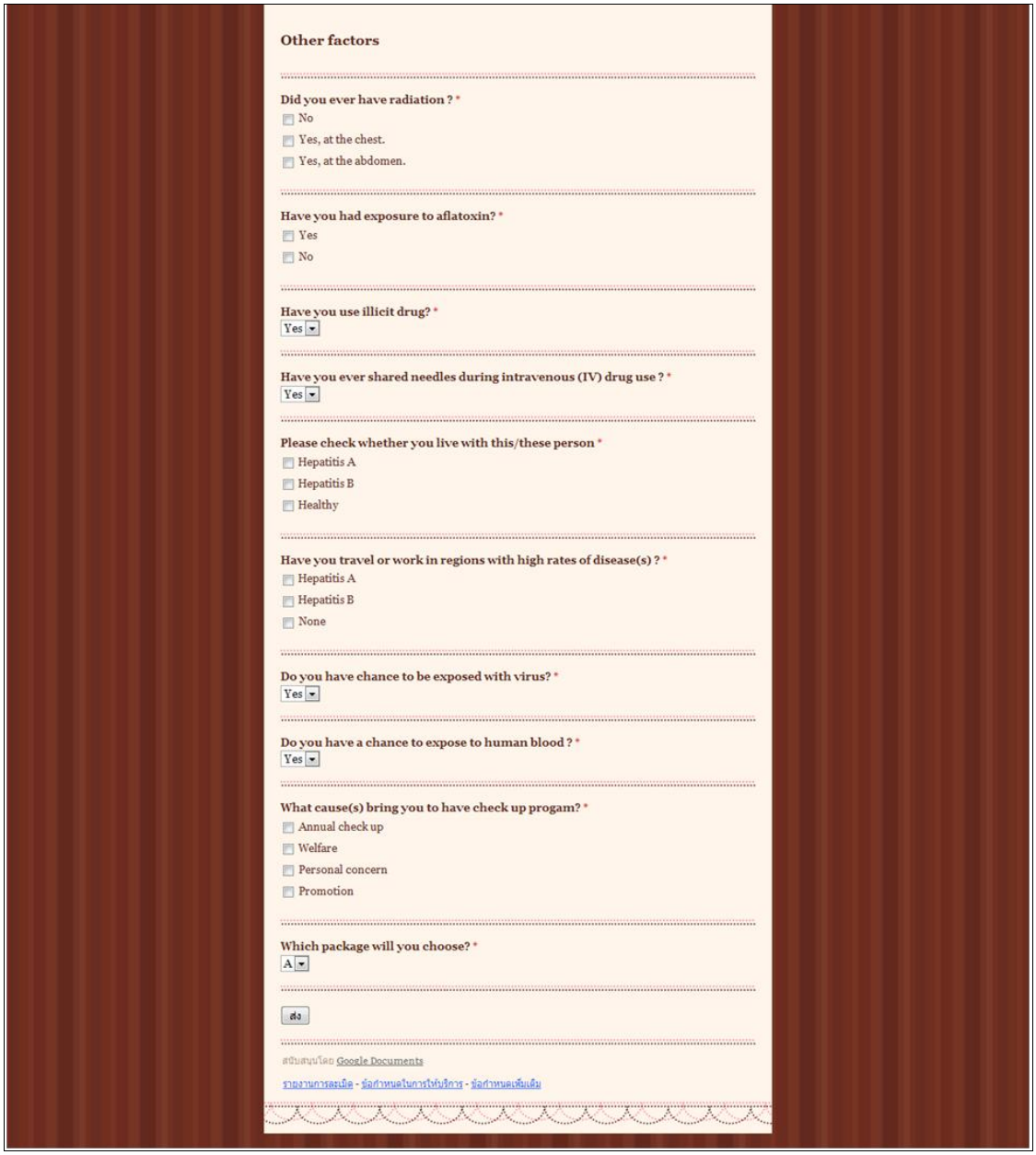


Figure 4.5 Demonstrate the question about other factors and the choices of package that user may choose

From the step of data collection, there are two data set which as input into WEKA as a training set and test set by number of the data are 304 and 255 consequently (The data sets are shown the number of answers or parameters as in Appendix E). All of the answers in this questionnaire were used as parameter in classification of the data. For example, sex has the answer as female and male which were used as an parameter to classify the risk of disease as breast cancer etc.

4.2 Modeling the rule

In this study use WEKA as a tool to analyze. The training data set is input into WEKA then give output as rules the these rules are used in the next step to evaluate how accuracy and precision of the rules are (The methods of input and run information are explained in Appendix C).

4.3 Results

This section can divided as 2 parts in questionnaire and rule modeling.

4.3.1 Questionnaire

4.3.1.1 Developing online questionnaire by this tool is free and easy to use that allow user who don't know programming can use this tool as in this research.

4.3.1.2 The online questionnaire is limited in some function as login function that let users or subjects can easily access because they don't have to login.

4.3.1.3 The collected data from this questionnaire is in form of spreadsheet which is easy to manipulate.

4.3.1.4 The questions are both of indirect and direct questions that mean some questions introduce that how risk of the diseases. For example, if the question is "Do you have history of any diseases?" and if the users/subjects answer breast cancer that mean they are high risk. Or if the answer is as none of the question " Which one is related to your behavior" which the choices are smoking, inactivity, drink alcohol etc. doesn't mean that they have no risk of any disease but they have to combined the other questions together as history of any disease or family history.

4.3.2 Modeling the rule

From above that explain about two set of data which were input into WEKA can explained the results as

4.3.2.1 In collected data, some questions have many answers. The record will show all of the answers of that question such as if users/subjects answer diabetes, high blood pressure and obesity in the question of "Which problem do you have?". So researcher has to manually group and filter the data before prepare them as an input.

4.3.2.2 The probability of rules can be happen in high number due to how answer is. For example there are 10 questions and 4 choices in each questions but pattern of answer can be different as User A is a,b,c,d,a,b,c,d,a,b but User B is a,a,b,b,c,c,d,d,a,a etc.. Thus in this research, the rules are not all of the rules that can be happen but it just the rules which are created from answers of users or subjects.

4.3.2.3 The training set data were input into WEKA and the run information not only shown rules which had been happen but also the accuracy and the precision that were calculate by this tools (demonstrate in table 4.1 and 4.2).

After modeling the rules, these rules are test again by use another set of data or call test set data. This step was bring rules from first run information to apply with the test set data then the second run information shown the used rules, accuracy and precision (demonstrate in table 4.1 and 4.2).

Table 4.1 Demonstrate the statistics of training set and test set.

Classification	TP rate		FP rate		Precision	
	Training set	Test set	Training set	Test set	Training set	Test set
B	0.865	0.844	0.023	0.034	0.939	0.915
D	0.958	0.932	0.026	0.031	0.92	0.902
C	0.917	0.897	0.082	0.096	0.862	0.853
A	0.909	0.905	0	0.004	1	0.95

Table 4.2 Demonstrate the correctly and incorrectly classified instances of both data set

	Training set	Test set
Correctly Classified Instances	91.09%	88.98%
Incorrectly Classified Instances	8.91%	11.02%

4.3.2.4 The results of both data sets as in table 4.1 and 4.2 gave many statistics which are Correctly classify instance and incorrectly classify instance , TP rate , FP rate and precision (See in Appendix D). When comparing, the statistics of two data sets are closed and are in high accuracy and precision.

CHAPTER V
DISCUSSION

From the results, this study can discuss as 2 parts. One is about online questionnaire and the other is part of modeling the rules.

5.1 Questionnaire

Online questionnaire in this study was developed by use Google docs and Google sites which provided some tools for creating website and document. The contents of this questionnaire are about health screening information, diseases and questionnaire . By using this tool, the results can be discussed as below.

5.1.1 The questionnaire is as a content of health screening site. The contents in the site are a questionnaire, health screening package, risk of disease such lung cancer breast cancer.

5.1.2 Forms in questionnaire are drop down list, check box and text box.

5.1.3 This questionnaire is easy for researcher in developing. But for users/subject it is not comfortable because there is many questions if they would like to leave the questionnaire and do it again later, they have to redo from the first question. This effect to redundant of data because the answers are recorded even users/subjects didn't complete all of the question and also researcher don't know how often of accessing to the questionnaire by same users/subjects.

5.1.4 Most of people who come to have medical check-up or health screening check up is only some targets such educated people , wealthy or people who have a welfare or an assurance etc. so user or subjects who done this questionnaire are limited. Hence this questionnaire is proper for some population.

5.1.5 The questions used in this research are rather difficult for people because most of them are technical term. Thus subjects who did questionnaire might be not well understand and they might gave answers by mistake.

5.2 Modeling the rules by WEKA

5.2.1 From the results in chapter4 the statistics are in high accuracy and precision. When consideration the rules which show true positive (TP) and false positive (FP) behind, most of them are as 0 such as rule3 of example1 that mean no false positive and no false negative so this should be a very good rule. It doesn't mean that but because the number of population is rather small to calculate those statistics. In the same way, rule1 of example1 show the TP rate as 11.0 and FP rate as 3.0 that mean from 14 numbers of population the prediction is incorrect as 3 and it seem high in this condition. But it may cause of the same reason that number of the population is too small.

Example 1

Age = 26-40 year

| What cause(s) bring you to have check up program? = Annual check up

| | Sex = Female

| | | Please select which problem(s) do you have. = None

| | | | Please choose if which one relate to your behavior = None: B (11.0/3.0)

| | | | Please choose if which one relate to your behavior = Inactivity: C (3.0)

| | | | Please choose if which one relate to your behavior = InCh: B (0.0)

Interpretation :

Rule1 : if the cause of check up program is "Annual check up" and user is female who has no problem and related behavior(s) is "None" then this user choose health screening package B with 3 true positive.

Rule2 : if the cause of check up program is "Annual check up" and user is female who has no problem and related behavior(s) is "Inactivity" then this user choose health screening package C with 3 true positive and no false positive.

Rule3 : if the user is female who has no problem and related behavior(s) is "Inactivity, Certain chronic condition" then this user choose health screening package B with no true positive and no false positive.

For easily understanding the example1 can demonstrate as figure 5.1

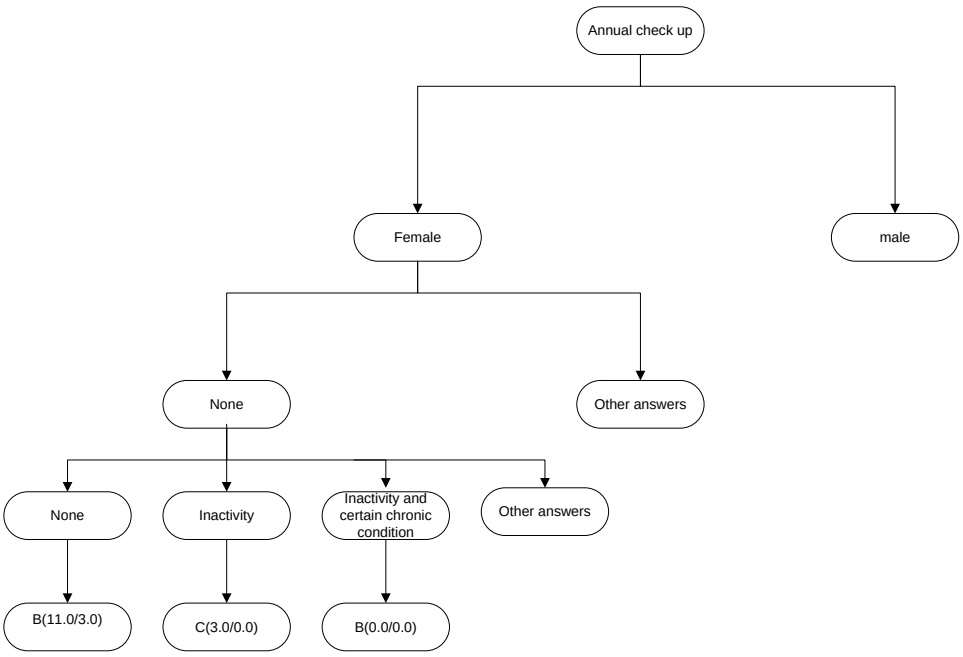


Figure 5.1 Demonstrate an example 1

5.2.2 From results in chapter4, the rules were made can be applied in creation or adaptation the medical examination in the packages such as example2.

Example2

Age = 61- 65 year

| Please choose if which one relate to your behavior = Inactivity

| | Is there anyone in your family have this or these problem(s) ? = High blood pressure: C (3.0)

This rule can be explained as if the patient or customer is in the age between 61-65 years and has inactivity behavior and member in the family has high blood pressure problem this customer will choose health screening C (in this study the true positive is 3 and the false positive is 0). The questions of this questionnaire

indicate risks of diseases that people may have such in this rule. It show that a user may has the risk of colon cancer and heart disease due to an inactivity behavior and high blood pressure due to member in the family has high blood pressure so the package C should include the examinations which can be diagnosis these conditions.

5.2.3 From run information, the rules from training set can be applied with the other data set because from comparing the results of both data they are very closed in statistics. But the data should be collected from the same target due to people characters as reason in 5.1.6.

5.2.4 The statistics in both run information are high precision and accuracy but if the other techniques and parameters of classification are replaced the results of run information may give different answers.

5.2.5 The rules in this study may be not good to apply because the population is not enough. The questionnaire in this research is nonspecific for any disease so the answer of the question may relate to several diseases such obesity is relate to risk of breast cancer, colon cancer, prostate cancer, heart disease, liver cancer or ovarian cancer etc..

CHAPTER VI
CONCLUSIONS AND RECOMMENDATION

6.1 Conclusions

This research study about classification of the relation of factors which may effect to patient decision in choosing of health screening packages. This research was divided for 2 parts as collection data via online question and classify data.

First part is the step of data collection, the questionnaire about health was created by use free tool as Google docs then sent it via online system. Then the completed questionnaires were stored in form of spreadsheet. This step had done for two times due to the step of data classification. This questionnaire is suitable for specific target because not all of people will have medical/health screening check-up for example such wealthy, education or welfare etc.. After gathering data , the data had filter to get rid of useless data such redundant data or uncompleted data etc. to prepare or clean data before classification step.

The second one is to classify the data by use "WEKA" as a tool. The 2 collection data which had been gathered were as an input. The first collection data was training set data and the other one was test set data. Training set data was run by WEKA then gave information of rules and statistics as correctly classified instance, incorrectly classified instance , TP rate and FP rate etc.. Then the test set data was also run by WEKA under the rules which were modeled from training set data. Run information from test set data gave type of statistics as run information from training set data the these value were compared. Results of both run information are demonstrated that they are very closed, the rules are high precision and accuracy and can be applied with another data sets which are similar characteristics of population or target.

6.2 Recommendation

6.2.1. Questionnaire

6.2.1.1 The online questionnaire should develop to be the program which can give the results to the patient when they completed the questionnaire such the proper health screening package for each user or the risk of any disease or condition that they may get.

6.2.1.2 Questions used for questionnaire should be adjusted to apply with all of targets.

6.2.1.3 The questionnaire which compose of many technical terms may make an unclear for the people who did. Thus the better way in gathering data is oral conversation because researcher can explain to make subjects understand an object of each questions.

6.2.2. Classification

Another techniques or parameters of the analyzing step should be try if it give more information or better rules or not.

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APPENDICES

APPENDIX A

From chapter4, there are collection data which had been group manually before input into WEKA. The data were group because some questions in questionnaire have many choices and can select many answers such some questions had 2 answer or more. So they had to filter the data which are the same groups before input them into WEKA . From the results in this study can group the questions with multiple answers as the table below.

A. The group of answer of question “Please choose if which one relate to your behavior “.

Table 1a

Answer	Group name
Dringing alcohol, Inactivity	AcIn
Dringing alcohol, Stress	AcStr
Inactivity, Certain chronic condition	InCh
Inactivity, Stress	InStr
Smoking, Dringing alcohol	SmAc
Smoking, Inactivity	SmIn
Smoking, Stress	SmStr
Dringing alcohol, Inactivity, Certain chronic condition	AcInCh
Dringing alcohol, Inactivity, Stress	AcInStr
Inactivity, Stress, Certain chronic condition	InStrCh
Smoking, Dringing alcohol, Inactivity	SmAcIn
Smoking, Dringing alcohol, Stress	SMAcStr
Smoking, Inactivity, Certain chronic condition	SmInCh
Smoking, Inactivity, Stress	SmInStr

B. The group of answer of question "Please select which problem(s) do you have.".

Table 2a

Answer	Group name
Control of salt, Kidney disease	SltK
High blood pressure or hypertension, Control of salt	HtSlt
High blood pressure or hypertension, Insulin resistant	HtDm
High blood pressure or hypertension, Kidney disease	HtK
High blood pressure or hypertension, Post menopausal hormone therapy	HtHr
High cholesterol, Blockages in the blood vessels in your arms or legs (peripheral artery disease)	HclPad
High cholesterol, High blood pressure or hypertension	HclHt
High cholesterol, Non alcoholic fatty liver disease	HclFl
High cholesterol, Post menopausal hormone therapy	HclHr
Insulin resistant, Post menopausal hormone therapy	DmHr
Non alcoholic fatty liver disease, Blockages in the blood vessels in your arms or legs (peripheral artery disease)	FlPad
Non alcoholic fatty liver disease, Have sexual transmitted disease	FlSex
Obesity, High cholesterol	ObHcl
Obesity, Non alcoholic fatty liver disease	ObFl
High blood pressureor hypertension, Insulin resistant, Post menopausal hormone therapy	HtDmHr
High blood pressureor hypertension, Non alcoholic fatty liver disease, Insulin resistant	HtFlDm
Obesity, High blood pressureor hypertension, Insulin resistant	ObHtDm
Obesity, High blood pressureor hypertension, Non alcoholic fatty liver disease	ObHtFl
Obesity, High cholesterol, High blood pressureor hypertension	ObHclHt
Obesity, Non alcoholic fatty liver disease, Insulin resistant	ObFlDm

Answer	Group name
Obesity, High cholesterol, Non alcoholic fatty liver disease	ObHclFl
High blood pressureor hypertension, Insulin resistant, Control of salt, Heart failure, Kidney disease	HtDmSltHrtK
High blood pressure or hypertension, Prediabetes, Heart failure, Post menopausal hormone therapy	HtPdmHrtHr
High cholesterol, High blood pressure or hypertension, Non alcoholic fatty liver disease, Blockages in the blood vessels in your arms or legs (peripheral artery disease)	HclHtFlPad
Insulin resistant, Control of salt, Heart failure, Kidney disease	DmSltHrtK
Obesity, High cholesterol, High blood pressure or hypertension, Non alcoholic fatty liver disease, Insulin resistant	ObHclHtFlDm
Obesity, High cholesterol, High blood pressure or hypertension, Control of salt, Kidney disease	ObHclHtSltK
Obesity, High cholesterol, High blood pressure or hypertension, Non alcoholic fatty liver disease, Insulin resistant, Post menopausal hormone therapy	ObHclHtFlDmHr
Obesity, High cholesterol, High blood pressure or hypertension, Insulin resistant, Control of salt, Kidney disease, Blockages in the blood vessels in your arms or legs (peripheral artery disease)	ObHclHtDmSltKPad

C. The group of answer of question “Have you ever had these conditions? “.

Table 3a

Answer	Group name
Chronic infection of Hepatitis C, Cirrhosis	HepcCir

D. The group of answer of question “Is there anyone in your family have this or these problem(s) ? “.

Table 4a

Answer	Group name
Breast cancer, Colon cancer	BrCo
Colon cancer, Prostate cancer	CoPro
High blood pressure, Breast cancer	HtBr
High blood pressure, Breast cancer, Colon cancer	HtBrCo
High blood pressure, Breast cancer, Colorectal polyp	HtBrCp
High blood pressure, Breast cancer, Prostate cancer	HtBrPro
High blood pressure, Colon cancer	HtCo
High blood pressure, Colorectal polyp	HtCp
High blood pressure, Prostate cancer	HtPro

E. The group of answer of question “What cause(s) bring you to have check up program? “.

Table 5a

Answer	Group name
Annual check up, Personal concern	APe
Annual check up, Personal concern, Promotion	APm
Annual check up, Promotion	APm
Annual check up, Welfare	AW
Annual check up, Welfare, Promotion	AWPm
Personal concern, Promotion	PePm
Welfare, Personal concern	Wpe
Welfare, Promotion	WPm

APPENDIX B
HEALTH SCREENING QUESTIONNAIRE

General question

1. Sex
    - Male
    - Female

2. Age
    - Under 25
    - 26- 40 year
    - 41-50 year
    - 51- 55 year
    - 56- 65 year
    - over 66 year

3. Race
    - Arabic
    - American
    - African
    - Asian
    - Europe

4. E-mail address

Personal information and history of medication

5. Please choose if which one relate to your behavior *
    - Smoking
    - Drinking alcohol
    - Inactivity
    - Stress
    - Certain chronic condition
    - None

6. Please select which problem(s) do you have. *
    - Obesity
    - High cholesterol
    - High blood pressure/ hypertension
    - Non alcoholic fatty liver disease
    - Prediabetes
    - Insulin resistant
    - History of gestational diabetes
    - Vitamin D less
    - Control of salt
    - Heart failure
    - Liver disease
    - Kidney disease
    - Post menopausal hormone therapy
    - HIV positive
    - Have sexual transmitted disease
    - Blockages in the blood vessels in your arms or legs (peripheral artery disease).
    - None

7. Have you ever had these conditions? *
    - Inflammatory intestinal conditions
    - Colon polyp
    - Chronic infection of Hepatiti B
    - Chronic infection of Hepatitis C
    - Cirrhosis
    - Inherited liver disease
    - Colon cancer
    - Breast cancer
    - Ovarian cancer
    - Were born to a woman with a hepatitis C infection
    - None

8. Have you had medical treatment as below ? *
    - Receive clotting-factor concentrates for hemophilia
    - Received a blood transfusion or organ transplant before 1992
    - Received clotting factor concentrates before 1987
    - Received hemodialysis treatments for a long period of time
    - Being hospitalized, especially for a serious condition that requires intensive care
    - No

Family history

9. Is there anyone in your family have this/these problem(s) ? *
    - High blood pressure
    - Breast cancer
    - Colon cancer
    - Prostate cancer
    - Colorectal polyp
    - None

Sexual information

10. Which age do you start menarch ? *
    - Under 12 years
    - < 13 years
    - I am a man.

11. How old were you when you have first child? *
    - Under 35
    - Over 35
    - No children
    - I am a man.

12. How old were you when you were menopause ? *
    - Under 55
    - Over 55
    - Not yet menopause
    - I am a man.

13. How old when you have sexual relation ? *
    - Under 18
    - Over 18
    - Never

14. Do you have sexual partners more than one ? *
    - Yes
    - No
    - I have no partner.

15. Are you man who has sexual relation with man ? *
    - Yes
    - No

16. Are you man who has unprotect sexual relation with man ? *
    - Yes
    - No

Other factors

17. Did you ever have radiation ? *
    - No
    - Yes, at the chest.
    - Yes, at the abdomen.

18. Have you had exposure to aflatoxin? *
    - Yes
    - No

19. Have you use illicit drug? *
    - Yes
    - No

20. Have you ever shared needles during intravenous (IV) drug use ? *
    - Yes
    - No

21. Please check whether you live with this/these person *
    - Hepatitis A
    - Hepatitis B
    - Healthy

22. Have you travel or work in regions with high rates of disease(s) ? *
    - Hepatitis A
    - Hepatitis B
    - None

23. Do you have chance to be exposed with virus? *
    - Yes
    - No

24. Do you have a chance to expose to human blood ? *
    - Yes
    - No

25. What cause(s) bring you to have check up progam? *
    - Annual check up
    - Welfare
    - Personal concern
    - Promotion

26. Which package will you choose? *
    - A
    - B
    - C
    - D

Table 1b Demonstrate details of health screening package

Examination	A	B		C		D	
		Male	Female	Male	Female	Male	Female
Vital Signs and Physical Examination	●	●	●	●	●	●	●
Imaging							
Chest X-Ray	●	●	●	●	●	●	●
Ultrasound whole abdomen		●	●	●	●	●	●
Digital Mammogram with Ultrasound Breast					●		●
Eye Test							
						●	●
Heart							
Electrocardiogram (EKG)		●	●	●	●	●	●
Exercise Stress Test (EST)				●	●	●	●
Gynecology							
PV & Pap Test (Liquid based)			●		●		●
Lab Test							
Complete Blood Count (CBC)	●	●	●	●	●	●	●
Blood group ABO						●	●
Blood Group Rh						●	●
Thalasemia Screening (Hb Typing)						●	●
Fasting blood sugar	●	●	●	●	●	●	●
Hepatitis A Screening - Anti HAV (total)						●	●
Hepatitis B Screening - HBsAg		●	●	●	●	●	●
Hepatitis B Screening - Anti HBs		●	●	●	●	●	●
Hepatitis B Screening - Anti HBc						●	●
Hepatitis C Screening - Anti HCV		●	●	●	●	●	●
Kidney Function Test - Bun				●	●	●	●
Kidney Function Test - Creatinine	●	●	●	●	●	●	●
Liver Function Test - SGOT				●	●	●	●
Liver Function Test - SGPT	●	●	●	●	●	●	●
Liver Function Test - Alk Phosphatase		●	●	●	●	●	●
Liver Function Test - Gamma GT						●	●
Liver Function Test - Bilirubin (Total Bilirubin, Direct Bilirubin)						●	●
Liver Function Test - Albumin						●	●
Uric Acid	●	●	●	●	●	●	●
Urine Examination	●	●	●	●	●	●	●
Lipid Profile - Cholesterol, HDL-c, Triglyceride, LDL-c (Direct)	●	●	●	●	●	●	●
Prostate Specific Antigen (PSA)						●	
AFP - Liver Cancer						●	●
CEA - GI Cancer						●	●
CA 19-9 - Pancreas Cancer						●	●
CA 125 - Ovarian Cancer							●
Thyroid Function Test - FT4 & TSH						●	●
Urine Exam	●	●	●	●	●	●	●
Stool Exam	●	●	●	●	●	●	●

APPENDIX C
WEKA

This chapter explain how to input data into WEKA and run the rules then calculate an accuracy and precision. The steps are as below.

1.Training set

A. Data input

a. Open WEKA then choose explorer bottom.

Figure 1c

b. Click open file and select the training set file from directory then select classify tab.

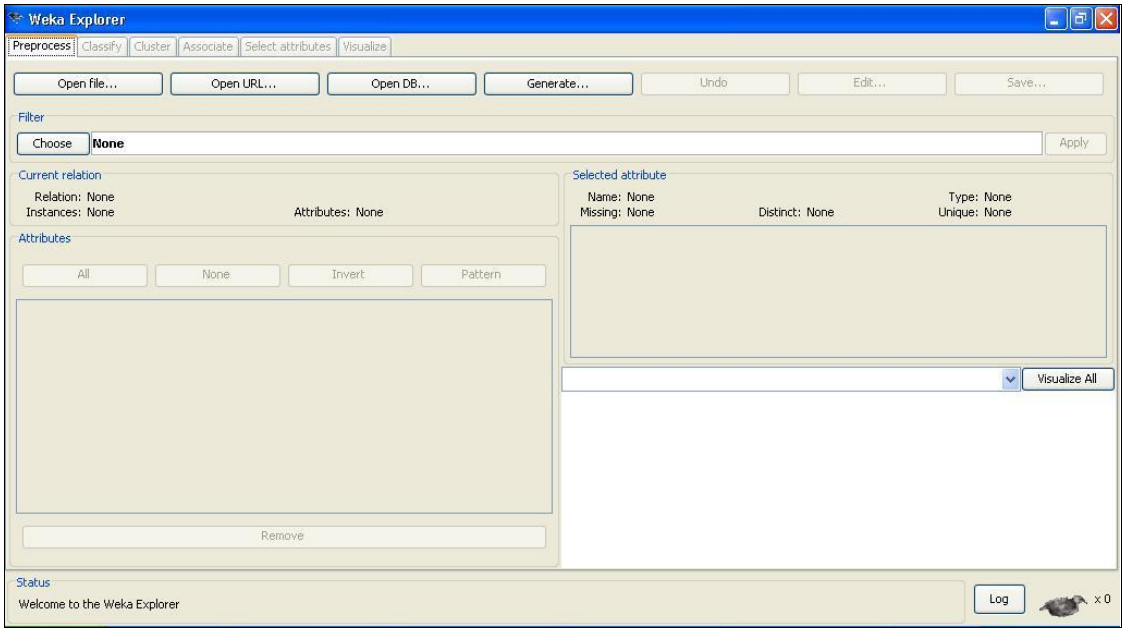

Figure 2c

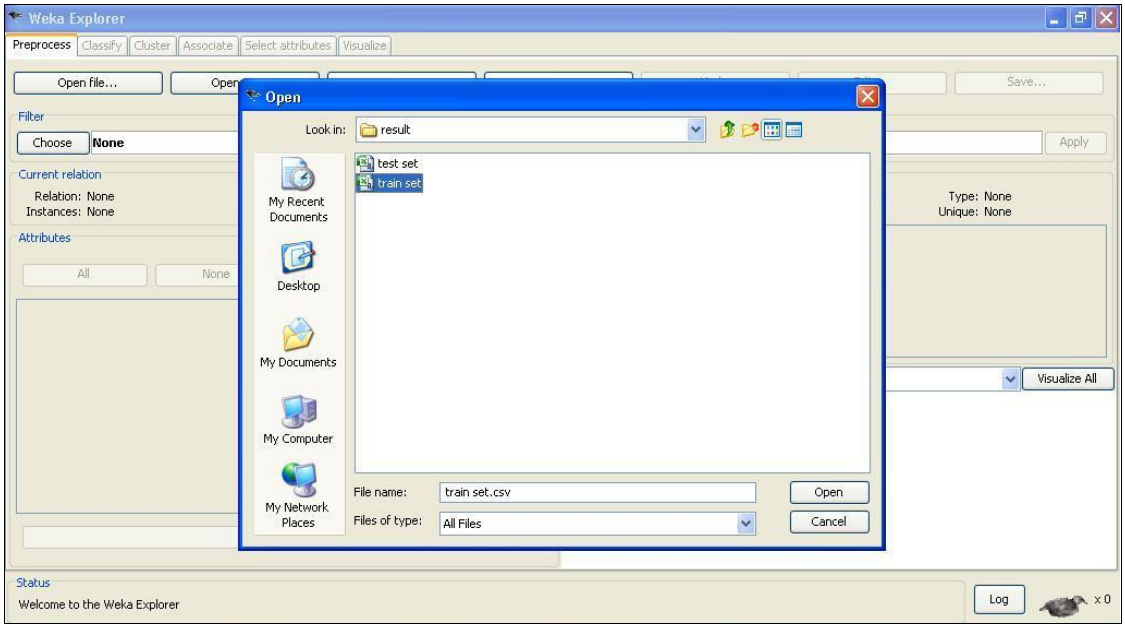

Figure 3c

c. Select the class which will be classified from drop down list box.

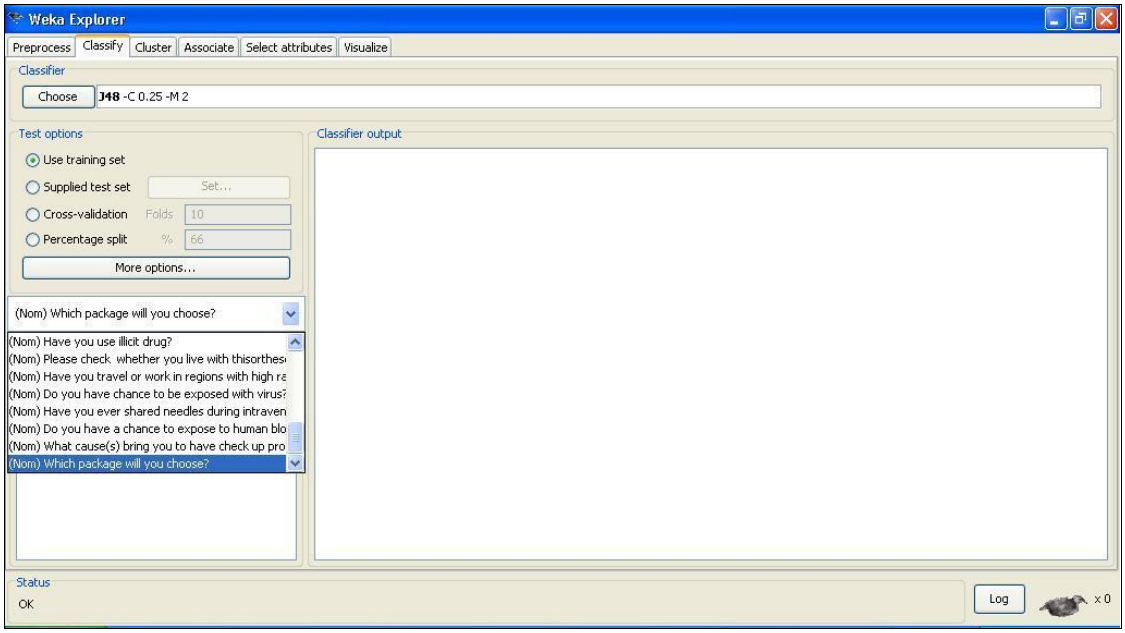

Figure 4c

d. Choose classifier by click on choose button then select subfolder tree and select J48.

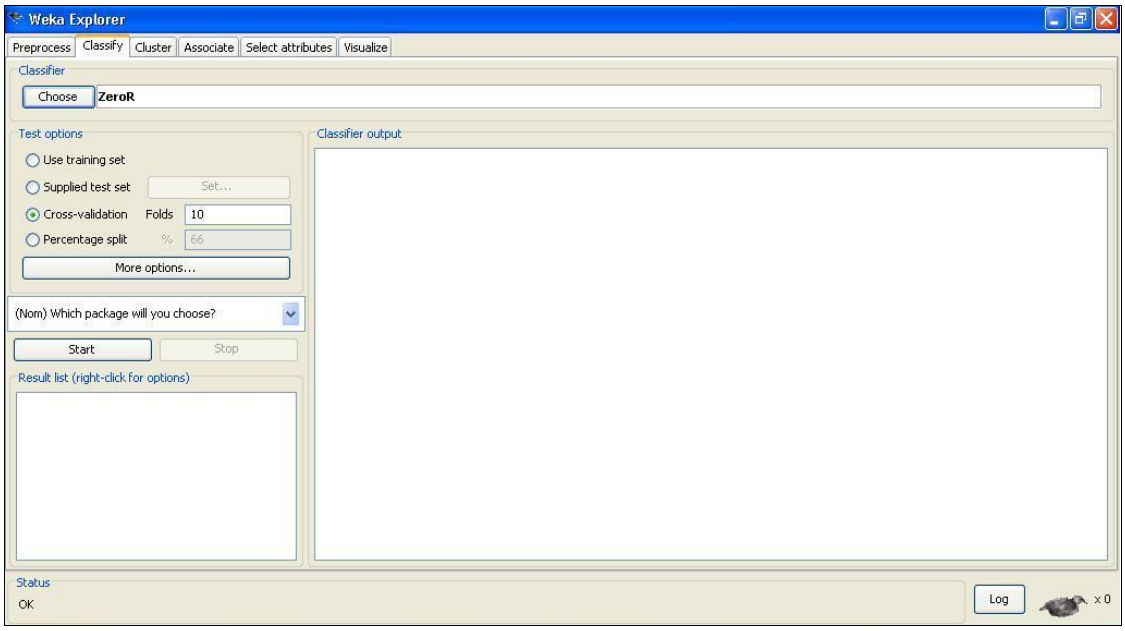

Figure 5c

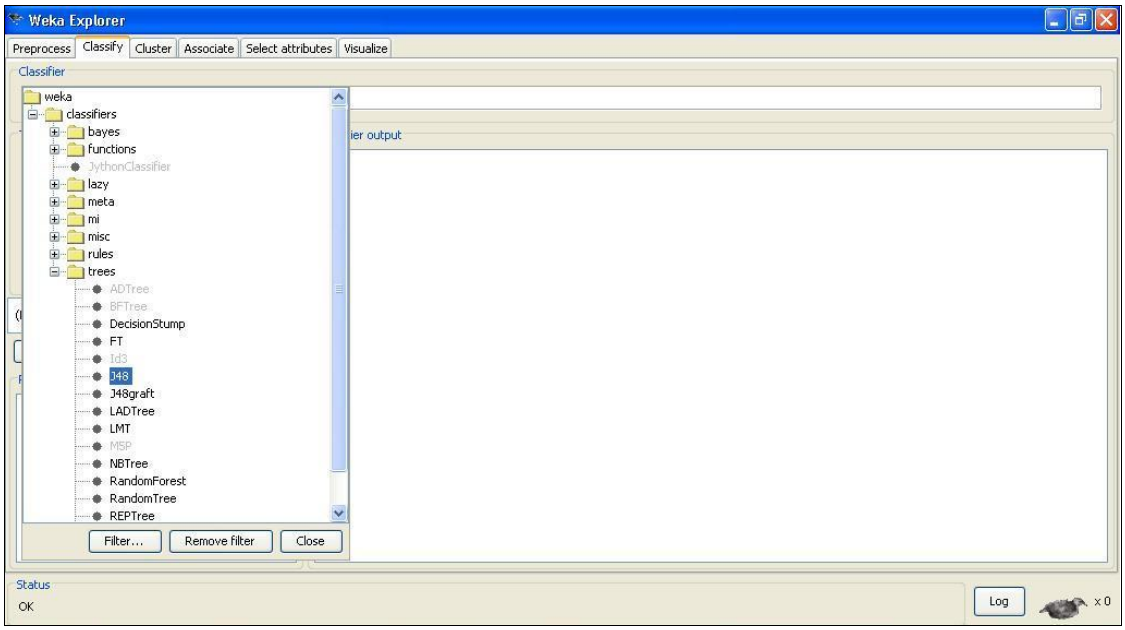

Figure 6c

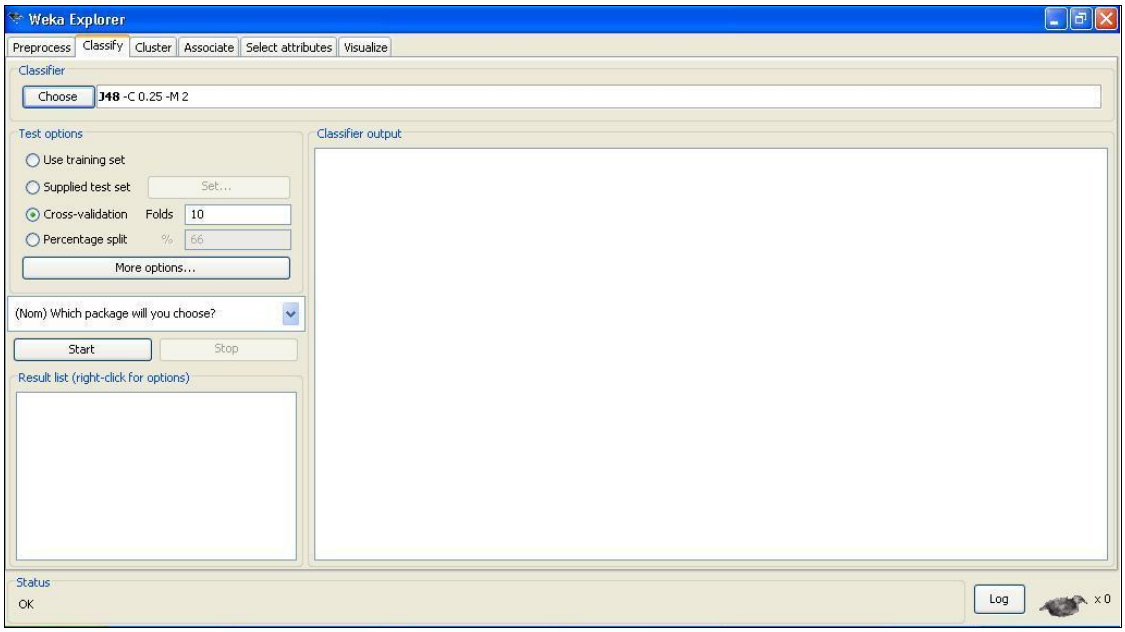

Figure 7c

e. Set parameter by click the box right to a choose button by use parameters as in figure C8.

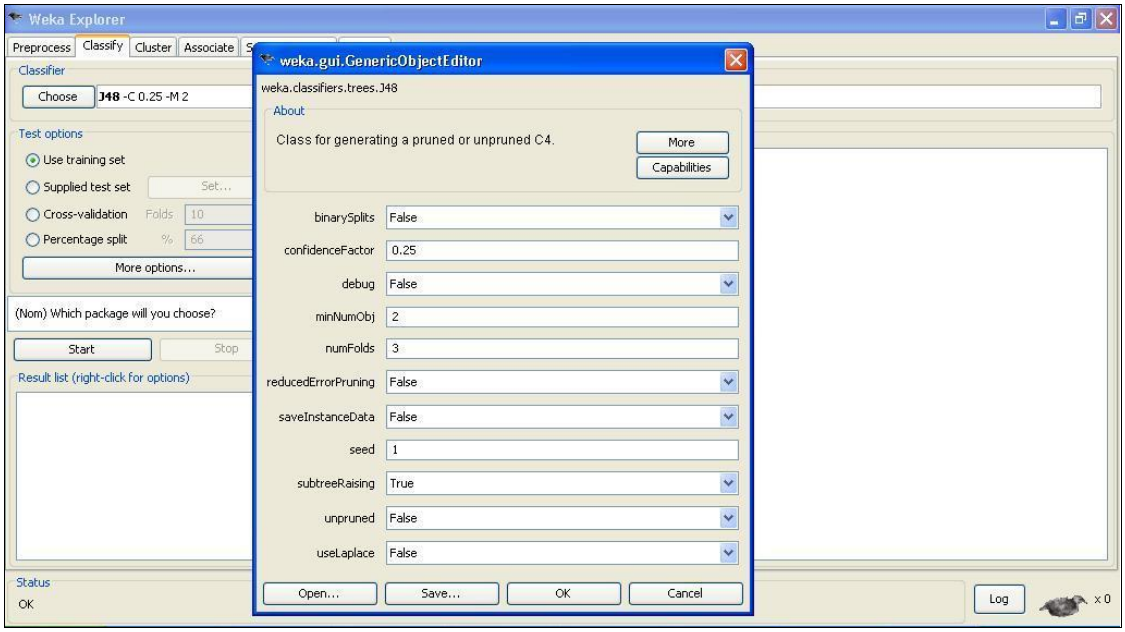

Figure 8c

f. Select test option as "Use training set" then click start to run information.

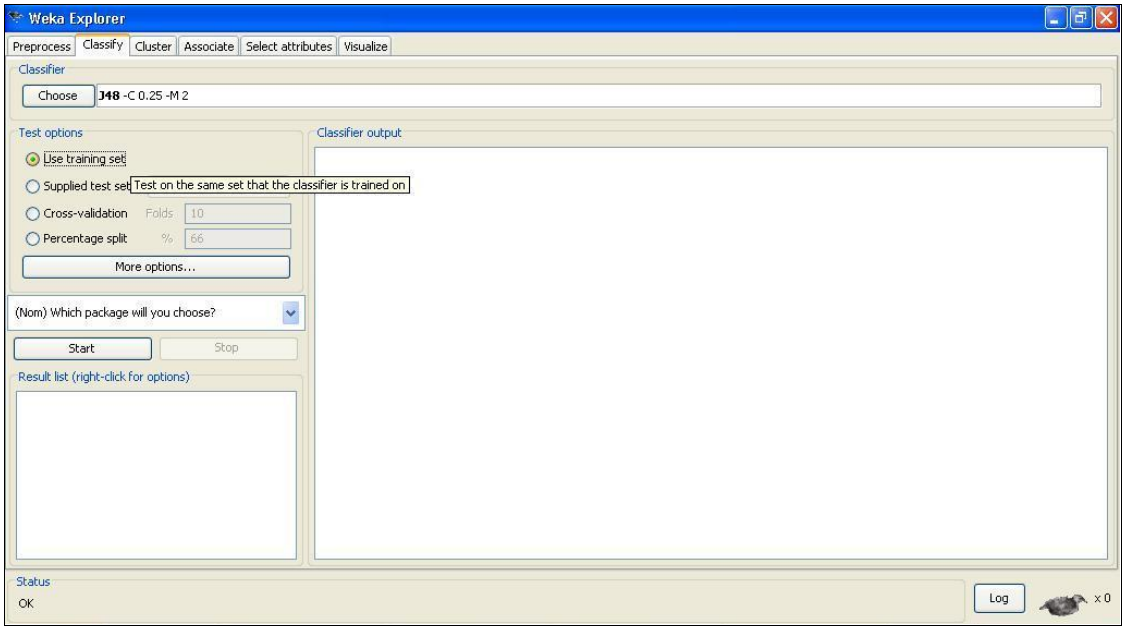

Figure 9c

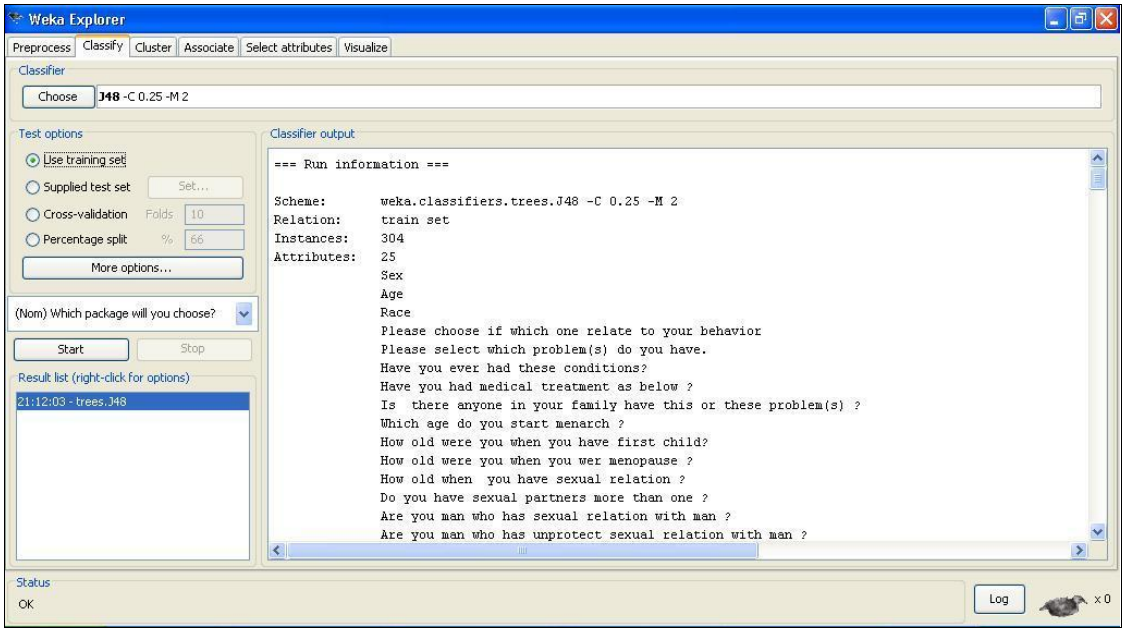

Figure 10c

B. Data output

From run information the output is shown as below.

=== Run information ===

Scheme: weka.classifiers.trees.J48 -C 0.25 -M 2

Relation: test1

Instances: 304

Attributes: 25

Sex

Age

Race

Please choose if which one relate to your behavior

Please select which problem(s) do you have.

Have you ever had these conditions?

Have you had medical treatment as below ?

Is there anyone in your family have this or these problem(s) ?

Which age do you start menarch ?

How old were you when you have first child?
How old were you when you wer menopause ?
How old when you have sexual relation ?
Do you have sexual partners more than one ?
Are you man who has sexual relation with man ?
Are you man who has unprotect sexual relation with man ?
Did you ever have radiation ?
Have you had exposure to aflatoxin?
Have you use illicit drug?
Please check whether you live with thisorthese person
Have you travel or work in regions with high rates of disease(s) ?
Do you have chance to be exposed with virus?
Have you ever shared needles during intravenous (IV) drug use ?
Do you have a chance to expose to human blood ?
What cause(s) bring you to have check up progam?
Which package will you choose?

Test mode: evaluate on training data

=== Classifier model (full training set) ===

J48 pruned tree

Age = 26-40 year
| What cause(s) bring you to have check up progam? = Annual check up
| | Sex = Female
| | | Please select which problem(s) do you have. = None
| | | | Please choose if which one relate to your behavior = None: B (11.0/3.0)
| | | | Please choose if which one relate to your behavior = Inactivity: C (3.0)
| | | | Please choose if which one relate to your behavior = InCh: B (0.0)
| | | | Please choose if which one relate to your behavior = SmAc: B (0.0)
| | | | Please choose if which one relate to your behavior = InStr: B (0.0)

| | | | Please choose if which one relate to your behavior = Certain chronic condition: B (0.0)
| | | | Please choose if which one relate to your behavior = SmIn: B (0.0)
| | | | Please choose if which one relate to your behavior = Stress: B (0.0)
| | | | Please choose if which one relate to your behavior = Smoking: B (0.0)
| | | | Please choose if which one relate to your behavior = Dringing alcohol: B (0.0)
| | | | Please choose if which one relate to your behavior = SmInStr: B (0.0)
| | | | Please choose if which one relate to your behavior = AcStr: B (0.0)
| | | | Please choose if which one relate to your behavior = SmInCh: B (0.0)
| | | | Please choose if which one relate to your behavior = AcIn: B (0.0)
| | | | Please choose if which one relate to your behavior = SmAcIn: B (0.0)
| | | | Please choose if which one relate to your behavior = AcInStr: B (0.0)
| | | | Please choose if which one relate to your behavior = InStrCh: B (0.0)
| | | | Please choose if which one relate to your behavior = SmStr: B (0.0)
| | | | Please choose if which one relate to your behavior = SMAcStr: B (0.0)
| | | | Please choose if which one relate to your behavior = AcInCh: B (0.0)
| | | Please select which problem(s) do you have. = Obesity: B (0.0)
| | | Please select which problem(s) do you have. = ObHclHtFlDm: B (0.0)
| | | Please select which problem(s) do you have. = ObHclHtFlDmHr: B (0.0)
| | | Please select which problem(s) do you have. = ObFl: C (3.0)
| | | Please select which problem(s) do you have. = Post menopausal hormone therapy: B (0.0)
| | | Please select which problem(s) do you have. = ObHclFl: C (3.0)
| | | Please select which problem(s) do you have. = HtHr: B (0.0)
| | | Please select which problem(s) do you have. = ObHclHtDmSltKPad: B (0.0)
| | | Please select which problem(s) do you have. = HtDm: B (0.0)
| | | Please select which problem(s) do you have. = HtDmHr: B (0.0)
| | | Please select which problem(s) do you have. = Liver disease: B (0.0)
| | | Please select which problem(s) do you have. = Have sexual transmitted disease: C (3.0)

| | | Please select which problem(s) do you have. = History of gastational diabetes: B (3.0)

| | | Please select which problem(s) do you have. = Non alcoholic fatty liver disease: B (3.0)

| | | Please select which problem(s) do you have. = ObHtDm: B (0.0)

| | | Please select which problem(s) do you have. = ObHtFl: B (3.0)

| | | Please select which problem(s) do you have. = ObHclHt: B (0.0)

| | | Please select which problem(s) do you have. = FlSex: B (0.0)

| | | Please select which problem(s) do you have. = HtPdmHrtHr: B (0.0)

| | | Please select which problem(s) do you have. = HtK: B (0.0)

| | | Please select which problem(s) do you have. = DmHr: B (0.0)

| | | Please select which problem(s) do you have. = High cholesterol: B (0.0)

| | | Please select which problem(s) do you have. = HclHr: B (0.0)

| | | Please select which problem(s) do you have. = HclHt: B (0.0)

| | | Please select which problem(s) do you have. = Kidney disease: B (0.0)

| | | Please select which problem(s) do you have. = ObFlDm: B (0.0)

| | | Please select which problem(s) do you have. = High blood pressureor hypertension: B (0.0)

| | | Please select which problem(s) do you have. = Prediabetes: B (0.0)

| | | Please select which problem(s) do you have. = HclFl: B (0.0)

| | | Please select which problem(s) do you have. = ObHcl: B (0.0)

| | | Please select which problem(s) do you have. = HtFlDm: B (0.0)

| | | Please select which problem(s) do you have. = High blood pressureor hypertension, DmSltHrtK: B (0.0)

| | | Please select which problem(s) do you have. = HclHtFlPad: B (0.0)

| | | Please select which problem(s) do you have. = SltK: B (0.0)

| | | Please select which problem(s) do you have. = HclPad: B (0.0)

| | | Please select which problem(s) do you have. = DmSltHrtK: B (0.0)

| | | Please select which problem(s) do you have. = ObHclHtSltK: B (0.0)

| | | Please select which problem(s) do you have. = FlPad: B (0.0)

| | | Please select which problem(s) do you have. = HtSlt: B (0.0)

| | | Please select which problem(s) do you have. = HtDm, SltK: B (0.0)

| | | Please select which problem(s) do you have. = HIV positive: B (0.0)
| | Sex = Male: B (15.0)
| What cause(s) bring you to have check up progam? = APe
| | Do you have sexual partners more than one ? = No: C (8.0)
| | Do you have sexual partners more than one ? = I have no partner.: C (0.0)
| | Do you have sexual partners more than one ? = Yes: B (3.0)
| What cause(s) bring you to have check up progam? = APm
| | Please choose if which one relate to your behavior = None: B (3.0)
| | Please choose if which one relate to your behavior = Inactivity: B (0.0)
| | Please choose if which one relate to your behavior = InCh: B (0.0)
| | Please choose if which one relate to your behavior = SmAc: B (0.0)
| | Please choose if which one relate to your behavior = InStr: B (0.0)
| | Please choose if which one relate to your behavior = Certain chronic condition: B (0.0)
| | Please choose if which one relate to your behavior = SmIn: B (0.0)
| | Please choose if which one relate to your behavior = Stress: C (3.0)
| | Please choose if which one relate to your behavior = Smoking: B (0.0)
| | Please choose if which one relate to your behavior = Dringing alcohol: B (0.0)
| | Please choose if which one relate to your behavior = SmInStr: B (0.0)
| | Please choose if which one relate to your behavior = AcStr: B (0.0)
| | Please choose if which one relate to your behavior = SmInCh: B (0.0)
| | Please choose if which one relate to your behavior = AcIn: B (0.0)
| | Please choose if which one relate to your behavior = SmAcIn: B (0.0)
| | Please choose if which one relate to your behavior = AcInStr: B (0.0)
| | Please choose if which one relate to your behavior = InStrCh: B (0.0)
| | Please choose if which one relate to your behavior = SmStr: D (1.0)
| | Please choose if which one relate to your behavior = SMAcStr: B (0.0)
| | Please choose if which one relate to your behavior = AcInCh: B (0.0)
| What cause(s) bring you to have check up progam? = AW
| | Sex = Female: C (3.0)
| | Sex = Male: B (3.0)
| What cause(s) bring you to have check up progam? = AWPm: C (3.0)

| What cause(s) bring you to have check up progam? = Personal concern
| | Have you ever shared needles during intravenous (IV) drug use ? = No: B (7.0/1.0)
| | Have you ever shared needles during intravenous (IV) drug use ? = Yes: A (3.0)
| What cause(s) bring you to have check up progam? = PePm: B (0.0)
| What cause(s) bring you to have check up progam? = Promotion
| | Please select which problem(s) do you have. = None: A (3.0)
| | Please select which problem(s) do you have. = Obesity: B (0.0)
| | Please select which problem(s) do you have. = ObHclHtFlDm: B (0.0)
| | Please select which problem(s) do you have. = ObHclHtFlDmHr: B (0.0)
| | Please select which problem(s) do you have. = ObFl: B (0.0)
| | Please select which problem(s) do you have. = Post menopausal hormone therapy: B (0.0)
| | Please select which problem(s) do you have. = ObHclFl: B (0.0)
| | Please select which problem(s) do you have. = HtHr: B (0.0)
| | Please select which problem(s) do you have. = ObHclHtDmSltKPad: B (0.0)
| | Please select which problem(s) do you have. = HtDm: B (0.0)
| | Please select which problem(s) do you have. = HtDmHr: B (0.0)
| | Please select which problem(s) do you have. = Liver disease: B (0.0)
| | Please select which problem(s) do you have. = Have sexual transmitted disease: B (0.0)
| | Please select which problem(s) do you have. = History of gastational diabetes: B (0.0)
| | Please select which problem(s) do you have. = Non alcoholic fatty liver disease: B (0.0)
| | Please select which problem(s) do you have. = ObHtDm: B (0.0)
| | Please select which problem(s) do you have. = ObHtFl: B (0.0)
| | Please select which problem(s) do you have. = ObHclHt: B (0.0)
| | Please select which problem(s) do you have. = FlSex: B (0.0)
| | Please select which problem(s) do you have. = HtPdmHrtHr: B (0.0)
| | Please select which problem(s) do you have. = HtK: B (0.0)
| | Please select which problem(s) do you have. = DmHr: B (0.0)

| | Please select which problem(s) do you have. = High cholesterol: B (3.0)
| | Please select which problem(s) do you have. = HclHr: B (0.0)
| | Please select which problem(s) do you have. = HclHt: B (0.0)
| | Please select which problem(s) do you have. = Kidney disease: B (0.0)
| | Please select which problem(s) do you have. = ObFlDm: B (0.0)
| | Please select which problem(s) do you have. = High blood pressureor hypertension: B (0.0)
| | Please select which problem(s) do you have. = Prediabetes: B (0.0)
| | Please select which problem(s) do you have. = HclFl: B (0.0)
| | Please select which problem(s) do you have. = ObHcl: B (0.0)
| | Please select which problem(s) do you have. = HtFlDm: B (0.0)
| | Please select which problem(s) do you have. = High blood pressureor hypertension, DmSltHrtK: B (0.0)
| | Please select which problem(s) do you have. = HclHtFlPad: B (0.0)
| | Please select which problem(s) do you have. = SltK: B (0.0)
| | Please select which problem(s) do you have. = HclPad: B (0.0)
| | Please select which problem(s) do you have. = DmSltHrtK: B (0.0)
| | Please select which problem(s) do you have. = ObHclHtSltK: B (0.0)
| | Please select which problem(s) do you have. = FlPad: B (0.0)
| | Please select which problem(s) do you have. = HtSlt: B (0.0)
| | Please select which problem(s) do you have. = HtDm, SltK: B (0.0)
| | Please select which problem(s) do you have. = HIV positive: B (0.0)
| What cause(s) bring you to have check up progam? = Welfare: A (6.0)
| What cause(s) bring you to have check up progam? = Wpe: B (3.0)
| What cause(s) bring you to have check up progam? = WPm: C (6.0)
Age = 51 - 60 year
| Please choose if which one relate to your behavior = None: C (7.0/1.0)
| Please choose if which one relate to your behavior = Inactivity: D (12.0/1.0)
| Please choose if which one relate to your behavior = InCh: D (0.0)
| Please choose if which one relate to your behavior = SmAc: C (4.0)
| Please choose if which one relate to your behavior = InStr: D (0.0)

| Please choose if which one relate to your behavior = Certain chronic condition: D (3.0)
| Please choose if which one relate to your behavior = SmIn: C (3.0)
| Please choose if which one relate to your behavior = Stress: D (0.0)
| Please choose if which one relate to your behavior = Smoking: C (6.0/1.0)
| Please choose if which one relate to your behavior = Dringing alcohol: D (3.0)
| Please choose if which one relate to your behavior = SmInStr: D (0.0)
| Please choose if which one relate to your behavior = AcStr: D (0.0)
| Please choose if which one relate to your behavior = SmInCh: D (0.0)
| Please choose if which one relate to your behavior = AcIn: D (5.0)
| Please choose if which one relate to your behavior = SmAcIn: D (0.0)
| Please choose if which one relate to your behavior = AcInStr: D (0.0)
| Please choose if which one relate to your behavior = InStrCh: D (3.0)
| Please choose if which one relate to your behavior = SmStr: D (0.0)
| Please choose if which one relate to your behavior = SMAcStr: D (0.0)
| Please choose if which one relate to your behavior = AcInCh: D (0.0)
Age = 41- 50 year
| Have you had medical treatment as below ? = No: C (52.0/13.0)
| Have you had medical treatment as below ? = Being hospitalized, especially for a serious condition that requires intensive care
| | Please choose if which one relate to your behavior = None: B (5.0)
| | Please choose if which one relate to your behavior = Inactivity: B (0.0)
| | Please choose if which one relate to your behavior = InCh: B (0.0)
| | Please choose if which one relate to your behavior = SmAc: B (0.0)
| | Please choose if which one relate to your behavior = InStr: B (0.0)
| | Please choose if which one relate to your behavior = Certain chronic condition: B (0.0)
| | Please choose if which one relate to your behavior = SmIn: B (0.0)
| | Please choose if which one relate to your behavior = Stress: B (0.0)
| | Please choose if which one relate to your behavior = Smoking: A (3.0)
| | Please choose if which one relate to your behavior = Dringing alcohol: B (0.0)
| | Please choose if which one relate to your behavior = SmInStr: B (0.0)

| | Please choose if which one relate to your behavior = AcStr: B (0.0)
| | Please choose if which one relate to your behavior = SmInCh: B (0.0)
| | Please choose if which one relate to your behavior = AcIn: B (0.0)
| | Please choose if which one relate to your behavior = SmAcIn: B (0.0)
| | Please choose if which one relate to your behavior = AcInStr: B (0.0)
| | Please choose if which one relate to your behavior = InStrCh: B (0.0)
| | Please choose if which one relate to your behavior = SmStr: B (0.0)
| | Please choose if which one relate to your behavior = SMAcStr: B (0.0)
| | Please choose if which one relate to your behavior = AcInCh: B (0.0)
| Have you had medical treatment as below ? = Received hemodialysis treatments for a long period of time: B (2.0)
| Have you had medical treatment as below ? = Received a blood transfusion or organ transplant before 1992, Received hemodialysis treatments for a long period of time: C (0.0)
Age = 61- 65 year
| Please choose if which one relate to your behavior = None: D (3.0)
| Please choose if which one relate to your behavior = Inactivity
| | Is there anyone in your family have this or these problem(s) ? = High blood pressure: C (3.0)
| | Is there anyone in your family have this or these problem(s) ? = Breast cancer: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = Colon cancer: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = HtBr: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = HtBrCo: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = HtBrCp: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = HtCo: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = HtCp: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = None: D (9.0)
| | Is there anyone in your family have this or these problem(s) ? = HtBrPro: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = BrCo: D (0.0)

| | Is there anyone in your family have this or these problem(s) ? = Colorectal polyp: D (0.0)

| | Is there anyone in your family have this or these problem(s) ? = HtPro: D (0.0)

| | Is there anyone in your family have this or these problem(s) ? = Prostate cancer: D (0.0)

| | Is there anyone in your family have this or these problem(s) ? = CoPro: D (0.0)

| Please choose if which one relate to your behavior = InCh: C (3.0/1.0)

| Please choose if which one relate to your behavior = SmAc: D (0.0)

| Please choose if which one relate to your behavior = InStr: D (0.0)

| Please choose if which one relate to your behavior = Certain chronic condition: D (3.0)

| Please choose if which one relate to your behavior = SmIn: D (3.0)

| Please choose if which one relate to your behavior = Stress: D (0.0)

| Please choose if which one relate to your behavior = Smoking: D (0.0)

| Please choose if which one relate to your behavior = Dringing alcohol: D (0.0)

| Please choose if which one relate to your behavior = SmInStr: D (0.0)

| Please choose if which one relate to your behavior = AcStr: D (3.0/1.0)

| Please choose if which one relate to your behavior = SmInCh: D (0.0)

| Please choose if which one relate to your behavior = AcIn: D (0.0)

| Please choose if which one relate to your behavior = SmAcIn: C (3.0)

| Please choose if which one relate to your behavior = AcInStr: D (0.0)

| Please choose if which one relate to your behavior = InStrCh: D (0.0)

| Please choose if which one relate to your behavior = SmStr: D (0.0)

| Please choose if which one relate to your behavior = SMAcStr: D (0.0)

| Please choose if which one relate to your behavior = AcInCh: D (0.0)

Age = under 25 year

| How old when you have sexual relation ? = Over 18

| | What cause(s) bring you to have check up progam? = Annual check up: B (9.0/1.0)

| | What cause(s) bring you to have check up progam? = APe: B (3.0)

| | What cause(s) bring you to have check up progam? = APm: B (0.0)

| | What cause(s) bring you to have check up progam? = AW: B (0.0)

| | What cause(s) bring you to have check up progam? = AWPm: B (0.0)
| | What cause(s) bring you to have check up progam? = Personal concern: B (0.0)
| | What cause(s) bring you to have check up progam? = PePm: B (0.0)
| | What cause(s) bring you to have check up progam? = Promotion: B (0.0)
| | What cause(s) bring you to have check up progam? = Welfare: A (6.0)
| | What cause(s) bring you to have check up progam? = Wpe: B (0.0)
| | What cause(s) bring you to have check up progam? = WPm: B (0.0)
| How old when you have sexual relation ? = Never: A (9.0)
| How old when you have sexual relation ? = Under 18: B (6.0)
Age = over 66 year: D (27.0/4.0)

Number of Leaves : 227

Size of the tree : 244

Time taken to build model: 0.08 seconds

=== Evaluation on training set ===
=== Summary ===

Correctly Classified Instances	276	91.0891 %
Incorrectly Classified Instances	27	8.9109 %
Kappa statistic	0.8751	
Mean absolute error	0.0714	
Root mean squared error	0.189	
Relative absolute error	19.9385 %	
Root relative squared error	44.6662 %	
Total Number of Instances	303	
Ignored Class Unknown Instances	1	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	ROC Area	Class
0.865	0.023	0.939	0.865	0.901	0.98	B
0.958	0.026	0.92	0.958	0.939	0.99	D
0.917	0.082	0.862	0.917	0.889	0.967	C
0.909	0	1	0.909	0.952	0.995	A
Weighted Avg. 0.911	0.043	0.913	0.911	0.911	0.979	

=== Confusion Matrix ===

a	b	c	d	<-- classified as
77	1	11	0	a = B
0	69	3	0	b = D
4	5	100	0	c = C
1	0	2	30	d = A

2. Test set

C. Data input

g. Select test option as “Supplied test set”.

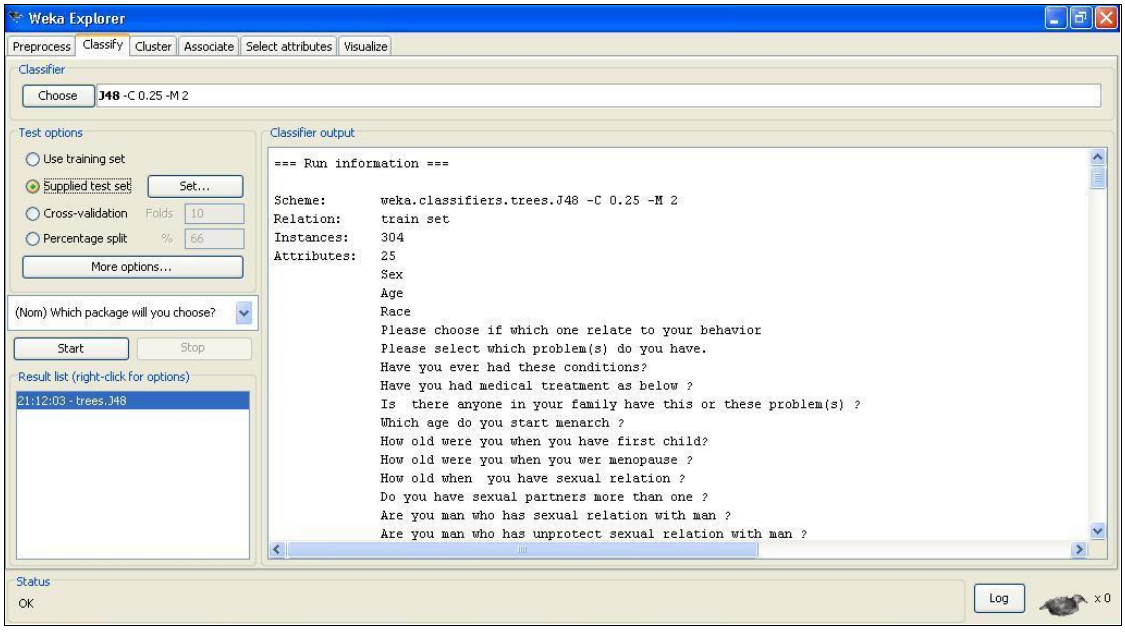

Figure 11c

h. Then select set button right to the “Supplied test set”.

i. Select test data file from directory.

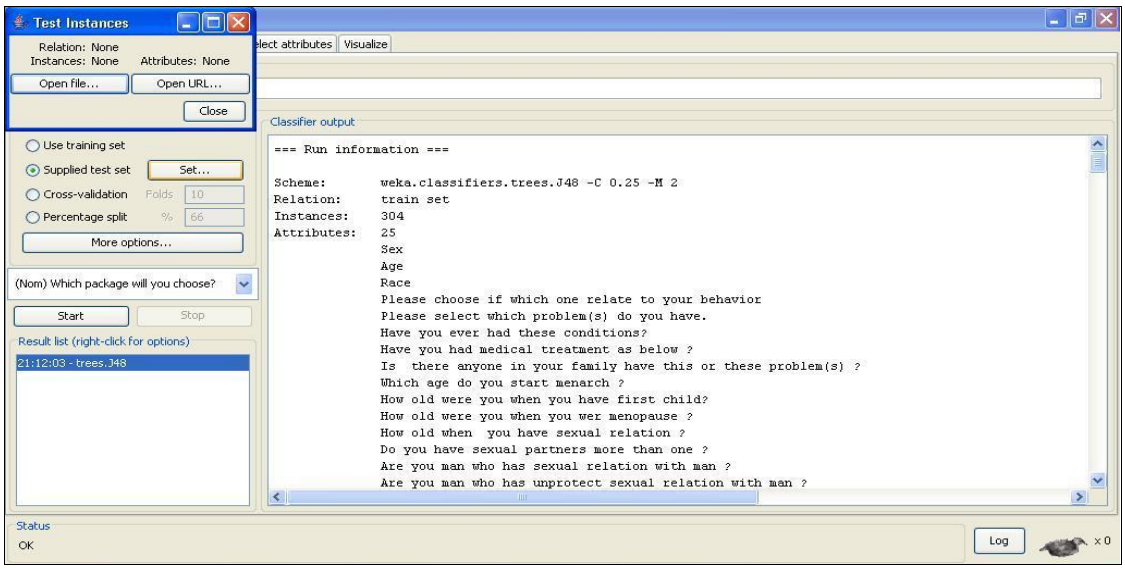

Figure 12c

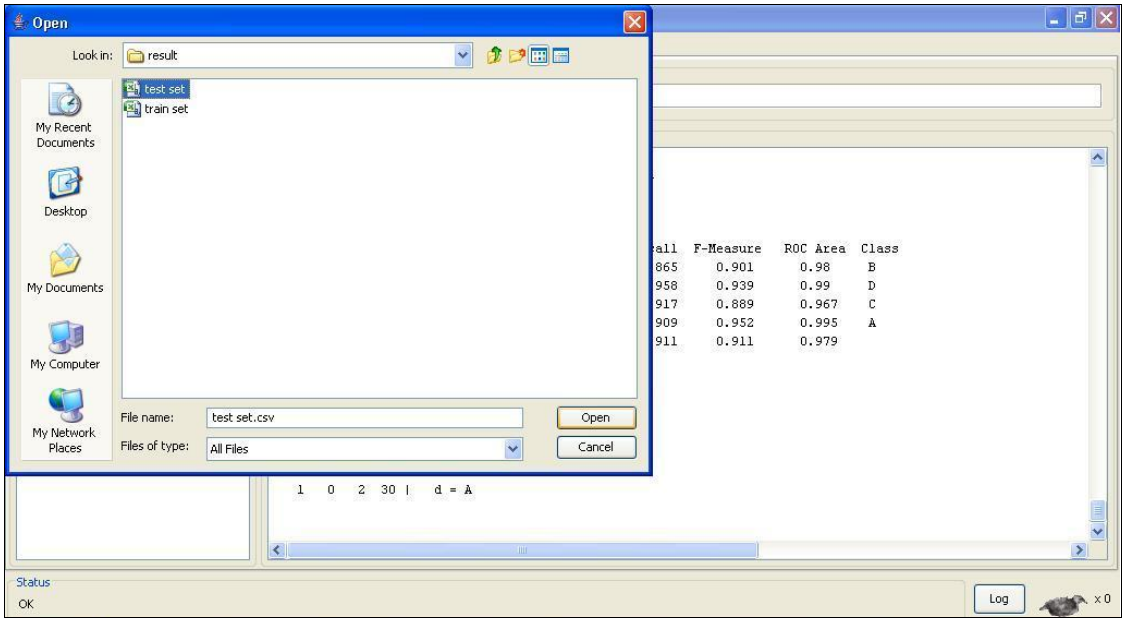

Figure 13c

j. Click “Start” to run information.

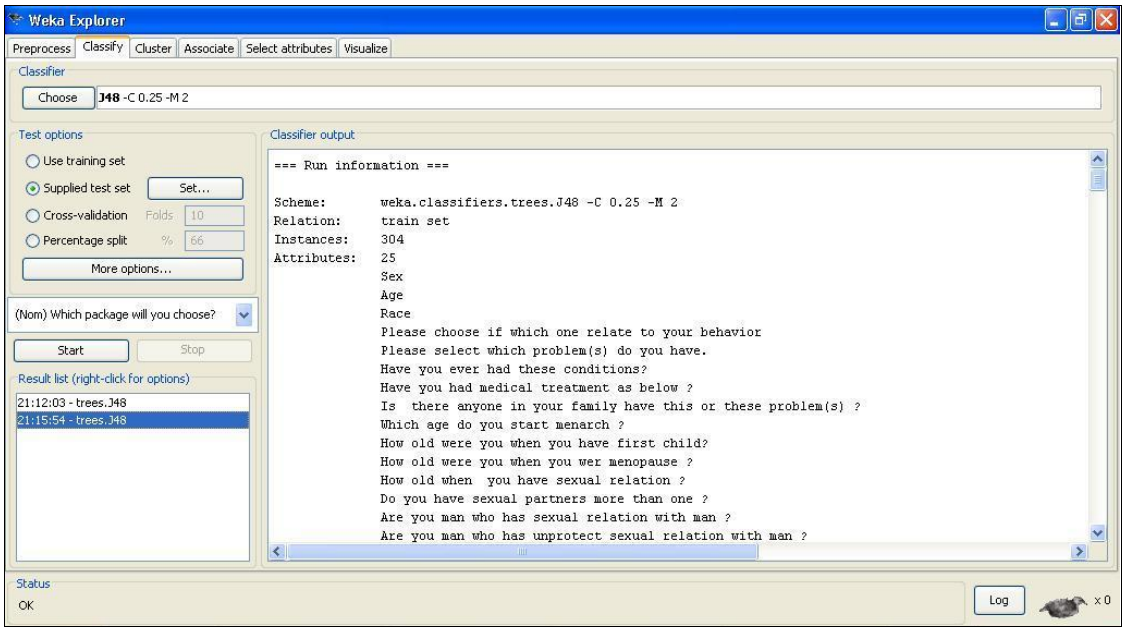

Figure 14c

D. Data output

From run information the output is shown as

=== Run information ===

Scheme: weka.classifiers.trees.J48 -C 0.25 -M 2

Relation: test1

Instances: 304

Attributes: 25

Sex

Age

Race

Please choose if which one relate to your behavior

Please select which problem(s) do you have.

Have you ever had these conditions?

Have you had medical treatment as below ?

Is there anyone in your family have this or these problem(s) ?

Which age do you start menarch ?

How old were you when you have first child?
How old were you when you wer menopause ?
How old when you have sexual relation ?
Do you have sexual partners more than one ?
Are you man who has sexual relation with man ?
Are you man who has unprotect sexual relation with man ?
Did you ever have radiation ?
Have you had exposure to aflatoxin?
Have you use illicit drug?
Please check whether you live with thisorthese person
Have you travel or work in regions with high rates of disease(s) ?
Do you have chance to be exposed with virus?
Have you ever shared needles during intravenous (IV) drug use ?
Do you have a chance to expose to human blood ?
What cause(s) bring you to have check up progam?
Which package will you choose?

Test mode: user supplied test set: 255 instances

=== Classifier model (full training set) ===

J48 pruned tree

Age = 26-40 year
| What cause(s) bring you to have check up progam? = Annual check up
| | Sex = Female
| | | Please select which problem(s) do you have. = None
| | | | Please choose if which one relate to your behavior = None: B (11.0/3.0)
| | | | Please choose if which one relate to your behavior = Inactivity: C (3.0)
| | | | Please choose if which one relate to your behavior = InCh: B (0.0)
| | | | Please choose if which one relate to your behavior = SmAc: B (0.0)
| | | | Please choose if which one relate to your behavior = InStr: B (0.0)

| | | | Please choose if which one relate to your behavior = Certain chronic condition: B (0.0)

| | | | Please choose if which one relate to your behavior = SmIn: B (0.0)

| | | | Please choose if which one relate to your behavior = Stress: B (0.0)

| | | | Please choose if which one relate to your behavior = Smoking: B (0.0)

| | | | Please choose if which one relate to your behavior = Dringing alcohol: B (0.0)

| | | | Please choose if which one relate to your behavior = SmInStr: B (0.0)

| | | | Please choose if which one relate to your behavior = AcStr: B (0.0)

| | | | Please choose if which one relate to your behavior = SmInCh: B (0.0)

| | | | Please choose if which one relate to your behavior = AcIn: B (0.0)

| | | | Please choose if which one relate to your behavior = SmAcIn: B (0.0)

| | | | Please choose if which one relate to your behavior = AcInStr: B (0.0)

| | | | Please choose if which one relate to your behavior = InStrCh: B (0.0)

| | | | Please choose if which one relate to your behavior = SmStr: B (0.0)

| | | | Please choose if which one relate to your behavior = SMAcStr: B (0.0)

| | | | Please choose if which one relate to your behavior = AcInCh: B (0.0)

| | | Please select which problem(s) do you have. = Obesity: B (0.0)

| | | Please select which problem(s) do you have. = ObHclHtFlDm: B (0.0)

| | | Please select which problem(s) do you have. = ObHclHtFlDmHr: B (0.0)

| | | Please select which problem(s) do you have. = ObFl: C (3.0)

| | | Please select which problem(s) do you have. = Post menopausal hormone therapy: B (0.0)

| | | Please select which problem(s) do you have. = ObHclFl: C (3.0)

| | | Please select which problem(s) do you have. = HtHr: B (0.0)

| | | Please select which problem(s) do you have. = ObHclHtDmSltKPad: B (0.0)

| | | Please select which problem(s) do you have. = HtDm: B (0.0)

| | | Please select which problem(s) do you have. = HtDmHr: B (0.0)

| | | Please select which problem(s) do you have. = Liver disease: B (0.0)

| | | Please select which problem(s) do you have. = Have sexual transmitted disease: C (3.0)

| | | Please select which problem(s) do you have. = History of gastational diabetes: B (3.0)

| | | Please select which problem(s) do you have. = Non alcoholic fatty liver disease: B (3.0)

| | | Please select which problem(s) do you have. = ObHtDm: B (0.0)

| | | Please select which problem(s) do you have. = ObHtFl: B (3.0)

| | | Please select which problem(s) do you have. = ObHclHt: B (0.0)

| | | Please select which problem(s) do you have. = FlSex: B (0.0)

| | | Please select which problem(s) do you have. = HtPdmHrtHr: B (0.0)

| | | Please select which problem(s) do you have. = HtK: B (0.0)

| | | Please select which problem(s) do you have. = DmHr: B (0.0)

| | | Please select which problem(s) do you have. = High cholesterol: B (0.0)

| | | Please select which problem(s) do you have. = HclHr: B (0.0)

| | | Please select which problem(s) do you have. = HclHt: B (0.0)

| | | Please select which problem(s) do you have. = Kidney disease: B (0.0)

| | | Please select which problem(s) do you have. = ObFlDm: B (0.0)

| | | Please select which problem(s) do you have. = High blood pressureor hypertension: B (0.0)

| | | Please select which problem(s) do you have. = Prediabetes: B (0.0)

| | | Please select which problem(s) do you have. = HclFl: B (0.0)

| | | Please select which problem(s) do you have. = ObHcl: B (0.0)

| | | Please select which problem(s) do you have. = HtFlDm: B (0.0)

| | | Please select which problem(s) do you have. = High blood pressureor hypertension, DmSltHrtK: B (0.0)

| | | Please select which problem(s) do you have. = HclHtFlPad: B (0.0)

| | | Please select which problem(s) do you have. = SltK: B (0.0)

| | | Please select which problem(s) do you have. = HclPad: B (0.0)

| | | Please select which problem(s) do you have. = DmSltHrtK: B (0.0)

| | | Please select which problem(s) do you have. = ObHclHtSltK: B (0.0)

| | | Please select which problem(s) do you have. = FlPad: B (0.0)

| | | Please select which problem(s) do you have. = HtSlt: B (0.0)

| | | Please select which problem(s) do you have. = HtDm, SltK: B (0.0)

| | | Please select which problem(s) do you have. = HIV positive: B (0.0)
| | Sex = Male: B (15.0)
| What cause(s) bring you to have check up progam? = APe
| | Do you have sexual partners more than one ? = No: C (8.0)
| | Do you have sexual partners more than one ? = I have no partner.: C (0.0)
| | Do you have sexual partners more than one ? = Yes: B (3.0)
| What cause(s) bring you to have check up progam? = APm
| | Please choose if which one relate to your behavior = None: B (3.0)
| | Please choose if which one relate to your behavior = Inactivity: B (0.0)
| | Please choose if which one relate to your behavior = InCh: B (0.0)
| | Please choose if which one relate to your behavior = SmAc: B (0.0)
| | Please choose if which one relate to your behavior = InStr: B (0.0)
| | Please choose if which one relate to your behavior = Certain chronic condition: B (0.0)
| | Please choose if which one relate to your behavior = SmIn: B (0.0)
| | Please choose if which one relate to your behavior = Stress: C (3.0)
| | Please choose if which one relate to your behavior = Smoking: B (0.0)
| | Please choose if which one relate to your behavior = Dringing alcohol: B (0.0)
| | Please choose if which one relate to your behavior = SmInStr: B (0.0)
| | Please choose if which one relate to your behavior = AcStr: B (0.0)
| | Please choose if which one relate to your behavior = SmInCh: B (0.0)
| | Please choose if which one relate to your behavior = AcIn: B (0.0)
| | Please choose if which one relate to your behavior = SmAcIn: B (0.0)
| | Please choose if which one relate to your behavior = AcInStr: B (0.0)
| | Please choose if which one relate to your behavior = InStrCh: B (0.0)
| | Please choose if which one relate to your behavior = SmStr: D (1.0)
| | Please choose if which one relate to your behavior = SMAcStr: B (0.0)
| | Please choose if which one relate to your behavior = AcInCh: B (0.0)
| What cause(s) bring you to have check up progam? = AW
| | Sex = Female: C (3.0)
| | Sex = Male: B (3.0)
| What cause(s) bring you to have check up progam? = AWPm: C (3.0)

| What cause(s) bring you to have check up progam? = Personal concern
| | Have you ever shared needles during intravenous (IV) drug use ? = No: B (7.0/1.0)
| | Have you ever shared needles during intravenous (IV) drug use ? = Yes: A (3.0)
| What cause(s) bring you to have check up progam? = PePm: B (0.0)
| What cause(s) bring you to have check up progam? = Promotion
| | Please select which problem(s) do you have. = None: A (3.0)
| | Please select which problem(s) do you have. = Obesity: B (0.0)
| | Please select which problem(s) do you have. = ObHclHtFlDm: B (0.0)
| | Please select which problem(s) do you have. = ObHclHtFlDmHr: B (0.0)
| | Please select which problem(s) do you have. = ObFl: B (0.0)
| | Please select which problem(s) do you have. = Post menopausal hormone therapy: B (0.0)
| | Please select which problem(s) do you have. = ObHclFl: B (0.0)
| | Please select which problem(s) do you have. = HtHr: B (0.0)
| | Please select which problem(s) do you have. = ObHclHtDmSltKPad: B (0.0)
| | Please select which problem(s) do you have. = HtDm: B (0.0)
| | Please select which problem(s) do you have. = HtDmHr: B (0.0)
| | Please select which problem(s) do you have. = Liver disease: B (0.0)
| | Please select which problem(s) do you have. = Have sexual transmitted disease: B (0.0)
| | Please select which problem(s) do you have. = History of gastational diabetes: B (0.0)
| | Please select which problem(s) do you have. = Non alcoholic fatty liver disease: B (0.0)
| | Please select which problem(s) do you have. = ObHtDm: B (0.0)
| | Please select which problem(s) do you have. = ObHtFl: B (0.0)
| | Please select which problem(s) do you have. = ObHclHt: B (0.0)
| | Please select which problem(s) do you have. = FlSex: B (0.0)
| | Please select which problem(s) do you have. = HtPdmHrtHr: B (0.0)
| | Please select which problem(s) do you have. = HtK: B (0.0)
| | Please select which problem(s) do you have. = DmHr: B (0.0)

| | Please select which problem(s) do you have. = High cholesterol: B (3.0)
| | Please select which problem(s) do you have. = HclHr: B (0.0)
| | Please select which problem(s) do you have. = HclHt: B (0.0)
| | Please select which problem(s) do you have. = Kidney disease: B (0.0)
| | Please select which problem(s) do you have. = ObFlDm: B (0.0)
| | Please select which problem(s) do you have. = High blood pressureor hypertension: B (0.0)
| | Please select which problem(s) do you have. = Prediabetes: B (0.0)
| | Please select which problem(s) do you have. = HclFl: B (0.0)
| | Please select which problem(s) do you have. = ObHcl: B (0.0)
| | Please select which problem(s) do you have. = HtFlDm: B (0.0)
| | Please select which problem(s) do you have. = High blood pressureor hypertension, DmSltHrtK: B (0.0)
| | Please select which problem(s) do you have. = HclHtFlPad: B (0.0)
| | Please select which problem(s) do you have. = SltK: B (0.0)
| | Please select which problem(s) do you have. = HclPad: B (0.0)
| | Please select which problem(s) do you have. = DmSltHrtK: B (0.0)
| | Please select which problem(s) do you have. = ObHclHtSltK: B (0.0)
| | Please select which problem(s) do you have. = FlPad: B (0.0)
| | Please select which problem(s) do you have. = HtSlt: B (0.0)
| | Please select which problem(s) do you have. = HtDm, SltK: B (0.0)
| | Please select which problem(s) do you have. = HIV positive: B (0.0)
| What cause(s) bring you to have check up progam? = Welfare: A (6.0)
| What cause(s) bring you to have check up progam? = Wpe: B (3.0)
| What cause(s) bring you to have check up progam? = WPm: C (6.0)
Age = 51 - 60 year
| Please choose if which one relate to your behavior = None: C (7.0/1.0)
| Please choose if which one relate to your behavior = Inactivity: D (12.0/1.0)
| Please choose if which one relate to your behavior = InCh: D (0.0)
| Please choose if which one relate to your behavior = SmAc: C (4.0)
| Please choose if which one relate to your behavior = InStr: D (0.0)

| Please choose if which one relate to your behavior = Certain chronic condition: D (3.0)
| Please choose if which one relate to your behavior = SmIn: C (3.0)
| Please choose if which one relate to your behavior = Stress: D (0.0)
| Please choose if which one relate to your behavior = Smoking: C (6.0/1.0)
| Please choose if which one relate to your behavior = Dringing alcohol: D (3.0)
| Please choose if which one relate to your behavior = SmInStr: D (0.0)
| Please choose if which one relate to your behavior = AcStr: D (0.0)
| Please choose if which one relate to your behavior = SmInCh: D (0.0)
| Please choose if which one relate to your behavior = AcIn: D (5.0)
| Please choose if which one relate to your behavior = SmAcIn: D (0.0)
| Please choose if which one relate to your behavior = AcInStr: D (0.0)
| Please choose if which one relate to your behavior = InStrCh: D (3.0)
| Please choose if which one relate to your behavior = SmStr: D (0.0)
| Please choose if which one relate to your behavior = SMAcStr: D (0.0)
| Please choose if which one relate to your behavior = AcInCh: D (0.0)
Age = 41- 50 year
| Have you had medical treatment as below ? = No: C (52.0/13.0)
| Have you had medical treatment as below ? = Being hospitalized, especially for a serious condition that requires intensive care
| | Please choose if which one relate to your behavior = None: B (5.0)
| | Please choose if which one relate to your behavior = Inactivity: B (0.0)
| | Please choose if which one relate to your behavior = InCh: B (0.0)
| | Please choose if which one relate to your behavior = SmAc: B (0.0)
| | Please choose if which one relate to your behavior = InStr: B (0.0)
| | Please choose if which one relate to your behavior = Certain chronic condition: B (0.0)
| | Please choose if which one relate to your behavior = SmIn: B (0.0)
| | Please choose if which one relate to your behavior = Stress: B (0.0)
| | Please choose if which one relate to your behavior = Smoking: A (3.0)
| | Please choose if which one relate to your behavior = Dringing alcohol: B (0.0)
| | Please choose if which one relate to your behavior = SmInStr: B (0.0)

| | Please choose if which one relate to your behavior = AcStr: B (0.0)
| | Please choose if which one relate to your behavior = SmInCh: B (0.0)
| | Please choose if which one relate to your behavior = AcIn: B (0.0)
| | Please choose if which one relate to your behavior = SmAcIn: B (0.0)
| | Please choose if which one relate to your behavior = AcInStr: B (0.0)
| | Please choose if which one relate to your behavior = InStrCh: B (0.0)
| | Please choose if which one relate to your behavior = SmStr: B (0.0)
| | Please choose if which one relate to your behavior = SMAcStr: B (0.0)
| | Please choose if which one relate to your behavior = AcInCh: B (0.0)
| Have you had medical treatment as below ? = Received hemodialysis treatments for a long period of time: B (2.0)
| Have you had medical treatment as below ? = Received a blood transfusion or organ transplant before 1992, Received hemodialysis treatments for a long period of time: C (0.0)
Age = 61- 65 year
| Please choose if which one relate to your behavior = None: D (3.0)
| Please choose if which one relate to your behavior = Inactivity
| | Is there anyone in your family have this or these problem(s) ? = High blood pressure: C (3.0)
| | Is there anyone in your family have this or these problem(s) ? = Breast cancer: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = Colon cancer: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = HtBr: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = HtBrCo: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = HtBrCp: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = HtCo: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = HtCp: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = None: D (9.0)
| | Is there anyone in your family have this or these problem(s) ? = HtBrPro: D (0.0)
| | Is there anyone in your family have this or these problem(s) ? = BrCo: D (0.0)

| | Is there anyone in your family have this or these problem(s) ? = Colorectal polyp: D (0.0)

| | Is there anyone in your family have this or these problem(s) ? = HtPro: D (0.0)

| | Is there anyone in your family have this or these problem(s) ? = Prostate cancer: D (0.0)

| | Is there anyone in your family have this or these problem(s) ? = CoPro: D (0.0)

| Please choose if which one relate to your behavior = InCh: C (3.0/1.0)

| Please choose if which one relate to your behavior = SmAc: D (0.0)

| Please choose if which one relate to your behavior = InStr: D (0.0)

| Please choose if which one relate to your behavior = Certain chronic condition: D (3.0)

| Please choose if which one relate to your behavior = SmIn: D (3.0)

| Please choose if which one relate to your behavior = Stress: D (0.0)

| Please choose if which one relate to your behavior = Smoking: D (0.0)

| Please choose if which one relate to your behavior = Dringing alcohol: D (0.0)

| Please choose if which one relate to your behavior = SmInStr: D (0.0)

| Please choose if which one relate to your behavior = AcStr: D (3.0/1.0)

| Please choose if which one relate to your behavior = SmInCh: D (0.0)

| Please choose if which one relate to your behavior = AcIn: D (0.0)

| Please choose if which one relate to your behavior = SmAcIn: C (3.0)

| Please choose if which one relate to your behavior = AcInStr: D (0.0)

| Please choose if which one relate to your behavior = InStrCh: D (0.0)

| Please choose if which one relate to your behavior = SmStr: D (0.0)

| Please choose if which one relate to your behavior = SMAcStr: D (0.0)

| Please choose if which one relate to your behavior = AcInCh: D (0.0)

Age = under 25 year

| How old when you have sexual relation ? = Over 18

| | What cause(s) bring you to have check up progam? = Annual check up: B (9.0/1.0)

| | What cause(s) bring you to have check up progam? = APe: B (3.0)

| | What cause(s) bring you to have check up progam? = APm: B (0.0)

| | What cause(s) bring you to have check up progam? = AW: B (0.0)

| | What cause(s) bring you to have check up progam? = AWPm: B (0.0)
| | What cause(s) bring you to have check up progam? = Personal concern: B (0.0)
| | What cause(s) bring you to have check up progam? = PePm: B (0.0)
| | What cause(s) bring you to have check up progam? = Promotion: B (0.0)
| | What cause(s) bring you to have check up progam? = Welfare: A (6.0)
| | What cause(s) bring you to have check up progam? = Wpe: B (0.0)
| | What cause(s) bring you to have check up progam? = WPm: B (0.0)
| How old when you have sexual relation ? = Never: A (9.0)
| How old when you have sexual relation ? = Under 18: B (6.0)
Age = over 66 year: D (27.0/4.0)

Number of Leaves : 227

Size of the tree : 244

Time taken to build model: 0.06 seconds

=== Evaluation on test set ===
=== Summary ===

Correctly Classified Instances	226	88.9764 %
Incorrectly Classified Instances	28	11.0236 %
Kappa statistic	0.8424	
Mean absolute error	0.0811	
Root mean squared error	0.2065	
Relative absolute error	22.8542 %	
Root relative squared error	49.2637 %	
Total Number of Instances	254	
Ignored Class Unknown Instances	1	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	ROC Area	Class
	0.844	0.034	0.915	0.844	0.878	0.968	B
	0.932	0.031	0.902	0.932	0.917	0.976	D
	0.897	0.096	0.853	0.897	0.874	0.959	C
	0.905	0.004	0.95	0.905	0.927	0.996	A
Weighted Avg.	0.89	0.054	0.891	0.89	0.89	0.969	

=== Confusion Matrix ===

```
 a  b  c  d   <-- classified as
65  1 10  1 |  a = B
 0 55  4  0 |  b = D
 5  5 87  0 |  c = C
 1  0  1 19 |  d = A
```

APPENDIX D

The questionnaire which composes of many questions are indication of risk of diseases that the user may has . This chapter describes about risk of diseases classify by disease.

1. Breast cancer

- **Being female.** Women are much more likely than men are to develop breast cancer.
- **Increasing age.** Your risk of breast cancer increases as you age. Women older than 60 have a greater risk than do younger women.
- **A personal history of breast cancer.** If you've had breast cancer in one breast, you have an increased risk of developing cancer in the other breast.
- **A family history of breast cancer.** If you have a mother, sister or daughter with breast cancer, you have a greater chance of being diagnosed with breast cancer. Still, the majority of people diagnosed with breast cancer have no family history of the disease.
- **Inherited genes that increase cancer risk.** Certain gene mutations that increase the risk of breast cancer can be passed from parents to children. The most common gene mutations are referred to as BRCA1 and BRCA2. These genes can greatly increase your risk of breast cancer and other cancers, but they don't make cancer inevitable.
- **Radiation exposure.** If you received radiation treatments to your chest as a child or young adult, you're more likely to develop breast cancer later in life.
- **Obesity.** Being overweight or obese increases your risk of breast cancer.
- **Beginning your period at a younger age.** Beginning your period before age 12 increases your risk of breast cancer.

- **Beginning menopause at an older age.** If you began menopause after age 55, you're more likely to develop breast cancer.
- **Having your first child at an older age.** Women who give birth to their first child after age 35 may have an increased risk of breast cancer.
- **Postmenopausal hormone therapy.** Women who take hormone therapy medications that combine estrogen and progesterone to treat the signs and symptoms of menopause have an increased risk of breast cancer.
- **Drinking alcohol.** Drinking alcohol may increase the risk of breast cancer.

2. Cervical cancer

- **Many sexual partners** The greater your number of sexual partners and the greater your partner's number of sexual partners the greater your chance of acquiring HPV.
- **Early sexual activity.** Having sex before age 18 increases your risk of HPV. Immature cells seem to be more susceptible to the precancerous changes that HPV can cause.
- **Other sexually transmitted diseases (STDs).** If you have other STDs such as chlamydia, gonorrhea, syphilis or HIV/AIDS the greater your chance is of also having HPV.
- **A weak immune system.** Most women who are infected with HPV never develop cervical cancer. However, if you have an HPV infection and your immune system is weakened by another health condition, you may be more likely to develop cervical cancer.
- **Cigarette smoking.** The exact mechanism that links cigarette smoking to cervical cancer isn't known, but tobacco use increases the risk of precancerous changes as well as cancer of the cervix. Smoking and HPV infection may work together to cause cervical cancer.

3. Colon cancer

- **Older age.** About 90 percent of people diagnosed with colon cancer are older than 50. Colon cancer can occur in younger people, but it occurs much less frequently.
- **African-American race.** African-Americans have a greater risk of colon cancer than do people of other races.
- **A personal history of colorectal cancer or polyps.** If you've already had colon cancer or adenomatous polyps, you have a greater risk of colon cancer in the future.
- **Inflammatory intestinal conditions.** Long-standing inflammatory diseases of the colon, such as ulcerative colitis and Crohn's disease, can increase your risk of colon cancer.
- **Inherited syndromes that increase colon cancer risk.** Genetic syndromes passed through generations of your family can increase your risk of colon cancer. These syndromes include familial adenomatous polyposis and hereditary nonpolyposis colorectal cancer, which is also known as Lynch syndrome.
- **Family history of colon cancer and colon polyps.** You're more likely to develop colon cancer if you have a parent, sibling or child with the disease. If more than one family member has colon cancer or rectal cancer, your risk is even greater. In some cases, this connection may not be hereditary or genetic. Instead, cancers within the same family may result from shared exposure to an environmental carcinogen or from diet or lifestyle factors.
- **Low-fiber, high-fat diet.** Colon cancer and rectal cancer may be associated with a diet low in fiber and high in fat and calories. Research in this area has had mixed results. Some studies have found an increased risk of colon cancer in people who eat diets high in red meat and processed meats.
- **A sedentary lifestyle.** If you're inactive, you're more likely to develop colon cancer. Getting regular physical activity may reduce your risk of colon cancer.
- **Diabetes.** People with diabetes and insulin resistance may have an increased risk of colon cancer.

- **Obesity.** People who are obese have an increased risk of colon cancer and an increased risk of dying of colon cancer when compared with people considered normal weight.
- **Smoking.** People who smoke cigarettes may have an increased risk of colon cancer.
- **Alcohol.** Heavy use of alcohol may increase your risk of colon cancer.
- **Radiation therapy for cancer.** Radiation therapy directed at the abdomen to treat previous cancers may increase the risk of colon cancer.

4. Lung cancer

- **Smoking.** Smoking remains the greatest risk factor for lung cancer. Your risk of lung cancer increases with the number of cigarettes you smoke each day and the number of years you have smoked. Quitting at any age can significantly lower your risk of developing lung cancer.
- **Exposure to secondhand smoke.** Even if you don't smoke, your risk of lung cancer increases if you're exposed to secondhand smoke.
- **Exposure to radon gas.** Radon is produced by the natural breakdown of uranium in soil, rock and water that eventually becomes part of the air you breathe. Unsafe levels of radon can accumulate in any building, including homes. Radon testing can determine whether levels are safe.
- **Exposure to asbestos and other chemicals.** Workplace exposure to asbestos and other substances known to cause cancer — such as arsenic, chromium, nickel and tar — also can increase your risk of developing lung cancer, especially if you're a smoker.
- **Family history of lung cancer.** People with a parent, sibling or other first-degree relative with lung cancer have an increased risk of the disease.
- **Excessive alcohol use.** Drinking more than a moderate amount of alcohol — no more than one drink a day for women or two drinks a day for men — may increase your risk of lung cancer.
- **Certain lung diseases.** People with certain lung diseases, such as chronic obstructive pulmonary disease, may have an increased risk of lung cancer.

5. Prostate cancer

- **Older age.** The risk of prostate cancer increases with age. Prostate cancer is most common in men over 65.
- **Being black.** Black men have a greater risk of prostate cancer than do men of other races. It's not clear why this is.
- **Family history of prostate cancer.** If men in your family have had prostate cancer, your risk may be increased.
- **Obesity.** Obese men diagnosed with prostate cancer are more likely to have advanced disease that's more difficult to treat.

6. Liver cancer

- **Your sex.** Men are more likely to develop liver cancer than are women.
- **Your age.** In North America, Europe and Australia, liver cancer most commonly affects older adults. In developing countries of Asia and Africa, liver cancer diagnosis tends to occur at a younger age — between 20 and 50.
- **Chronic infection with HBV or HCV.** Chronic infection with hepatitis B virus (HBV) or hepatitis C virus (HCV) increases your risk of liver cancer.
- **Cirrhosis.** This progressive and irreversible condition causes scar tissue to form in your liver and increases your chances of developing liver cancer.
- **Certain inherited liver diseases.** Liver diseases that can increase the risk of liver cancer include hemochromatosis, autoimmune hepatitis and Wilson's disease.
- **Diabetes.** People with this blood sugar disorder have a greater risk of liver cancer than do people who don't have diabetes.
- **Nonalcoholic fatty liver disease.** An accumulation of fat in the liver increases the risk of liver cancer.
- **Exposure to aflatoxins.** Consuming foods contaminated with fungi that produce aflatoxins greatly increases the risk of liver cancer. Crops such as corn and peanuts can become contaminated with aflatoxins.

- **Excessive alcohol consumption.** Consuming more than a moderate amount of alcohol can lead to irreversible liver damage and increase your risk of liver cancer.
- **Obesity.** Having an unhealthy body mass index increases the risk of liver cancer.

7. Ovarian cancer

- **Inherited gene mutations.** While the vast majority of women who develop ovarian cancer don't have an inherited gene mutation, the most significant risk factor for ovarian cancer is having an inherited mutation in one of two genes called breast cancer gene 1 (BRCA1) and breast cancer gene 2 (BRCA2). These genes were originally identified in families with multiple cases of breast cancer, which is how they got their names, but people with these mutations also have a significantly increased risk of ovarian cancer.

Women with the BRCA1 mutation have a 35 to 70 percent higher risk of ovarian cancer than do women without this mutation, and for women with a BRCA2 mutation, the risk is between 10 and 30 percent higher. For most women, the overall lifetime risk is about 1.5 percent, according to the ACS. You're at particularly high risk of carrying these types of mutations if you're of Ashkenazi Jewish descent.

Another known genetic link involves an inherited syndrome called hereditary nonpolyposis colorectal cancer (HNPCC). Women in HNPCC families are at increased risk of cancers of the uterine lining (endometrium), colon, ovary and stomach. Risk of ovarian cancer associated with HNPCC is lower than is that of ovarian cancer associated with BRCA mutations.

- **Family history.** Sometimes, ovarian cancer occurs in more than one family member but isn't the result of any known inherited gene alteration. Having a family history of ovarian cancer increases your risk of the disease by 10 to 15 percent, according to the ACS.
- **A history of breast cancer.** If you've been diagnosed with breast cancer, your risk of ovarian cancer also is elevated.

- **Age.** Ovarian cancer most often develops after menopause. Your risk of ovarian cancer increases with age through your late 70s. Although most cases of ovarian cancer are diagnosed in postmenopausal women, the disease also occurs in premenopausal women.
- **Childbearing status.** Women who have had at least one pregnancy appear to have a lower risk of developing ovarian cancer. Similarly, the use of oral contraceptives appears to offer some protection against ovarian cancer.
- **Infertility.** If you've had trouble conceiving, you may be at increased risk. Although the link is poorly understood, studies indicate that infertility increases the risk of ovarian cancer, even without use of fertility drugs. Some research has also suggested that taking fertility drugs, such as clomiphene (Clomid), for more than one year may increase your risk of ovarian cancer, but it's not clear whether the increased risk actually comes from the drug or from the infertility.
- **Hormone replacement therapy (HRT).** Findings about the possible link between postmenopausal use of the hormones estrogen and progestin and risk of ovarian cancer have been inconsistent. However, a recent analysis of numerous studies, published in the journal Gynecologic Oncology, confirmed an association between HRT and ovarian cancer, particularly for those who took estrogen only. The risk appears to be highest among women who took HRT for more than five years.
- **Obesity.** Women who are obese have a greater risk of ovarian cancer. Obesity may also be linked to more-aggressive ovarian cancers, which can result in a shorter time to disease relapse and a decrease in the overall survival rate.
- **Male hormones.** The medication danazol, a male hormone (androgen), is used to treat endometriosis and has been linked to an increased risk of ovarian cancer. More study is needed to further define this association.

8. Coronary heart disease

- **Tobacco smoke** — Smokers' risk of developing coronary heart disease is 2–4 times that of nonsmokers. Cigarette smoking is a powerful independent risk factor for sudden cardiac death in patients with coronary heart disease; smokers have about twice the risk of nonsmokers. Cigarette smoking also acts with other risk factors

to greatly increase the risk for coronary heart disease. People who smoke cigars or pipes seem to have a higher risk of death from coronary heart disease (and possibly stroke) but their risk isn't as great as cigarette smokers'. Exposure to other people's smoke increases the risk of heart disease even for nonsmokers.

- **High blood cholesterol** — As blood cholesterol rises, so does risk of coronary heart disease. When other risk factors (such as high blood pressure and tobacco smoke) are present, this risk increases even more. A person's cholesterol level is also affected by age, sex, heredity and diet.
- **High blood pressure** — High blood pressure increases the heart's workload, causing the heart to thicken and become stiffer. It also increases your risk of stroke, heart attack, kidney failure and congestive heart failure. When high blood pressure exists with obesity, smoking, high blood cholesterol levels or diabetes, the risk of heart attack or stroke increases several times.
- **Physical inactivity** — An inactive lifestyle is a risk factor for coronary heart disease. Regular, moderate-to-vigorous physical activity helps prevent heart and blood vessel disease. The more vigorous the activity, the greater your benefits. However, even moderate-intensity activities help if done regularly and long term. Physical activity can help control blood cholesterol, diabetes and obesity, as well as help lower blood pressure in some people.
- **Obesity and overweight** — People who have excess body fat — especially if a lot of it is at the waist — are more likely to develop heart disease and stroke even if they have no other risk factors. Excess weight increases the heart's work. It also raises blood pressure and blood cholesterol and triglyceride levels, and lowers HDL ("good") cholesterol levels. It can also make diabetes more likely to develop. Many obese and overweight people may have difficulty losing weight. But by losing even as few as 10 pounds, you can lower your heart disease risk.
- **Diabetes mellitus** — Diabetes seriously increases your risk of developing cardiovascular disease. Even when glucose (blood sugar) levels are under control, diabetes increases the risk of heart disease and stroke, but the risks are even greater if blood sugar is not well controlled. About three-quarters of people with diabetes die of some form of heart or blood vessel disease. If you have diabetes, it's

extremely important to work with your healthcare provider to manage it and control any other risk factors you can.

9. Hepatitis

There are many types of hepatitis as A,B,C,D but the mostly seen are Type A,B and C .

1. Hepatitis A

- Travel or work in regions with high rates of hepatitis A
- Are a man who has sexual contact with other men
- Use injected or noninjected illicit drugs
- who has hepatitis A
- Work in a research setting where you may be exposed to the virus
- Receive clotting-factor concentrates for hemophilia or another medical condition

2. Hepatitis B

- Have unprotected sex with more than one partner
- Have unprotected sex with someone who's infected with HBV
- Have a sexually transmitted disease such as gonorrhea or chlamydia
- Are a man who has sexual contact with other men
- Share needles during intravenous (IV) drug use
- Share a household with someone who has a chronic HBV infection
- Have a job that exposes you to human blood
- Receive hemodialysis for end-stage kidney (renal) disease
- Travel to regions with high infection rates of HBV, such as Africa, Central and Southeast Asia, and Eastern Europe

3. Hepatitis C

- Are a health care worker who has been exposed to infected blood
- Have ever injected illicit drugs

- Are HIV-positive
- Received a piercing or tattoo in an unclean environment using unsterile equipment
- Received a blood transfusion or organ transplant before 1992
- Received clotting factor concentrates before 1987
- Received hemodialysis treatments for a long period of time
- Were born to a woman with a hepatitis C infection

10.Cirrhosis

Cirrhosis is caused by scar tissue that forms in your liver in response to damage that occurs repeatedly over many years.

Each time your liver is injured, it tries to repair itself. In the process, scar tissue forms in the liver. As the scar tissue builds up, it becomes increasingly difficult for the liver to function. In advanced cirrhosis, the liver no longer works. Because the liver is a vital organ that you can't live without, if it fails it must be replaced with a liver transplant.

A number of causes of liver damage A wide variety of diseases and conditions can damage the liver and lead to cirrhosis, including:

- Chronic alcohol abuse
- Hepatitis B
- Hepatitis C
- Cystic fibrosis
- Destruction of the bile ducts (primary biliary cirrhosis)
- Fat that accumulates in the liver (nonalcoholic fatty liver disease)
- Hardening and scarring of the bile ducts (primary sclerosing cholangitis)
- Inability to process sugars in milk (galactosemia)
- Iron buildup in the body (hemochromatosis)
- Liver disease caused by your body's immune system (autoimmune hepatitis)
- Parasite common in developing countries (schistosomiasis)

- Poorly formed bile ducts in babies (biliary atresia)
- Problems storing and releasing energy your cells need to function (glycogen storage disease)
- Too much copper accumulated in the liver (Wilson's disease)

Tests and procedures used to diagnose cirrhosis include:

- **Blood tests** such as a complete blood count, bilirubin test and specific tests to determine the cause of cirrhosis
- **Imaging procedures** such as computerized tomography (CT), ultrasound and magnetic resonance imaging (MRI)
- **Examination of a sample of liver tissue (liver biopsy),** which is typically done using a needle guided by ultrasound imaging

11.Kidney failure

1. Acute kidney failure

Acute kidney failure almost always occurs in connection with another medical condition or event. Conditions that increase your risk of acute kidney failure include:

- Being hospitalized, especially for a serious condition that requires intensive care
- Advanced age
- Blockages in the blood vessels in your arms or legs (peripheral artery disease)
- Diabetes
- High blood pressure
- Heart failure
- Kidney diseases
- Liver disease

2. Chronic kidney failure

Chronic kidney failure describes the gradual loss of kidney function. Your kidneys filter wastes and excess fluids from your blood which are then excreted in your urine. When chronic kidney failure damages your kidneys, dangerous levels of fluid and waste can accumulate in your body.

In the early stages of chronic kidney failure, you may have few signs or symptoms. Chronic kidney failure may not become apparent until your kidney function is significantly impaired.

Treatment for chronic kidney failure, also called chronic kidney disease, focuses on slowing the progression of the kidney damage, usually by controlling the underlying cause. Chronic kidney failure can progress to end-stage kidney disease, which is fatal without artificial filtering (dialysis) or a kidney transplant.

APPENDIX E

From the results in Chapter can be shown the number of parameters as the figures below

1. Training set

No.	Label	Count
1	Female	174
2	Male	129

Figure 1.1e Demonstrate number of sex .

No.	Label	Count
1	26-40 year	105
2	51 - 60 year	46
3	41- 50 year	62
4	61- 65 year	30
5	under 25 year	33
6	over 66 year	27

Figure 1.2e Demonstrate number of data in range ages.

No.	Label	Count
1	Asian	129
2	Arabic	67
3	Europe	40
4	African	9
5	American	58

Figure 1.3e Demonstrate number of races.

No.	Label	Count
1	None	91
2	Inactivity	65
3	InCh	15
4	SmAc	20
5	InStr	3
6	Certain chronic condition	12
7	SmIn	15
8	Stress	6
9	Smoking	27
10	Dringing alcohol	6
11	SmInStr	3
12	AcStr	6
13	SmInCh	2
14	AcIn	5
15	SmAcIn	9
16	AcInStr	3
17	InStrCh	6
18	SmStr	3
19	SMAcStr	3
20	AcInCh	3

Figure 1.4e Demonstrate number of answers in the question "Please choose if which one relate to your behavior".

No.	Label	Count
1	None	124
2	Obesity	5
3	ObHclHtFlDm	3
4	ObHclHtFlDmHr	3
5	ObFl	6
6	Post menopausal hormone therapy	7
7	ObHclFl	3
8	HtHr	3
9	ObHclHtDmSltKPad	3
10	HtDm	2
11	HtDmHr	6
12	Liver disease	14
13	Have sexual transmitted disease	3
14	History of gastational diabetes	3
15	Non alcoholic fatty liver disease	9
16	ObHtDm	3
17	ObHtFl	3
18	ObHclHt	8
19	Fl5ex	3
20	HtPdmHrtHr	3
21	HtK	6
22	DmHr	3
23	High cholesterol	9
24	HclHr	3
25	HclHt	6
26	Kidney disease	6
27	ObFlDm	3
28	High blood pressureor hypertension	3
29	Prediabetes	3
30	HclFl	3
31	ObHcl	9
32	HtFlDm	3
33	High blood pressureor hypertension, DmSltHrtK	3
34	HclHtFlPad	2
35	SltK	6
36	HclPad	3
37	DmSltHrtK	3
38	ObHclHtSltK	3
39	FlPad	3
40	HtSlt	3
41	HtDm, SltK	3
42	HIV positive	3

Figure 1.5e Demonstrate number of answers in the question" Please select which problem(s) do you have?".

No.	Label	Count
1	None	226
2	Breast cancer	17
3	Ovarian cancer	7
4	Chronic infection of Hepatiti B	12
5	Colon polyp	14
6	Inflammatory intestinal conditions	12
7	Colon cancer	9
8	HepcCir	3
9	Chronic infection of Hepatitis C	3

Figure 1.6e Demonstrate number of answers in the question"Have you ever had these conditions".

No.	Label	Count
1	No	276
2	Being hospitalized, especially for a serious condition th...	15
3	Received hemodialysis treatments for a long period of ...	9
4	Received a blood transfusion or organ transplant befor...	3

Figure 1.7e Demonstrate number of answers in the question "Have you had medical treatment as below ?".

No.	Label	Count
1	High blood pressure	60
2	Breast cancer	38
3	Colon cancer	23
4	HtBr	16
5	HtBrCo	3
6	HtBrCp	3
7	HtCo	6
8	HtCp	6
9	None	124
10	HtBrPro	3
11	BrCo	3
12	Colorectal polyp	3
13	HtPro	9
14	Prostate cancer	3
15	CoPro	3

Figure 1.8e Demonstrate number of answers in the question"Is there anyone in your family have this/these problem(s) ?".

No.	Label	Count
1	Under 12 years	85
2	under 13 years	86
3	man	132

Figure 1.9e Demonstrate number of answers in the question "Which age do you start menarch?" .

No.	Label	Count
1	No children	54
2	Under 35	117
3	I am a man.	117
4	Over 35	15

Figure 1.10e Demonstrate number of answers in the question "How old were you when you have first child?".

No.	Label	Count
1	Not yet menopause	114
2	Under 55	46
3	Over 55	11
4	I am a man	132

Figure 1.11e Demonstrate number of answers in the question"How old were you when you were menopause ?".

No.	Label	Count
1	Over 18	206
2	Never	31
3	Under 18	66

Figure 1.12e Demonstrate number of answers in the question"How old when you have sexual relation ?".

No.	Label	Count
1	No	229
2	I have no partner.	41
3	Yes	33

Figure 1.13e Demonstrate number of answers in the question "Do you have sexual partners more than one ?".

No.	Label	Count
1	NO	291
2	Yes	12

Figure 1.14e Demonstrate number of answers in the question "Are you man who has sexual relation with man ?".

No.	Label	Count
1	NO	300
2	Yes	3

Figure 1.15e Demonstrate number of answers in the question" Are you man who has unprotect sexual relation with man?".

No.	Label	Count
1	No	277
2	Yes, at the chest.	14
3	Yes, at the abdomen.	12

Figure 1.16e Demonstrate number of answers in the question "Did you ever have radiation ?".

No.	Label	Count
1	No	301
2	Yes	2

Figure 1.17e Demonstrate number of answers in the question"Have you had exposure to aflatoxin?".

No.	Label	Count
1	No	287
2	Yes	16

Figure 1.18e Demonstrate number of answers in the question "Have you use illicit drug?".

No.	Label	Count
1	Healthy	276
2	Hepatitis B	18
3	Hepatitis A	9

Figure 1.19e Demonstrate number of answers in the question"Have you ever shared needles during intravenous (IV) drug use ?".

No.	Label	Count
1	None	284
2	Hepatitis B	12
3	Hepatitis A	7

Figure 1.20e Demonstrate number of answers in the question" Please check whether you live with this/these person".

No.	Label	Count
1	No	300
2	Yes	3

Figure 1.21e Demonstrate number of answers in the question "Have you travel or work in regions with high rates of disease(s) ?".

No.	Label	Count
1	No	291
2	Yes	12

Figure 1.22e Demonstrate number of answers in the question " Do you have chance to be exposed with virus?".

No.	Label	Count
1	No	288
2	Yes	15

Figure 1.23e Demonstrate number of answers in the question "Do you have a chance to expose to human blood ?".

No.	Label	Count
1	Annual check up	134
2	APe	36
3	APm	38
4	AW	24
5	AWPm	3
6	Personal concern	28
7	PePm	6
8	Promotion	9
9	Welfare	16
10	Wpe	3
11	WPm	6

Figure 1.24e Demonstrate number of of answers in the question " What cause(s) bring you to have check up progam?".

No.	Label	Count
1	B	89
2	D	72
3	C	109
4	A	33

Figure 1.25e Demonstrate number of answers in the question." Which package will you choose?"

2. Test set

No.	Label	Count
1	Female	155
2	Male	99

Figure 2.1e Demonstrate number of sex.

No.	Label	Count
1	26-40 year	90
2	51 - 60 year	39
3	41- 50 year	51
4	61- 65 year	28
5	under 25 year	23
6	over 66 year	23

Figure 2.2e Demonstrate number of range age.

No.	Label	Count
1	Asian	111
2	Arabic	55
3	Europe	36
4	African	5
5	American	47

Figure 2.3e Demonstrate number of race.

No.	Label	Count
1	None	79
2	Inactivity	56
3	InCh	14
4	SmAc	14
5	InStr	3
6	Certain chronic condition	9
7	SmIn	14
8	Stress	5
9	Smoking	23
10	Dringing alcohol	5
11	SmInStr	2
12	AcStr	6
13	SmInCh	2
14	AcIn	5
15	SmAcIn	7
16	AcInStr	2
17	InStrCh	4
18	SmStr	2
19	SMAcStr	1
20	AcInCh	1

Figure 2.4e Demonstrate number of answers in the question “Please choose if which one relate to your behavior”.

No.	Label	Count
1	None	100
2	Obesity	6
3	ObHclHtFlDm	3
4	ObHclHtFlDmHr	1
5	ObFl	6
6	Post menopausal hormone therapy	7
7	ObHclFl	3
8	HtHr	3
9	ObHclHtDmSltKPad	3
10	HtDm	1
11	HtDmHr	5
12	Liver disease	11
13	Have sexual transmitted disease	1
14	History of gastational diabetes	3
15	Non alcoholic fatty liver disease	9
16	ObHtDm	3
17	ObHtFl	2
18	ObHclHt	7
19	FlSex	3
20	HtPdmHrtHr	2
21	HtK	5
22	DmHr	3
23	High cholesterol	7
24	HclHr	3
25	HclHt	6
26	Kidney disease	3
27	ObFlDm	3
28	High blood pressureor hypertension	3
29	Prediabetes	3
30	HclFl	3
31	ObHcl	7
32	HtFlDm	3
33	High blood pressureor hypertension, DmSltHrtK	3
34	HclHtFlPad	2
35	SltK	6
36	HclPad	3
37	DmSltHrtK	3
38	ObHclHtSltK	2
39	FlPad	3
40	HtSlt	1
41	HtDm, SltK	2
42	HIV positive	1

Figure 2.5e Demonstrate number of answers in the question" Please select which problem(s) do you have?".

No.	Label	Count
1	None	192
2	Breast cancer	14
3	Ovarian cancer	6
4	Chronic infection of Hepatiti B	7
5	Colon polyp	10
6	Inflammatory intestinal conditions	11
7	Colon cancer	9
8	HepcCir	3
9	Chronic infection of Hepatitis C	2

Figure 2.6e Demonstrate number of answers in the question "Have you ever had these conditions".

No.	Label	Count
1	No	235
2	Being hospitalized, especially for a serious condition th...	12
3	Received hemodialysis treatments for a long period of ...	5
4	Received a blood transfusion or organ transplant befor...	2

Figure 2.7e Demonstrate number of answers in the question "Have you had medical treatment as below ?".

No.	Label	Count
1	High blood pressure	50
2	Breast cancer	31
3	Colon cancer	19
4	HtBr	14
5	HtBrCo	2
6	HtBrCp	1
7	HtCo	6
8	HtCp	6
9	None	105
10	HtBrPro	2
11	BrCo	3
12	Colorectal polyp	2
13	HtPro	9
14	Prostate cancer	2
15	CoPro	2

Figure 2.8e Demonstrate number of answers in the question "Is there anyone in your family have this/these problem(s) ?".

No.	Label	Count
1	Under 12 years	74
2	under 13 years	78
3	man	102

Figure 2.9e Demonstrate number of answers in the question "Which age do you start menarch?" .

No.	Label	Count
1	No children	49
2	Under 35	100
3	I am a man.	92
4	Over 35	13

Figure 2.10e Demonstrate number of answers in the question "How old were you when you have first child?".

No.	Label	Count
1	Not yet menopause	102
2	Under 55	43
3	Over 55	7
4	I am a man	102

Figure 2.11e Demonstrate number of answers in the question "How old were you when you were menopause ?".

No.	Label	Count
1	Over 18	168
2	Never	29
3	Under 18	57

Figure 2.12e Demonstrate number of answers in the question "How old when you have sexual relation ?".

No.	Label	Count
1	No	196
2	I have no partner.	31
3	Yes	27

Figure 2.13e Demonstrate number of answers in the question "Do you have sexual partners more than one ?".

No.	Label	Count
1	NO	243
2	Yes	11

Figure 2.14e Demonstrate number of answers in the question "Are you man who has sexual relation with man ?".

No.	Label	Count
1	NO	251
2	Yes	3

Figure 2.15e Demonstrate number of answers in the question "Are you man who has unprotect sexual relation with man ?".

No.	Label	Count
1	No	229
2	Yes, at the chest.	13
3	Yes, at the abdomen.	12

Figure 2.16e Demonstrate number of answers in the question "Did you ever have radiation ?".

No.	Label	Count
1	No	252
2	Yes	2

Figure 2.17e Demonstrate number of answers in the question "Have you had exposure to aflatoxin?".

No.	Label	Count
1	No	241
2	Yes	13

Figure 2.18e Demonstrate number of answers in the question "Have you use illicit drug?".

No.	Label	Count
1	Healthy	233
2	Hepatitis B	13
3	Hepatitis A	8

Figure 2.19e Demonstrate number of answers in the question "Have you ever shared needles during intravenous (IV) drug use ?".

No.	Label	Count
1	None	238
2	Hepatitis B	9
3	Hepatitis A	7

Figure 2.20e Demonstrate number of answers in the question" Please check whether you live with this/these person".

No.	Label	Count
1	No	251
2	Yes	3

Figure 2.21e Demonstrate number of answers in the question "Have you travel or work in regions with high rates of disease(s) ?".

No.	Label	Count
1	No	246
2	Yes	8

Figure 2.22e Demonstrate number of answers in the question" Do you have chance to be exposed with virus?".

No.	Label	Count
1	No	240
2	Yes	14

Figure 2.23e Demonstrate number of answers in the question "Do you have a chance to expose to human blood ?".

No.	Label	Count
1	Annual check up	119
2	APe	27
3	APm	34
4	AW	21
5	AWPm	3
6	Personal concern	17
7	PePm	6
8	Promotion	8
9	Welfare	11
10	Wpe	3
11	WPm	5

Figure 2.24e Demonstrate number of of answers in the question" What cause(s) bring you to have check up progam?".

No.	Label	Count
1	B	77
2	D	59
3	C	97
4	A	21

Figure 2.25e Demonstrate number of answers in the question." Which package will you choose?"

BIOGRAPHY

NAME	Kanchana Rachrujitong
DATE OF BIRTH	22 Jan 1984
PLACE OF BIRTH	Bangkok
INSTITUTIONS ATTENDED	Chaing Mai University, 2000-2003 Bachelor of Science (Radiologic Technologist) Mahidol University, 2010 Master of Science (Technology of Information System Management)
HOME ADDRESS	90/907 Piyavararom village Soi Piyavararom 24 Bangkay-Trainot Rd Nontaburi 11110