Research Title	The Support Vector Machines for Health Risk Assessment of Cardiovascular Disease of People in the Lower North	
Researcher	Ms. Arucha	Sadsri
	Dr. Yutthana	Phimthong-Ngam
	Dr. Rangsan	Jomtarak
Research Consultants	Assoc.Prof.Dr.Kesorn	Suwanprasert
Organization	Faculty of Nursing	
	Suan Dusit University	
Year	2017	

In this study, we apply the Support Vector Machines to evaluate the health risk of cardiovascular disease. We approached the performance of classification models by the support vector machines (SVMs) algorithms of NO concentration for assessment of a mechanism of cardiovascular disease. NO is free radicals that play an important role as redox signaling, neuromodulator and oxidant in the system. We use cerebrovascular reactivity (CVR) test for assessment of cerebral reserve function and autoregulation in control vs cardiovascular disease. It is well known that the heart of SVMs classifier design is kernel function selection and adjustment of its parameters. We improve the most effective kernel function based on the best advantage of each single kernel model for training and testing these real-world medical data and then construct a novel integration of hybrid kernel function.

The result reveals that the classifier performances by each single kernel function and hybrid kernel function are following: it showed 90.00% from polynomial kernel function in experiment phase and is followed by 88.00% and 84.00% from polynomial in recovery and basal phase, respectively. Considering the best parameters of most experimental results, they have shown classifier performance of NO by polynomial is high when the parameter β is odd numbers. The classification results of RBF in experiment phase is the best (94.00%), followed by results in basal (88.00%) and recovery (84.00%) phase, respectively. The classifier performance of RBF kernel is high when the parameter σ is an even number. For sigmoid kernel function have shown low performance of the most kernel function with highest classified accuracy is 78.00%

in recovery phase and is followed by 74.00% and 58.00% in basal and experiment phase, respectively. The best parameters most experimental results have shown that classifier performance of sigmoid is high when the sum of a parameter γ and α is odd numbers. An improvement of classifier performance for NO assessment, when we vary the value of a parameter (η and ϕ) to test the data sets in each phrase, the results of a hybrid kernel in experiment phase is the best (96.00%), followed by results in basal (94.00%) and recovery (92.00%) phase, respectively. The best values of both parameters resulting in the highest performance for classification of NO by hybrid kernel function are 0.5. Consider the values of parameters compared with the highest performance, low value of parameters is detected. Multi-layer Perceptron achieved the highest level of accuracy (93.93%) and is followed by 93.86%, 93.46%, 85.34% and 79.03% from Polynomial Perceptron, Modular networks, Generalized Feedforward and Radial Basis Function Perceptron, respectively. Considering the best performance suggests that the Multi-layer Perceptron is a suitable system to assess the risk of cardiovascular disease. This Special Project Study confirms the potential Feedforward genetic algorithms and suggests another alternative to application of genetic algorithms technology to evaluate the health risk of cardiovascular disease.

Later findings, to comparing GAs for infarct and ischemia classification shows that, the Genetic Algorithms that has the most relevant improvement is the one for the classification of inferior ischemia: its sensitivity increases of 3.8% while, 1 - NPV decreases of 2.3%. In all the other networks the improvement are less important: the variation of sensitivity is never over 2.0% and for 1 - NPV this variation is even smaller, 0.4% is the maximum increase.