Abstract

The spread of pathogens can hurt various aspects, such as the health, economy, and welfare of a country's people. One example is the spread of viruses. Viruses can infect living things causing serious health problems with characteristics that cannot be seen with the naked eye. Therefore, sophisticated microscopic tools are needed to overcome these problems such as Transmission Electron Microscopy (TEM). This tool utilizes electron signals to help identify it in detail by explaining the morphological structure of the virus. However, this technique requires quite a long time and more accuracy and experience to identify the characteristics of complex structures, and the resulting images have poor lighting. Therefore, using Machine Learning is one solution to overcome these problems where the available data is currently sufficient. This study proposes a Support Vector Machine (SVM) algorithm combined with one of the metaheuristic algorithms included in the Artificial Immune System (AIS) group, namely the Clonal Selection Algorithm (CSA) for the classification of virus types. This method can produce an accuracy of 0.8167 compared to other algorithms such as SVM-RBF Kernel, SVM-Bagging Classifier, and SVM-AdaBoost, where the proposed algorithm can prove that the results are superior to different algorithms.

Keywords: Clonal Selection Algorithm (CSA), Machine Learning, Support Vector Machine (SVM), Transmission Electron Microscopy (TEM), Viruses