

ABSTRACT

Keywords: crops; crop rotation; modular neural networks

Various techniques are used to extract out patterns in data, usually with the use of machine learning, data mining and knowledge discovery in database (KDD), and even neural networks. Neural networks are structures that can be “trained” to recognize patterns in inputs. One of its various types is a modular neural network, which focuses on segregating tasks into modules. In this study, the patterns to be learned with neural networks are crop patterns or to be specific, cyclic patterns. These patterns are formed generally with crop rotation. A modular feedforward-backpropagation neural network has a significance impact in determining or predicting these cyclic patterns in planting crops like maize or corn, rice, cassava and banana on the Lanao del Sur province considering the environmental and soil factors affecting it.

The focus and goal for this study is to find whether employing neural networks is useable and applicable in trying to find the cyclic pattern in crops. Data is collected thru extraction and selection of attributes and then preprocessed for use later. The steps in preprocessing involves normalization and conversion. Then, after the data is handled, the neural network is designed and build. In this step, the hyperparameters and important functions are defined. Using this as basis, the neural network is to be designed and built accordingly. After doing so, training is done for the neural network to learn the pattern in which it involves several experiments to adjust the hyperparameters of the neural networks. Testing the accuracy of the neural network is done next. Usually, training and testing are done repeatedly to achieve better optimization and accuracy, before being used.

Training each of the neural networks resulted in different configurations of hyperparameters. The configuration with the fastest training period was selected in order to avoid overfitting in learning. The longer a neural network learn, the more it overfits. Even though a configuration was selected, all of the variations must be tested. But surprisingly, all configurations achieved almost the same accuracy. Even the prediction results from each configuration are almost identical.

This study was able to conclude that modular neural networks can indeed be used in determining or predicting the cyclic patterns from crop rotations. Several points were achieved in arriving the conclusion, which includes the sufficiency of the data used, the effectiveness of the factors selected as input parameters, the confidence of the design made for the neural networks and its effectiveness to give accurate predictions. In conclusion, the study was indeed able to design a modular neural network to model the cyclic patterns of crops even with an accuracy of 77%.