An Application of Artificial Neural Networks to Predict the Milk Yield of a Typical Dairy Farm in Sri Lanka

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It is quite interesting that milk and dairy products play an important role in a healthy, balanced diet thus contributing to certain indispensable nutritional benefits. Hence, the need for dairy is crucial, which means dairy farms provide a vital necessity to the people in both rural and other areas across the country. Therefore, accurate forecast of milk yield is important for dairy farmers to utilize and optimize their production process. The present study is aimed at using Artificial Neural Networks (ANN) for predicting the milk yield of a dairy farm by considering the potential factors that affect the milk production. Further, it is important to note that this dairy farm has kept records of the daily milk yield, the amount of food given to cows, and weather condition. Data from January 2016 to June 2018 were used for the study. In this regard, a feedforward neural network (FFNN), non-linear auto regressive neural network (NAR), and a non-linear auto regressive exogenous neural network (NARX) were fitted. Analysis was done using Matlab software and all three implemented models took around 30 seconds for execution. While all the three models exhibited quite strong model performances, the NARX model exhibited prominently outstanding results. The best forecasting performance was shown by the NARX neural network which contained one hidden layer with five neurons having saturating linear transfer function. Normalized Mean Squared Error (NMSE) was 0.0247 for the overall model while the Mean Absolute Error (MAE) value was 6.6245.

Keywords: Dairy; Neural network; Milk yield; Factors

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