

squared error (NMSE). Coefficient of determination ( $R^2$ ) measured to identify the appropriateness of using weather variables and solar angles to forecast solar radiation. The final hourly FFNN model consists of 2 hidden layers and there are 5 neurons and 3 neurons in each layer respectively. This model was able to forecast hourly solar radiation with 0.0961 NMSE and the  $R^2$  was 90.39%. This implies the capability of this model for prediction of global solar radiation when unseen weather data input supply to the model and ensure the accuracy of the result.

## 1. Introduction

Power generation from renewable energy sources has become sustainable alternatives for the increasing energy demand in Sri Lanka. Despite other renewable sources, solar power generation becomes prominent in Sri Lanka due to the location closer to equator and availability of solar radiation throughout the year. Currently in Sri Lanka new trends towards grid-connected photovoltaic (PV) systems can be observed. Capability of power generation in the future is an essential information to build reliable PV systems and financing major power plants. To estimate the power output, Global solar radiation (GSR) is the most significant parameter. Moreover, solar radiation data are used in agricultural modelling and health care modelling. Due to less availability and high cost of GSR data, use of weather variables and solar angles to estimate GSR is a reliable alternative.

All over the world numerous researches forecasted GSR using different techniques and they can be divided into four categories; statistical models, AI based models, physical models and hybrid models (Wan et al. [9]). Comparisons of multiple techniques emphasized the fact that hybrid models combining two or more techniques have the ability to overcome the faults in individual models (Chaturvedi and Isha [2]). Further, their study concludes that ANN technique is more suitable for situations where enough historical data are available. ANN technique was tested by many researches using different network models around the world. In New Zealand, GSR was estimated using NARX neural network considering weather variables and resulted 0.0591 MSE (Ahmad and Anderson [1]). In France, solar radiation