**By: Vivek Thakur (15mi424), Komal Mehra (15mi413)**

The Nonlinear autoregressive exogenous (NARX) model predicts the current value of a time series based upon its previous values as well as the current and past values of multiple driving (exogenous) series. This paper proposes a novel dual-stage attention-based recurrent neural network (DA-RNN), which consists of an encoder with an input attention mechanism and a decoder with a temporal attention mechanism.

In the first stage, a new attention mechanism is developed to adaptively extract the relevant driving series at each time step by referring to the previous encoder hidden state. In the second stage, a temporal attention mechanism is used to select relevant encoder hidden states across all time steps. These two attention models are well integrated within an LSTM-based recurrent neural network (RNN) and can be jointly trained using standard back propagation.

The newly introduced input attention mechanism can adaptively select the relevant driving series. The temporal attention mechanism can naturally capture the long-range temporal information of the encoded inputs. Based upon these two attention mechanisms, the DA-RNN can not only adaptively select the most relevant input features, but can also capture the long-term temporal dependencies of a time series appropriately