Prediction Model:

Deep learning is an umbrella for different approaches based on learning network structures. These approaches include stacked autoencoder network, long-short term memory (LSTM), and convolutional neural network(CNN).

CNN:

CNN is a form of neural network model that enables for image and video processing. One of the most important categories is image recognition and classification. CNNs are commonly utilised in domains such as object detection, facial recognition, and so on. CNN analyses the image’s raw pixel data, then it trains the model and followed by feature extraction process for improved classification results. CNN is made of three types of layers which is convolutional, pooling and fully connected layers. The feature extraction process is performed by the first two layer, which is convolutional and pooling layer. These extracted features are mapped to the final output by the third layer which is fully connected layer. Forward propagation and backward propagation is used to evaluate the model’s performance and to update the values of kernels and weights parameters.

Using forward propagation on training dataset, model performance is evaluated under the certain kernels and weights, with the help of loss function. Similarly, based on the loss values and through backpropagation using gradient descent optimization algorithm, the values of the parameters are updated (kernels and weights)

//In this paper, we present our experience of using one of deep learning networks called convolutional network (CNN) to predict stocks movement direction in Qatar Stock Exchange (QE) as a case study of using deep learning in emerging markets. The main contribution of this study is to highlight the importance of considering external factors, in addition to historical data, when building machine learning models to predict stocks in emerging markets.

RNN:

RNNs, or recurrent neural networks, are a type of neural network that excels at modelling sequence data like time series or natural language. Natural language processing and speech recognition are two disciplines where RNN models are commonly applied.

Rnn, like feedforward and convolutional neural networks (CNNs), learn from training input. It can handle any range of data input, and the model's size does not expand as the amount of the input grows. They are differentiated by their "memory," which allows them to actually impact current input and output by using insights from previous inputs. In classic deep neural networks, inputs and outputs are assumed to be independent of one another.

BPTT varies from the standard approach in RNN since it adds the errors at each time step, resulting in two difficulties known as exploding gradients and vanishing gradients. Aside from that, RNN computation is sluggish, and it also has a problem obtaining information from the past.

LSTM:

LSTM is known for its ability to learn long term data dependencies.

This is possible because the model's recurring module is made up of four levels that interact with one another.

An LSTM module contains three gates and a cell state, which allows model to operate on its own, that is learn, unlearn, or retain information from each unit. Information flows through each unit without being altered with the help of cell state. It is achieved by allowing only very few linear transactions. These units, where information flows, contains three gates, input, output, and a forget gate. The main functionality of these gates is to add or remove the data from the cell state. The decision of ignoring the information from the previous cell state is determined by the forget gate. The input gate uses a point-wise multiplication operation of ‘sigmoid' and 'tanh' to regulate the information flow to the current cell state. At last, the output gate selects which data must be sent to the next hidden state.

An LSTM module has a cell state and three gates which provides them with the power to selectively learn, unlearn or retain information from each of the units. The cell state in LSTM helps the information to flow through the units without being altered by allowing only a few linear interactions. Each unit has an input, output and a forget gate which can add or remove the information to the cell state. The forget gate decides which information from the previous cell state should be forgotten for which it uses a sigmoid function. The input gate controls the information flow to the current cell state using a point-wise multiplication operation of ‘sigmoid’ and ‘tanh’ respectively. Finally, the output gate decides which information should be passed on to the next hidden state