DEEP LEARNING IN TIME SERIES FORECASTING

Bindu Krishnan

Department of Data Science

Jain University, Kochi, Kerala, India 682 042.

bindusruthy@gmail.com

Abstract

Deep Learning is receiving lot of attention in the scientific community for the last few years, mainly due to the state-of-the-art results obtained in different areas like image processing, natural language processing, sequential modelling, among many others. Deep Learning algorithms use neural networks, which associate inputs and outputs using intermediate layers to model non-linear relationships.

Time series analysis is an interesting research area with a great number of applications in business, economics, finance and computer science. Deep learning methods are capable of identifying structure and pattern of data such as non-linearity and complexity in time series forecasting. Time series problems are a special case of sequential data, where deep learning models can be applied. The standard options to this type of problems are Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) including Long Short-Term Memory (LSTM), Gated Recurrent Units (GRU), Bidirectional RNN and Deep RNN. In order to understand which are the most promising approaches to apply in time series problems, an empirical study about different models and methods, within the deep learning framework, that are possible to use, needs to be conducted.

The main objective of this talk is to conduct a review on the empirical study and analysis with the goal of investigating the performance of traditional forecasting techniques and deep learning-based algorithms. The practical aspects, such as the setting of values for hyperparameters and the choice of the most suitable frameworks, for the successful application of deep learning to time series are also provided and discussed. Several fruitful research fields in which the architectures analysed have obtained a good performance are reviewed. As a result, research gaps have been identified in the literature for several domains of application, thus expecting to inspire new and better forms of knowledge.

Keywords: Big Data, Deep Learning, Time Series Forecasting.