

Chapter 12

Computationally Efficient and Effective Machine Learning Model Using Time Series Data in Different Prediction Problems

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ABSTRACT

Automated feature engineering is to build predictive models that are capable of transforming raw data into features, that is, creation of new features from existing ones on various datasets to create meaningful features and examining their effect on planned model performances on various parameters like accuracy, efficiency, and prevent data leakage. So the challenges for experts are to plan computationally efficient and effective machine, learning-based predictive models. This chapter will provide an imminent to the important intelligent techniques that could be utilized to enhance predictive analytics by using an advanced form of the predictive model. A computationally efficient and effective machine learning model using functional link artificial neural network (FLANN) is discussed to design for predicting the business needs with a high degree of accuracy for the traders or investors. The performance of the models using FLANN is encouraging when scientifically analyzed the experimental results of the model using different statistical analyses.

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INTRODUCTION

A feature is a computable property of any given datasets which is appeared as columns. Each feature, or column, represents a quantifiable piece of data that can be used for analysis based on needs. With processes like feature selection and feature engineering, the quality of the dataset can be improved to solve many real-world problems specifically business-related problems. The benefits of performing feature selection in a selected database before model designing reduces overfitting improve accuracy and reduces training time. In a similar context, the benefits of using the feature engineering process are to build better and faster predictive models for the analysts to transform the raw data into useful and meaningful features for better representations of any unseen data in a given problem. Introduction to automated feature engineering using machine learning will save time, build better predictive models, create meaningful features, and prevent data leakage. It requires expert knowledge i.e. applied machine learning is known as feature engineering to develop a better, efficient, and robust predictive model. Forecasting is an integral part of the planning and decision-making process for companies to survive in this modern and competitive world. Unlike past, business depends on the brand, and companies are limited so forecasting was not too important. Looking at the present scenarios where sentiment is not at all applicable the organizations need to make an accurate forecast on their future products to sustain in the market. According to literature forecasting can be defined:

“Forecasting is predicting, projecting, or estimating some future event or condition which is outside an organization’s control and provides a basis for managerial planning” (Herbig et al., 1994).

“Forecasting is generally used to predict or describe what will happen (for example to sales demand, cash flow, or employment levels) given a set of circumstances or assumptions” (Waddell D., et.al, 1994)

Forecasting methods can be divided into three basic categories:

1. Quantitative or Statistical
2. Qualitative or Judgmental
3. Time Horizon

Quantitative or Statistical Method is based on mathematical models, past data, and other related features for forecasting the future. Qualitative or Judgmental method is based on opinions from experts, knowledge, and skills when there is no past data available. Time Horizon forecasts are based on a time span of the future it covers in terms of long-term, medium-term and short-term forecasts. Quantitative or Statistical Method is mainly applied in practice since they are objective and the availability of facts sufficiently in the present digitized world. Moreover, it could bring good results for the company with a significant change in economic effect. There are different techniques of forecasting in Quantitative methods such as Business Barometers, Time Series Analysis, Extrapolation, Regression Analysis, Econometric Models, and Input & Output Analysis.

The arrival of machine learning, big data, and cloud computing technologies has created exhilarating new ways for engineers to build a remunerative career helps to solve real-world challenges in different prediction problems and benefits companies to make better decisions. The use of automated feature engineering in machine learning solves many predictions problems in different domains such as stock

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