

Chapter 4

Prediction Models

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ABSTRACT

Having/living convenient life through smart devices, people are more interested or more dependent on to predict something for future (i.e., with respect to their health, business, etc.). For that, many prediction models by several researchers are being used in many applications. Due to a vast (rapid) change in lifestyle, people are more prone to a number of life-threatening diseases when it comes to their well-being. Many of these diseases start developing their symptoms in their early stages. But, still many of these diseases like cancer, kidney damages remain unidentified in their developing stages. The earlier a disease is predicted, the easier it becomes to cure it and even prevent it. Predictive modeling provides a huge step forward in medical science in preventing the risk among patients. Prediction modeling is the process of analyzing current conditions to predict future results.

INTRODUCTION

The storage of data in digital form has provided an opportunity to efficient data usage and produce useful information. The data rich environment provides actionable information that can be processed using different models to predict the future outcomes. Predictive analytics (Galit & Otto, 2011) comprises of varied statistical trends and techniques ranging from machine learning and predictive modeling to data mining (Riccardo & Blaz, 2009) to efficiently analyze the historical data and information so as to process them to create predictions about the unknown future events. It deals in developing various models that can predict the future outcome of an event by describing a variety of statistical and analytical techniques (Borislava et al., 2011). Today predictive analysis is used in many industries to solve different problems. The choice of predictive model to be used depends on the type of field to which the model would be applied. The components related to prediction modeling or predictive analytics can be depicted in figure 1 and discussed as:

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Data Mining: With the increasing sources of information, a huge amount of data is being fed into the databases daily. This data is in the form of raw facts. By analyzing the trends in the data, useful information can be articulated which could help in decision making. Data mining is the process of discovering patterns and anomalies from large sets of data through the application of statistics, machine learning and database systems. Data mining is used in extraction of potentially useful information that is still undiscovered in a large database. Data mining could be applied to identify multiple groups and clusters of data and forward them for further analysis through machine learning or predictive analytics.

Machine Learning: Machine learning is the branch of artificial intelligence which provides computer the ability to learn. One of the important ways is to learn by examples. These days, it is being used in various statistical models and methods for prediction of risks and opportunities and is found applicable in various fields such as banking fraud detection, medical diagnosis, natural language processing and analysis over the stock market. Various learning techniques (Carbonneau et al., 2008; Ruchika, 2015) such as Neural Networks, Multilayer Perceptron, support vector machines, Naïve Bayes and other are being used according to the application areas.

Figure 1. Component of Predictive Analytics (Dean & Will, 2014)



Here, figure 1 show that statistics, predictive modeling, machine learning and data mining are the part of predictive analytics. Predictive analytics and predictive modeling are two essential terms and used in many business applications like e-healthcare, retail/ customer relationship management (CRM), etc., for producing useful decisions. Prediction modeling is used in business applications like, fraud detection, spam mail detection, etc. Other applications include capacity planning, change management, Disaster Recovery (DR), engineering, physical and digital security management and city planning.

Analytics: Analytics is the scientific process of discovering and communicating the meaningful patterns which can be found in raw data or unstructured data (collected from many smart devices). There are four types of analytics (Wullianallur & Vijju, 2013) like data/ descriptive, predictive, prescriptive, diagnostic (refer figure 4 for explanation). Descriptive analytics put results in statistic form which can be easily understood by human-being.

Predictive Analytics: *Predictive analytics* is the use of data, statistical algorithms and machine learning techniques to identify the likelihood of future outcomes based on historical data. The evolution of predictive analytic can be found in figure 2.

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