

Predictive Analytics: A study of its Advantages and Applications

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ABSTRACT – The science of predictive analytics gives a line of future insight developed in the area of data analytics. Through predictive analytics, organizations or industries can identify the patterns within the data and make future forecasts on the basis of existing data and analytics techniques such as artificial intelligence, machine learning, pattern recognition. Machine Learning works on the idea of identifying the best suitable model for the data.

Keywords: Predictive Analytics, Dataset, Machine Learning, Pattern Recognition.

I. Introduction

Predictive analysis facilitates to visualize the future and is reliable and accurate than previous tools. Predictive analysis modelling is an iterative process which applies on a dataset and then based on the requirement, modelling techniques have been applied. Predictive analytics make it possible for organizations' in determining risk in prior, opportunities, tendencies and able to make strategies for appropriate measures and this can happen only when accurate predictions done through organized and unorganized information.

II. Why Predictive Analysis

Organizations seek help of predictive analytics to solve real-time problems and uncover new opportunities.

- Identifying fraud: Combination of several analytical methods can refine pattern detection and prevent criminal behavior. As cyber security becomes an issue, high-performance behavioral analytics monitors all activities on a network in hard-real time to detect an abnormal feature that may reflect a sign of threat.
- Optimizing trading campaigns: Predictive analysis is used to examine customer responses, to create new business models and to promote opportunities. These models may help the businesses attract, retain and grow their most profitable customers.
- Enhancement in operations. Most of the industries use predictive models to predict inventory and management of resources. Predictive analytics helps the organizations to function more efficiently.

A. Strengths of Predictive Analysis

Pre-Processing: Forecast by determining the previous and present performance and studying the historical data.

Data Analysis: By this, we determine that what has happened and why it had happened?

Prepare Data: Identify the data resources. Data could be in different formats and how we can use the data. Evaluate the quality of the data.

Data Processing: Based on study of datasets, best fit modeling techniques have been applied such as regression, pattern recognition, K-nearest neighbor (KNN), support vector machines etc.

Assessment: This process includes graphical representation of data, reports for comparative study and analysis.

Deployment: It helps in decision making in day-to-day process. It is a time-dependent and a delayed process which comes across with a lot of challenges.

Monitor & Improve: Determines what is happening now and necessary measures to be taken for the enhancement.

Figure 1.1 defines the process of predictive analysis:

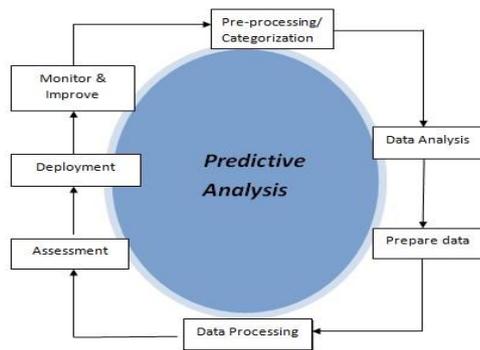


Fig1.1: Detailed diagram of Predictive Analysis

B. Using Predictive Analysis

In today’s world, industries use predictive analytics in a virtually boundless number of ways. Predictive analytics has covered extensive range of organizations. The technology is helpful in diverse fields such as medical research, finance oriented, agriculture, text mining, retailing, hospitality, automotive, aerospace and neuroscience, stock market, weather forecasting. The below examples show how organizations are making use of predictive analytics:

- Manufacturing: Determine the rate of machine failures.
- Energy: Predict demand and supply ratios. Also, determine the impact of weather events.
- Financial services: Design risk models. Predict financial market trends like stock market etc.

III. Literature Review

Fatimetou Zahra Mohamad Mahmoud demonstrated in this paper that many industries are using the concept of predictive analysis and how predictive analytics helped to achieve the solutions of many identified and unidentified problems. The predictive analytics helps in governance of time, money and resources. But predictive analytics is insufficient in producing the better results. Most of the organizations don’t know from where to begin, how to execute.

Lakshay Swani demonstrated that how predictive analytics plays a crucial role in upliftment of businesses through numerous data mining techniques. To make the predictions about the future, predictive analytics uses various machine learning, deep learning, pattern recognition and data mining techniques.

John Edwards(article) discussed that data is very crucial and played an important role in achieving new heights and targets with the help of predictive analytics.

Sadegh Bafandeh Imandoust demonstrated about numerous benefits, application areas of K-nearest neighbor (KNN) used for predicting economic events.

IV. Related Works

The table in the below section states the work done using various algorithms and modeling techniques in different areas such as education, finance-driven models, weather forecasting, medical research, neuroscience, agriculture, text-mining etc. The applied techniques enhance the simplicity, effectiveness and makes the system more robust.

The table given below states the sector or the area where the machine learning algorithm has been applied. It also enlists the techniques and algorithms used in the same along with their application areas and advantages.

Table 1: Modeling Techniques, Algorithms applied on different sectors

Sector	Techniques & Algorithm Used	Applications	Advantages
Education	Decision Tree - Branching Method & Statistical Probability	Governance & management of educational institution	enhances students’ performance
Finance-oriented Models	Regression Technique, KNN	Stock prices, banking, trend analysis	Improves & boosts sales
Medical Research, Weather forecasting, Air pollution	Time Series Algorithm- Clustering Algorithm		Designing & optimizing clinical trials
Neuroscience and behavioral	Pattern-recognition	Neuroimaging-based, psychiatric diagnostics	improves decision making
Agriculture, Text-mining, medicine	K-nearest Neighbor(KNN)	In agriculture include climate forecasting and estimating soil water parameters	simplicity, effectiveness, intuitiveness, robust
Marketing, Business Model	Support Vector Machine-captures geometric characteristics	Bankruptcy Prediction Model	Helps to solve linear and non-linear problems

V. Conclusion

Various industries are working on the idea of predictive analytics few get the desired results and others not. Research mainly focusses on the development and create new models. But, is this enough? The researchers also focus on the limitations of the existing systems and how the results can be improved.

VI. Future Scope

- Technological Enhancements: Due to current advancements in large datasets, predictive modeling has improvised the outcome.

- Risk Management: Advancement in predictive modeling is very encouraging in terms of business and research but they need to do risk management as well. Data privacy and security are at risk.

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