Artificial Intelligence as a Business Forecasting and Error Handling Tool

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Abstract: Any business enterprise must rely a lot on how well it can predict the future happenings. To cope up with the modern global customer demand, technological challenges, market competitions etc., any organization is compelled to foresee the future having maximum impact and least chances of errors. The traditional forecasting approaches have some limitations. That is why the business world is adopting the modern Artificial Intelligence based forecasting techniques. This paper has tried to present different types of forecasting and AI techniques that are useful in business forecasting. At the later stage we have also discussed the forecasting errors and the steps involved in planning the AI support system.

I. Introduction

Business forecasting is gaining a lot of attentions among all kinds of organizations. According to Glueck, "Forecasting is s a formal process of predicting future events that will significantly affect the functioning of an enterprise"[1]. Business forecasting refers to the analysis of past and current scenarios to obtain clues regarding the future trends in the business environment. Organizations practice forecasting for a number of reasons like supporting decision making process, to gain substantial competitive advantages, avoiding damages by external forces etc.

II. Forecasting Approaches

The business forecasting approaches are broadly categorized into two groups namely **Qualitative** and **Quantitative.**

Qualitative Models

Qualitative models are generally applicable in short-term predictions. They employ judgement as predicted by manager or business expert. Qualitative models may be good enough for the organizations for predicting near future events having not much area of influence especially if the data are not sufficiently available. Some common techniques are Delphi method, Panel consensus , Morphological research etc. This model generally follows a Top-Down approach.

Delphi method – In this method, the opinion of the experts are considered in the particular area. Very often the experts are communicated separately. The opinions are expressed in written form. The experts who come up with substantial difference in opinions are further requested to come closer to each other. The final result is used for forecasting. This method is quite useful for the situations having new and unexpected outcome for the business enterprise.

Quantitative Models

Quantitative models negate the judgemental factor by using various statistical tools for forecasting the future trends. These models are useful in long-term predictions measured in terms of months or years. Time series analysis, Regression analyses, Extrapolation etc are commonly used Quantitative approaches. The Quantitative models prefer to adopt a Bottom-Up approach.

Regression Analysis – This method attempt to find out the relative movement of two or more interrelated series. Regression analysis estimates the changes in one variable as a result of certain changes in another variable. For instances if it is certain that there is a correlation between the advertisement expenditure and sales volume, future sales can be predicted based on advertisement expenditure. However in real life entity like a business very often there exist many constraints affecting a particular business parameter.

In real life situation both the approaches are often used together to get the best of forecasting techniques.
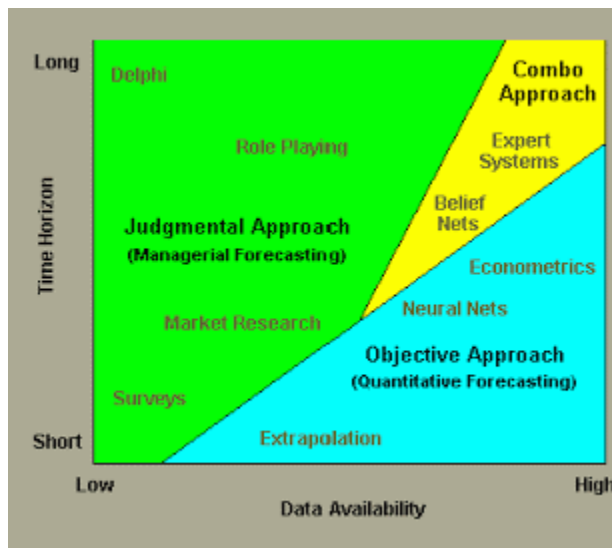
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A new generation of artificial intelligence techniques have emerged that hold promise in improving the forecasting process by bridging the gap between the two traditional forecasting approaches: Qualitative and Quantitative.

III. AI Based Solutions

The term Artificial Intelligence(AI) was coined by John McCarthy in 1956. In most general sense, AI is a branch of computer science concerned with helping machines to find solutions for complex problems in more like a human. The core issue of AI is to understand and exhibit the principles that make intelligent behaviour possible in artificial systems.

The commonly used AI techniques in the field of business forecasting are briefly described below.

Expert System – An Expert System (ES) attempts to capture the knowledge and skill of a human expert. ES tries to solve the real life problems which would otherwise require human expertise. Such a system is useful if the human expertise is not available and the problem can not be easily solved with the help of traditional computing methods. The cost of designing an Expert System must be practical and profitable.

A prototype alfalfa management CLIPS(C Language Integrated Production System) is an expert system developed by Purdue University agriculture scientist. It provides a very economic tool to reach to the conclusion regarding profitable alfalfa production that otherwise would require an expert[5].

Artificial Neural Network- This branch of AI or more precisely Soft Computing is being used in some unconventional range of domains of problems like finance, medicine, geology etc which concern the problem of prediction. It is an emulation of biological neural network. Artificial Neural Network(ANN) is nonlinear and it has the capability to learn from example much like what human brain does, which is quite extraordinary idea for the way computation has been done during last half century or so. One application of ANN may be forecasting employee turnover by category based on such factors as tenure with the firm, managerial level.

Belief Network- A belief network is a graphical representation of a model that captures the relationship between the variables of that model. Belief network is knowledge –based model which has potential for being a forecasting tool. Here the nodes imply the variables and the branches represent the conditional dependencies among the variables. Belief nets generate possibilities of the future outcomes. It uses either directed or undirected graphs

ARCO1 is an implementation of belief network used in forecasting. It is an AI knowledge base. ARCO1 models all variables believed to influence on crude oil market. There are certain techniques for collecting related facts. A market model is then presented to have consensus among the forecasting team members [7].

Business Forecasting Errors and AI

Another prime objective of using AI is to reduce the chances of errors in business forecasting. Errors in forecasting are very common because it is based on many assumptions and the quality of data that have been collected. Forecasting errors effect an organization in two ways, first the errors may lead to inefficient decision-making and secondly poor forecasting impairs performance within the existing planning. In both the cases the organization suffers. However we can plan for increasing the forecasting accuracy using AI support system.

1. Evaluate and characterize the current forecasting system.

2. Measure the current level of error by comparing industry norms

3. Specify new requirements and it's impact in the organizations

4. Identify alternative AI forecasting options.

5. Select best approach.

6. Identify potential problems .

7. Implement the new system and keep watching it's performance.

From many observations in a time series , we have found that Artificial Neural network generally produces lower error than regression procedure. That is why the use of AI based forecasting are being preferred in many cases like Bank failure, Electricity consumption etc.

IV.   Conclusion

Using this paper we have tried to examine some of the current approaches of AI that have been found very beneficial and promising for business forecasting . At first we have classified the forecasting approaches each with an example. AI comes into the scenario as a modern techniques used in forecasting. There are some specific branches of AI that are being widely used ,however there is still a long way to go.

Any forecasting are subjected to have errors because after all forecasting concerns future and it is beyond our visibility. Still AI based forecasting can better handle the chances of errors as seen in practical cases.

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Biography:

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