EXPLORING THE EMERGING ROLE OF DATA MINING AND RELATED TECHNOLOGIES IN RETAIL FORECASTING: CONTEXTUAL ISSUES & THE ROAD AHEAD

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ABSTRACT

The arrival, growth and spread of Information Technology and related tools have revolutionized the way modern day businesses are being conducted at the global as well as national levels. Optimum and precise decisions in the given dynamic and competitive business environment has emerged as a prerequisite for competitive growth and survival. Further, forecasting decisions also assume crucial significance across all areas of business with Retail also not being an exception. Forecasting decisions in context of Retail are associated with their own share of challenges and issues. The present working paper seeks to explore the emerging roles of Neural Networks and Data Mining in Retail Forecasting in context of today's business environment. It further explores the possible applications of other related IT technologies and also discusses the related issues and trends.

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Introduction

Data Mining as a technique for handling high volumes of data by uncovering patterns in the data and aiming towards predicting or forecasting trends of the future has over the few decades been employed in the retail markets with satisfactory results(Fayyad, U. M., et. al. 1996).

The technique if used judiciously has resulted in enhancing the competitive advantage of the firms employing it by ensuring growth in revenue, cutting of costs and an over-all better awareness and response to market place changes in the present dynamic and competitive business environment(Berry, M. J. et. al. 1997).

The areas of applications of this very potent tool in the retail scenario includes the designing of customized models for trading and also inventory related activities and investment or portfolio selection has been facilitated through it(Ahmed, Syed Riaz, 2004).

The numerous advantages that Data Mining provides includes (but is not limited to) are opportunities to enhance knowledge and awareness, providing solutions to extremely complicated data related issues, nurturing the core competencies of employees & organizations and above all sustaining and fuelling the competitive advantage and growth of firms(Westphal, C., & Blaxton, T. 1998; Hormozi, A. M., & Giles, S. 2004; Berkhin, P. 2006).

Retail & Data Mining: The Linkage

Reviews of existing literature on the subject point towards the fact that the Retail sector over the recent past has witnessed exponential growth and this growth has naturally been associated with increased competitiveness at the global level. The challenges to survive and flourish in such an environment are not an easy task(Apte, C. et. al. 2002;Chen, M. S. et. al. 1996).

To remain competitive and generate higher revenues a firm has to ensure that cost of production should be kept to a minimum with minimal compromise on quality and the mantra therefore is to provide low cost but high quality products and also nurture the skills

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and core competencies of its employees(Grupe, F. H., & Mehdi Owrang, M. 1995; Porter, A. L., & Cunningham, S. W. 2004)

This requires a firm to adopt a knowledge driven approach and it needs to exploit all possible sources of relevant and existing knowledge. The wide and huge volumes of knowledge available require focus upon the relevant knowledge and it is here that data mining comes into the picture(Groth, R. 2000).

Without employing data mining it is an extremely cumbersome task for the firm to explore and exploit knowledge in an optimal manner.

Data Mining in Retail: The Present Scenario

A brief overview of the commonly employed techniques that are employed by retail firms in today's business environment is presented in the following section.

Depending upon the type of knowledge that is being dealt with Data Mining techniques that are in use in today's times include:

i.   Database driven/management of information repositories approach to identify hidden and relevant trends in data to facilitate effective forecasting and precise decision making. As for instance, analyzing the shopping preferences of customers by using the data of last few years to come to a decision regarding their expected choices in the future.

ii.   Model based approach backed up by statistical tools and techniques which are most commonly employed in areas like medical diagnosis, approval of loans, deciding upon investment avenues and related.

iii. Clustering of data sets based on existing similarities or likeness to come to accurate analysis and future forecasts which ismoreappropriate for those situations where the volume of data is very huge and without proper demarcation into some facilitating units it is not possible to proceed further.

iv.   Sequential pattern and time series analysis for risk management and economy related aspects.

v.   Data visualization techniques which help to ensure that one need not be overwhelmed by the huge volumes of data and can visualize it in terms of manageable units so that they may be analyzed better.

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Data Mining in Retail: The Future Trends

Taking into account the fact that there has been an exponential growth in the volume of data owing to factors like businesses going global as a result of the application of IT for all firms in the future Data Mining is going to be a prerequisite for business growth, survival and management. However, there are some challenges that are present like:

i.   The high cost of software and training of the users to reap benefits of the technique is at times too high for new or smaller firms.

ii.   The technology is still evolving and application of the same on "as is" basis often associated with a risk of technological obsolescence

iii.   It is a bit of a dicey decision to be sure about the volume of data that a firm handles to be sure of employing Data Mining techniques.

iv.   The infrastructural requirements for employment of the technique often pose some operational problems for the employing firms.

Conclusion& Scope for Future Research

On the basis of the present paper that relies heavily upon review of literature concerning the subject it can be said that the importance of Data Mining cannot be ignored. Most of the firms have already been employing the technique to streamline their data and thereby facilitate efficient decision making. For the firms that are not yet employing the technique are facing pressures to do so in the near future to remain competitive in the business.

It would be interesting to observe the newer technologies that emerge in the future that reshape businesses and their data managements and hence there is an ample scope for further research in the area.

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