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AI-Based Sales Forecasting Model for Digital Marketing

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ABSTRACT

Sales prediction with minute accuracy plays a crucial role for an organization to sustain amidst the global competitive business environment. The use of artificial intelligence (AI) on top of the existing information technology environment has become one of the most exciting and promising area for any organizations in the current era of digital marketing. E-marketing provides customers to share their views with other customers. In this paper, the authors proposed a model which will be helpful to the digital marketers to find out the potential customers to extract value from customer feedback. The proposed model is based on artificial neural network and will make it possible to identify the customer demand depending on previous feedback and to predict the future sales volume of the product. The authors tried to utilize AI, mainly neural networks (NNs), to construct an intelligent sales prediction and also to apply ANNs for prediction regarding sales of mobile phone (Redmi, Note 6 Pro) one month ahead depending on customer feedback on two e-commerce platform, namely Amazon.in and Snapdeal.in.

KEYWORDS

Artificial Neural Network, Digital Marketing, Sales Prediction

1. INTRODUCTION

Sales forecasting is a well-known domain in the existing literature (Sun, Choi, Au, & Yu, 2008, p. 411). The challenge is that, till date, recent literatures cannot ensure any definite prescribed predictive model with guaranteed success rate. Even very few literatures can ensure a reasonable level of error margin during modeling anticipated sales. Three remarkable literatures confirming this challenging issue in this respect are (Mitra, Jain, Kishore, & Kumar, 2022,p.1), (Kantasa-ard, Nouiri, Bekrar, Ait el cadi, & Sallez, 2020, p. 7491) and (Seyedan &Mafakheri, 2020, p. 1). Researchers across the globe attempted various techniques ranging from elementary multiple linear regressions to advance non-linear Artificial Neural Network (ANN) with a view to improve accuracy from the literature available. However, very few studies are available which are optimal or near optimal in the predictive performance. Thus methodological research gaps exist in this area of research.

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There are many factors that influence sales and the exact nature of this influence could not be predicted by using any single model (Liu, Ren, Choi, Hui, & Ng, 2013, p. 1). Modeling such a mathematical function with several variables seems to be next to impossible due to high degree of dependency and auto-correlation among them. Here the challenge motivates the researchers to investigate into a deeper to unfold the said burning issue. Such mathematical modeling of sales function is well addressed in many recent studies of which two important are (Saraswathi, Renukadevi, Nandhinidevi, Gayathridevi, & Naveen, 2021, p. 14) and (Penpece, & Elma, 2014, p-435).

Artificial Neural Network (ANN) is commonly used in recent time for the above said sales forecasting for its inherent advantages. ANN is basically non-linear statistical regression model with feedback loop. It is named so became of its similarity with biological neural system of human brain. This is why ANN is called biologically inspired technique. This ANN can process information and updates its model parameters (i.e regression coefficients in non-linear case) for the next step from the error resulted in the previous step. This updation is technically known as learning. As ANN works learning from mistakes (i.e error minimization aspect of the model), it is also called machine learning in the recent literature. In this paper ANN and NN are used interchangeably without loss of generality.

The research work has shown that ANN technology is one of the appropriate techniques for solving the complex problems on sales forecasting (Frank, Garg, Sztandera, & Raheja, 2003, p. 107). The forecasting model based on ANN systems may be a suitable tool for enabling managers in the preparation of any sales forecast. The uniqueness of this paper is to shift the computing paradigm of sales forecast from traditional linear models in inferential statistic towards a world of non-linear dynamics based on ANN based predictive models. This paper is an attempt to investigate the suitability of using such ANN based methodologies for sales forecasting in the present era. The paper is a footstep towards the development of a mobile App to be used by manufacturers as well as retailers & customers to view the sales pattern of a product as emerged from the feed backs from e-commerce sites.

This research paper is organized as follows section 1. Depicts Introduction followed by section 2 as Literature Reviews of the work, section 3 as Proposed work and Research Goal, section 4 as Methodology, section 5 as Results and Interpretations, section 6 as Conclusions section 7 as Managerial Implications section 8 Limitations and Future Directions section 9. Acknowledgement.

2. LITERATURE REVIEWS

In the present century of Indian digital market, Amazon, Flipkart and Snapdeal are playing a major role to expand the e-commerce market share. In this study authors used feed forward ANN to analysis the customer's feedback which influences the potential customers for their purchase decisions (Biswas, Sanyal, & Mukherjee, 2021, p-78) Online review systems take an important role for any e-commerce business to analyze their customer's satisfaction and consequently up gradation of their products. It helps the retailers and manufacturers to make decision on their inventory management.

The use of Business Intelligence techniques (B.I) have become one of the most exciting and promising application areas for any business organizations. Drawing an optimal prediction at right time for the sales of each manufactured products is most important game changer for an enterprise. If an appropriate sales forecasting is not drawn at time, the enterprise can have face severe damage due to disruption of whole supply-chain pipeline. With the help of Artificial Neural Networks (ANNs), one of well-known Artificial Intelligence techniques, it's possible to draw optimal sales prediction of a product for an organization (Baba.and Suto, 2000, p.565).

If the sales forecasting is not done accurately then the manufacturers or retailers may fall in stock out or over stock. It may lead to increase of inventory cost, lost the loyal customers and miss the opportunity to catch ne new customers. There is a direct relation between demands forecasting and supply chain management. But the marketers are confronted with dynamic markets and uncertain. Always the conventional statistical methods are not suitable and applicable for a reliable sales