

Chapter 25

DE–ForABSA: A Novel Approach to Forecast Automobiles Sales Using Aspect Based Sentiment Analysis and Differential Evolution

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ABSTRACT

Today, amongst the various forms of online data, user reviews are very useful in understanding the user's attitude, emotion and sentiment towards a product. In this article, a novel method, named as DE-ForABSA is proposed to forecast automobiles sales based on aspect based sentiment analysis (ABSA) and ClusFuDE [8] (a hybrid forecasting model). DE-ForABSA consists of two phases – first, extracted user reviews of an automobile are analysed using ABSA. In ABSA, the reviews are pre-processed; aspects are extracted & aggregated to determine the polarity score of reviews. Second, uses of ClusFuDE consisting of clustering, fuzzy logical relationships and Differential Evolution (DE) to predict the sales of the automobile. DE is a population-based search method to optimize real values under the control of two operators: mutation & crossover. Score from phase 1 is a parameter in differential mutation in phase 2. The proposed method is tested on reviews & sales data of automobile. The empirical results show a Mean Square Error of 142.90 which indicates an effective consistency of the model

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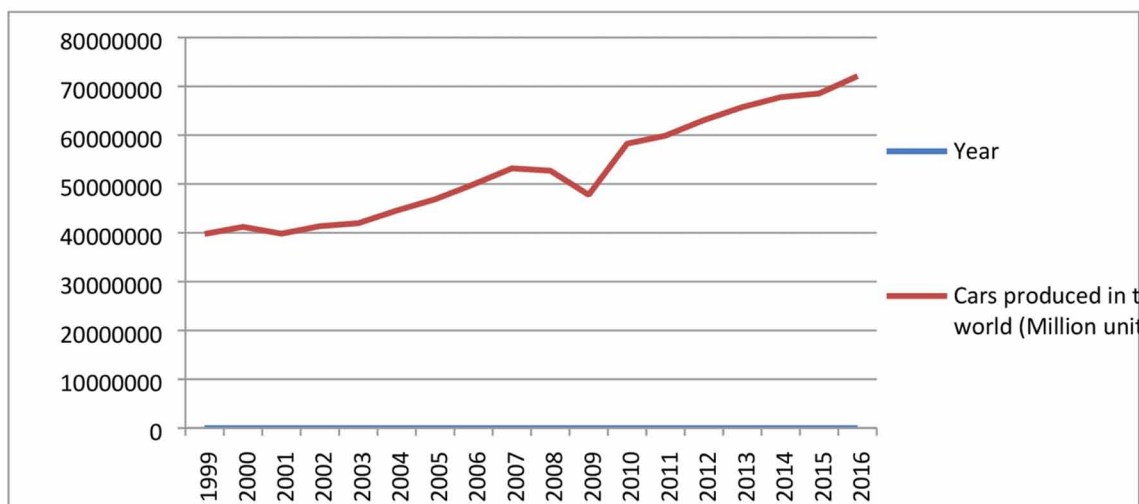
1. INTRODUCTION

Sentiment Analysis analyses the emotional tone behind a series of words which can be used to understand the attitudes, opinions and emotions of a holder. The sentiment is expressed as a quadruple (s, g, h, t) where, 's' is the sentiment, 'g' is the target, 'h' is the holder and 't' is the time of expression (Liu, 2012; Pang & Lee, 2008). It evaluates written or spoken language to determine if an expression is favourable, unfavourable, or neutral, and to what degree. It also helps to analyse what customers like and dislike about a brand/product/design. Customer reviews from social media, website, call centre agents, or any other source, contains a treasure trove of useful business information. In today's time, it is not enough to know what customers are talking about. One must also know how they feel about the product. Sentiment analysis is one way to uncover those feelings.

Amongst the various products, automobiles are those favourite possessions that someone would cherish throughout their lives. Automobiles are not only today's necessity but to some people it is a mark of status, grandeur and passion. The tangible value of automobiles can be observed from the statistics from year 1990 -2018 (in million units). These statistics indicate a continuous rise of international sale and purchase of automobiles from year 1990-2018. According to the reports, the purchase of automobiles had almost doubled in the last ten years. This is just one aspect of automobile industry, where it can be observed that people love to buy automobiles of their choice.

In view of this scenario, another objective outlook in the automotive industry is the management of the supply and demand. As the market is moving at a fast pace, the manufacturers, investors and managers are constantly trying to make unprecedented investments to grow their businesses worldwide. The survey conducted by OICA (Organisation Internationale des Constructeurs d'Automobiles), the International organization of motor vehicle manufacturers reported the yearly production of automobiles (passenger cars) from year 1999-2016. Figure 1 shows these statistics of the automobiles produced/year internationally.

Figure 1. Yearly production of automobiles (passenger cars) from year 1999-2016



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