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ANALYSIS ON LPC, RASTA AND MFCC TECHNIQUES IN AUTOMATIC SPEECH RECOGNITION SYSTEM

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ABSTRACT

This paper presents an analysis of three prominent feature extraction techniques—Linear Predictive Coding (LPC), RASTA (Relative Spectral Transform), and Mel-Frequency Cepstral Coefficients (MFCC)—used in Automatic Speech Recognition (ASR) systems. Each technique plays a critical role in extracting relevant acoustic features from speech signals that enable effective and accurate speech recognition. LPC is widely used for modeling speech signals and encoding them efficiently, while RASTA enhances feature extraction by compensating for distortions caused by environmental noise. MFCC, inspired by human auditory perception, is one of the most commonly adopted techniques in ASR systems due to its ability to capture the spectralcharacteristicsof speech.Thispaper compares these methods based on their performance, robustness, and computational complexity, providing insights into their strengths and weaknesses. The comparative analysis highlights how each method addresses different challenges in speech recognition and the contexts in which they are most effective. The aim is to provide a comprehensive understanding of these featureextractiontechniquesandguidethe choice of the most suitable method for specific ASR applications.

KEYWORDS: Automatic Speech Recognition (ASR), Linear Predictive Coding (LPC), RASTA, Mel-Frequency Cepstral Coefficients (MFCC), Feature Extraction, Speech Signal Processing, Acoustic Features, Speech Recognition Techniques, Signal Distortion, Noise Compensation.

1.INTRODUCTION

Everyday competitiveness between various shopping centres as and as huge marts is becominghigherintense,violentjustbecause of the quick development of global malls also online shopping. Each marketseeks to offer personalized and limited time deals toattract many clients relying on period of time, so that each item's volume of salesmay be estimated for the organization'sstock control, transportation andlogistical services. The current machine learning algorithm is very advanced and provides methods forpredicting or forecasting sales any kind of organization,extremely beneficialtoovercomelow –pricedusedfor prediction. Always better prediction is helpful,bothindevelopingandimproving

marketing strategies for themarketplace, which is also particularly helpful. A great deal of work having been gotten really intended to date the territory of deals foreseeing. Aconcise audit of the important work in the field of big mart deals isdepicted in this part. Numerous other Measurable methodologies, for example, withregression, (ARIMA) Auto-Regressive IntegratedMoving Average, (ARMA) Auto-Regressive Moving Average, have been utilized to develop a few dealsforecast standards. Be that as it may, deals anticipatingis a refined issue and is influenced by both outer and inside facto s, and there are two significant detriments to the measurable technique as set out in A. S. Weigendet A mixture occasional quantum relapse approach and(ARIMA) Auto-Regressive Integrated MovingAverage way todealwitheverydayfooddealsanticipating were recommend by N. S. Arunraj andfurthermore found that the exhibition of the individualmodel was moderately lower than that of the crossovermodel.

E. Hadavandi utilized the incorporation of "Genetic Fuzzy Systems (FS)" and informationgatheringtoconjecturethedeals oftheprintedcircuitboard.Intheirpaper,K-means bunching delivered K groups of allinformation records. At that point, all bunches were taken care of into autonomous with a data set tuningand rule-based extraction ability. Perceived work in thefield of deals gauging was done by P.A. Castillo, Sales estimating of new distributed books was done in apublication market the executives setting utilizingcomputational techniques. "Artificial neuralorganizations" areadditionallyutilizednearby incomeestimating. Fluffy Neural Networks have been created with the objective of improving prescient effectiveness,and the Radial "Base Function Neural Network(RBFN)" is required to have an incredible potential foranticipating deals.

2.LITERATURESURVEY

1) A comparative study of linear and nonlinear models for aggregate retails sales forecasting

AUTHORS: Ching Wu Chu and Guoqiang Peter Zhang The purpose of this paper is to compare the accuracy of various linear and nonlinear models for forecasting aggregate retail sales. Because of the strong seasonal fluctuations observed in the retail sales, several traditional seasonal forecasting methods such as the time series approachand the regression approach with seasonal dummy variables and trigonometric functions are employed. The nonlinear versions of these methods are implemented via neural networks that are generalized nonlinear functional approximators. Issuesof seasonal time series modeling such as deseasonalization are also investigated. Using multiple cross-validation samples, we find that the nonlinear models are able to outperform their linear counterparts in out-ofsample forecasting, and prior seasonal adjustment of the data can significantly improve forecasting performance of the neural network model. The overall best model is the neural network built on deseasonalized time series data. While seasonal dummy variables can be useful in developing effective regression models for predictingretailsales,theperformanceof

dummy regression models may not be robust. Furthermore, trigonometric models are not useful in aggregate retail sales forecasting.

2) Sustainable development and management in consumer electronics using soft computation

AUTHORS: Wang, Haoxiang Combination of Green supply chain management, Green product deletion decision and green cradle-to-cradle performance evaluation with Adaptive-Neuro-Fuzzy Inference System (ANFIS) to create a green system. Several factors like design process, client 13 specification,computationalintelligenceand soft computing are analysed and emphasis is given on solving problems of real domain.In this paper, the consumer electronics and smart systems that produce nonlinearoutputs are considered. ANFIS is used for handling these nonlinear outputs and offer sustainable development and management. This system offers decision making considering multiple objectives and optimizing multiple outputs. The systemalso provides efficient control performance and faster data transfer.

3) Data Mining based Prediction of Demand in Indian Market for Refurbished Electronics

AUTHORS: Suma, V., and Shavige Malleshwara Hills There has been an increasing demand in the e-commerce market for refurbished products across India during the last decade. Despite these demands, there has been very little research doneinthisdomain.Thereal-worldbusiness environment,marketfactorsandvarying customer behavior of the online market are often ignored in the conventional statistical models evaluated by existing research work. In this paper, we do an extensive analysis of the Indian e-commerce market using data-mining approach for prediction of demandof refurbished electronics. The impact of the real-world factors on the demand and the variables are also analyzed. Real-world datasets from three random e-commerce websites are considered for analysis. Data accumulation, processing and validation is carried out by means of efficient algorithms. Based on the results of this analysis, it is evident that highly accurate prediction can be made with the proposed approach despite the impacts of varying customer behavior and market factors. The results of analysis are represented graphically and can be used for further analysis of the market and launch of new products.

4) Forecasting Monthly Sales Retail Time Series: A Case Study 14

AUTHORS: Giuseppe Nunnari, Valeria Nunnari This paper presents a case study concerning the forecasting of monthly retail time series recorded by the US Census Bureau from 1992 to 2016. The modeling problem is tackled in two steps. First, originaltimeseriesarede-trendedbyusinga moving windows averaging approach. Subsequently, the residual time series are modeled by Non-linear Auto-Regressive (NAR) models, by using both Neuro-Fuzzy and FeedForward Neural Networks approaches. The goodness of the forecasting models, is objectively assessed by calculating the bias, the mae and the rmse errors.Finally,themodelskillindexis

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calculated considering the traditional persistent model as reference. Results show that there is a convenience in using the proposed approaches, compared to the referenceone.5)MultipleLinearRegression Analysis of the Overlay Accuracy Model Zone AUTHORS: Zone-Ching Lin, Wen-Jang Wu The multiple linear regression method was used to analyze the overlay accuracy model and study the feasibility of using linear methods to solve parameters of nonlinearoverlay equations.Themethodsof analysis include changing the number of sample points to derive the least sample number required for solving the accurate estimated parameter values. Besides, different high-order lens distortion parameters were ignored, and only the variousmodesoflow-orderparameterswere regressed to compare their effects on the overlay analysis results. The findings indicate that given a sufficient number of sample points, the usage of multiple linear regression analysis to solve the high-order nonlinear overlay accuracy modelcontaining seventh-order lens distortion parameters is feasible. When the estimated values of low-order overlay distortion parametersarefargreaterthanthoseofhigh-order lens distortion parameters, excellent overlay improvement can still be obtained even if the high-order lens distortion parameters are ignored. When the overlay at the four corners of image field obviously 15 exceedsthatnearthecenterofimagefield,it is found, through simulation, that the seventh-order parameters overlay model established in this paper has to be corrected by high-order lens distortion parameters to significantly improve the overlay accuracy.

3. EXISTINGSYSTEM

Auto-Regressive Integrated Moving Average,(ARMA)Auto-RegressiveMoving Average, have been utilized to develop afew deals forecast standards. Be that as it may,deals anticipating is arefinedissueand is influenced by both outer and inside factors, and there are two significant detriments to the measurable technique asset out in A. S. Weigend et A mixture occasional quantum relapse approach and (ARIMA) Auto-Regressive Integrated MovingAveragewayto deal with every day fooddealsanticipatingwererecommendby N.S.Arunrajandfurthermorefoundthatthe exhibition of the individual model was moderately lower than that of the crossover model.E. Hadavandi utilized the incorporation of “Genetic Fuzzy Systems (GFS)” andϖ information gathering to conjecture the deals of the printed circuit board. In their paper, K-means bunching delivered K groups of all information records. At that point, all bunches weretaken care of into autonomous with a dataset tuning and rule-based extraction ability. Perceived work in the field of deals gauging was done by P.A. Castillo, Salesϖestimating of new distributed books was done in a publication market the executives setting utilizing computational techniques. “Artificial neural organizations” are additionally utilized nearby income estimating. Fluffy Neural Networks have beencreatedwiththeobjectiveofimproving prescienteffectiveness,andtheRadial“Base Function Neural Network (RBFN)” is required to have an incredible potential for anticipating deals.

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DISADVANTAGESOFEXISTING SYSTEM:

Complex models like neural networks are overkill for simple problems likeϖ regression.Existing system models prediction analysis which gives less accuracy.ϖForecasting methods and applications contains Lack of Data and short lifeϖ cycles. So some of the data like historical data, consumer-oriented markets face uncertain demands, can be prediction for accurate result.

PROPOSEDSYSTEM:

The objective of this proposed system is to predict the future sales from givenϖ data of the previous year's using Decision Tree RegressionAnotherobjectiveistoconclude the best model which is more efficient and givesϖ fast and accurate result by using Decision Tree Regression.To find out key factors that can increase their sales and what changes could beϖ made to the product or store's characteristics.Experts also shown that a smart sales forecasting program is required to manageϖ vast volumes of data for business organizations.We are predicting the accuracy for Decision Tree Regression.Ourpredictionsϖhelp big marts to refine their methodologies and strategies which in turn helps them to increase their profit. The results predicted will be very useful for the executives of the company to know about their sales and profits. This will also give them the idea for their new locations or Centre‟s of Bigmart

ADVANTAGESOFPROPOSED SYSTEM:

Business assessments are based on the speedandprecisionofthemethodsϖusedto analyze the results. The Machine Learning Methods presented in this research paper should provide an effective method for data shaping and decision-making.New approachesthat canbetteridentifyconsumer needs and formulateϖ marketing plans will be implemented.The outcome of machine learning algorithm will help to select the most suitableϖdemandprediction algorithm and with the aid of which BigMart will prepare its marketing campaigns.

4. OUTPUTSCREENS

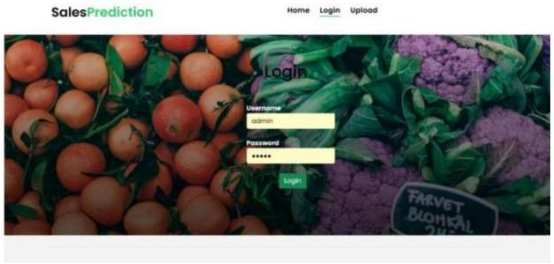

FIG4.1Log INPAGE

Fig4.2DataCollectionFromKaggle

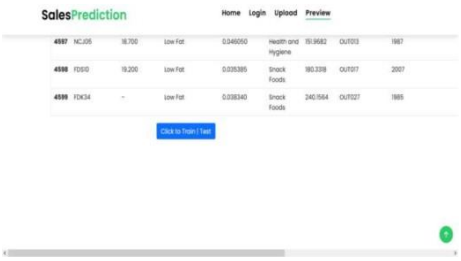

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Fig4.3PrepocessedDatasetOfBigmart Sales

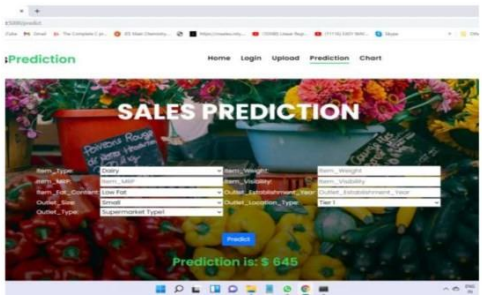

Fig4.4Prediction OfSalesOfAProduct

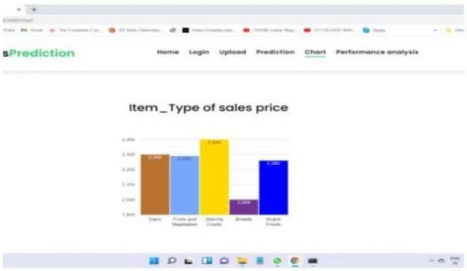

Fig4.5ComparisionGraphOnSalesOf Item Type

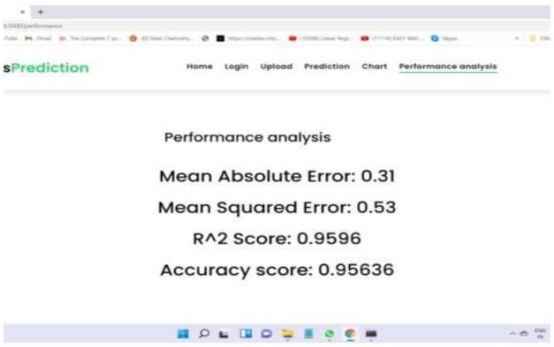

Fig4.6PerformanceValuesOfProposed Model

5. CONCLUSIONS

In this work, the effectiveness of various algorithms on the data on revenue and review of, bestperformance-algorithm, hereproposeasoftwaretousingregression approach for predicting the salescentered on salesdatafromthepasttheaccuracyoflinear regression prediction can be enhanced with this method, polynomial regression, Ridge regression, andXgboost regression can be determined. So, we canconclude ridge and Xgboost regression gives thebetterprediction with respect to Accuracy, MAE and RMSE than the Linear and polynomial regression approaches.In future, the forecasting sales and building a sales plancan help to avoid unforeseen cash flow and manage production, staff and financing needsmoreeffectively.Infutureworkwecan also consider with theARIMA model which shows the time series graph

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