

Enterprise Resource Planning using Sentiment Examination



Abhishek Mathapati, Deepthi K

Abstract: Enterprise Resource Planning(ERP) is a successful implementation to simplify the business process. The ERP system is an digitalized process of the company from manual updating to automated update.ERP system is a web-application that can be used by all the employees from anywhere and anytime where the data is stored in the centralized database and also ERP is used to assign the task to the particular user automatically based on reviews provided. The application mainly have 4 types of users namely Admin, Telecaller, Marketer and Developer. The admin has the authority to add employees, assign the roles and also has access to view all the information updated by different employee of the organization. The Telecaller will make calls to the client to fix the meeting and update the information in the application such as Name, address, meeting date etc. This information is visible to the marketer who will be meeting the client on the fixed date and discuss about the project. The marketer then update the status about the meeting in the application along with the client review. Based on client review, naïve bayes algorithm is used to classify the review into positive and negative review. If the review is positive then the project is directly assigned to the developer else if the review is negative the status is updated to the admin so that the admin can provide proposals or can fix meeting again for client satisfaction and confirmation. After developer get assigned to project, developer starts the project and send demo to the admin. The approval of the demo is done by admin then the developer completes the project and hosts the particular project. By this system the goal of digitalization and assigning the task to the employees automatically can be achieved.

Keywords: ERP system, naïve bayes, admin, telecaller, marketer, developer.

I. INTRODUCTION

The Enterprise system resource covers all the productivity like manufacturing, human resource, payable, inventory, selling and distribution, receivables, purchase and accounts. Enterprise resource planning performs major activity to increase customer/client service to enhance the corporate.

The ERP systems combine the business processes in different types of organisations, offer enormous advantages to the association in productivity, efficiency, cost reduction and quality/healthy management. The enterprise resource planning system offers service for client to merge the business management by providing all possible functional area. Implementation of enterprise resource planning system is very less cost effective.

Sentimental analysis helps an organization to integrate their business process and helps to provide better service to users. Sentimental analysis is used to examine the review given by client in text pattern. The machine learning algorithm basically naïve bayes algorithm is used to classify the review into negative and positive reviews given by the client. The IMDB dataset is used for the recognition of review into positive or negative. The IMDB dataset is a movie dataset which contains huge amount of data along with many emotions such as positive and negative data. The analysis of data helps to identify the review as positive or negative and assign the task automatically to the particular employee. Naïve bayes algorithm provides the best accuracy compared to other algorithms in this particular case.

II. LITERATURE SCAN

ON singh, UG singh et al [1] proposed a spadework for ERP. According to the spadework the strength of an ERP is a computerized transactional information system, with a centralized data repository. This allows for notable data availability and seamless combination between the business functions. Realizing associated benefits through an ERP implementation is challenging as experienced by a South African water utility system. The centralized database is used to store the data but the main disadvantage in this framework is only one user has access to update each and every activity performed by the employees of the organization which is time consuming as well as less efficient[1]. Małgorzata Nycz et al[2] proposed The ERP System As a Basic System for Business Analyses. This system gives brief description of implementing enterprise resource planning system in selected water park in Poland. This paper shows the disadvantages in business intelligence for selected business. The system explains that the ERP is successful in hardware components and also able to manage operations of waterpark. In this paper the identified key areas are to provide better customer service, facilitating the sale of goods and services and protection from abuse in the business sphere. Eic Nilson et al[3] proposed enterprise resource management system for knowledge transfer.

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Basically this paper explains that there is flow of knowledge (data/information) from one point to other point using ERP implementation architecture. The major drawback is there is flow of data to every employee of the organization. Example: From manager to all employee of his team. Even though some employee don't need that data they will receive the data. Mahrami et al [4] proposed ERP system in business organization.

To prospect ERP features the system is designed, effectiveness of its system and its execution in selected organizations in Oman. The study measures the user's satisfaction and its capacity to support and help the associations in their quest of solving major complex problems and other types of operations. An online questionnaire and survey is designed which is shared through Google Docs to measure the effectiveness and its user features for both governments and private sector organizations in Oman. The collected data is analyzed by using Excel and SPSS software. R. Agarwal et al[5] explains J48 algorithm as it is grader based on a decision tree which is used to generate rules for the target terms prediction. It has an capacity to deal with enormous training datasets. This algorithm is applied to the proposed system on reviews which classifies emotions into branches and nodes to predict the sentiment in the reviews. Large amount of data is trained but the accuracy level is less compared to random forest algorithm. The major drawback of J48 algorithm is it takes more time for the analysis of data. Lu, X et al[6] made sentimental analysis in sales using ERP system. The database stores flow of data from starting of project to the submission of project. Sentimental analysis is used to predict the value of the product as well as the demand of the product based on previous year record. Trieu Thi Van Hau et al[7] proposed a change management strategy for the successful implementation of enterprise resource planning systems. In this paper the author used a strategies to incorporate powerful communication, peak management assist, worthwhile training and knowledge bear, project conqueror and coherent systematic planning using ERP system. Ms.K.Mouthami et al[8] proposed sentiment analysis and classification based on textual reviews. Mining is used to extract large amount of data for analysis. Sentiment analysis is used for prediction of emotions in the given text or reviews. Sentimental analysis used to classify the user opinion in a given reviews. Dey L et al[9] proposed sentimental analysis of review datasets using Naïve Bayes and KNN classifier. Naïve Bayes classifies negative and positive words in the given reviews. It identifies emotions of the person in the given review. KNN groups the similar type of words which has classified from naïve bayes classifier.

III. METHODOLOGY

The ERP system is a digitalized process of the company from manual updating to automated update. The ERP system is a web-application that can be used by all the employees from anywhere and anytime where the data is stored in the centralized database and also ERP is used to assign the task to the particular user automatically based on reviews provided. There are basically four roles namely: Admin, Marketer, Telecaller, and Developer. These four users are front end of

web application for the enterprise. The web pages are used to store the data and update the information automatically using advanced tools

Presently some enterprises are using excel sheet to update and store the information regarding their project development. It is very difficult to store the data in excel sheets and also difficult to update the information on daily basis. Sometimes the data stored in excel sheet can be lost if system get crashed, hence ERP web application with centralized database is required to prevent the loss of data.

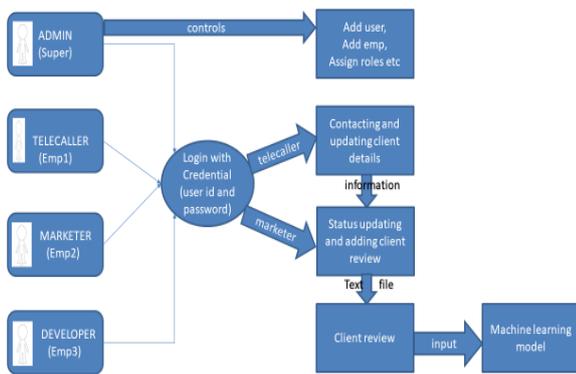
To store the data, SQL database is used. The analysis of reviews given by the client and marketer is done using naïve bayes algorithm. Naïve bayes algorithm gives the best result and accuracy of the analysis. Below is the procedure and roles of four user:-

1.Telecaller: The telecaller make calls to clients and fix an appointment with the client. Then telecaller update the information such as Name, Address, Contact information etc in the application.

2.Marketer: The marketing team will then get the notification on the assigned day to meet the client and discuss about the project, marketer may get approved from client or client can choose other options like follow-up to the next meeting or not interested or meeting successful. After that, marketing team user will update the meeting status (like client agreed or not to the Admin from his location) along with the review given by client.

3.Developer: Both marketer and clients reviews are analyzed. Using machine learning algorithm basically naïve bayes algorithm is used to classify the reviews given by the client. Naïve bayes algorithm is used to find the probability of the given review into positive or negative tag. If the provided review is positive after analysis then the particular project is automatically assigned to the developer else the status is updated to the admin so that the admin can provide better offers or setup another meeting. Once the project is assigned to the developer the developer starts the project and prepare a demo based on the project and provide the demo URL to the admin. The Admin then approves the demo and that notification of demo approval is sent to developer. After the approval the developer starts developing and host the project within the given deadline. All the activity performed by the developer is updated to admin simultaneously.

4.Admin: Admin has access to all data and maintains the enterprise by assigning the works to every employee. The admin has authority to add new employee, assign roles to employees and also to assign task to employees. Basically admin has authority to access all the information and able to trace the every activity of the employee. The flow of application is shown in below figure:-



IV. EXPERIMENTATION

To develop the web application as described above, the following technical tools are required:-

1]PHP:- Hypertext Pre-Processor is a server-side scripting language. It is designed for web development and used as general purpose programming language. This can be embedded with HTML (Hyper Text Mark-up Language). Various templates will include HTML and PHP for website designing. It can be deployed in any type of server and it is easy to use.

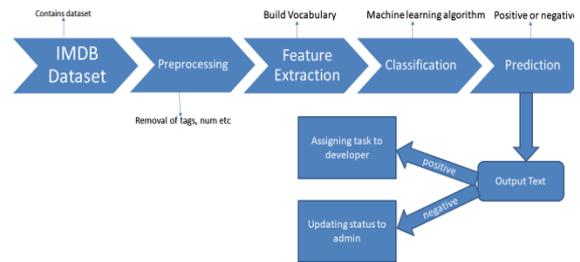
2] SQL Server:- PDO (PHP Data Objects) is used for Database Access. PDO is used for database access and provide a uniform methodology for accessing multiple databases. It is not dependent on specific syntax, but can allow for the process switch to multiple databases.



3]AJAX :- Mostly XML and Asynchronous JavaScript is a technique used to make the web pages which runs faster. The web pages which are programmed with AJAX will react faster and load the page faster by sending a small bit of information to the web server. The pages written with AJAX are loaded faster because only a small bit of data is loaded in the client system. It uses Java script and when it is reloaded it will not reload the full page. The browser data will be cleared after reloading the page when AJAX code is used. AJAX is client-side scripting language where the data used is stored in server-side.

4]Bootstrap:- Bootstrap is most popular HTML JAVA framework, CSS for developing responsive and mobile applications. It is a front end library to design web page and web application. It contains HTML and CSS based design for forms, buttons, labels and some other user interface components. It is used for good and successive web pages with complex designing and user interface. Bootstrap is used to divide the section of web page as needed. Each section can be easily designed and made easy for user to work with it. The above tools are used by naïve bayes algorithm to develop the web application and to classify the reviews given by the

client. The flow of classifying and analysing the review is shown in figure below:-



The IMDB dataset is a movie dataset which contains huge amount of data along with many emotions such as positive and negative data. The pre-processing phase is used to remove unwanted tags, numbers and special characters which has no meaning. This phase also remove the meaningless words. The pre-processing phase also helps to remove the unwanted texts from the review given by client so that the feature extraction and classification can be done with less conflict. In feature extraction, the vocabulary is built from the sentence provided and the stem word is found for each of the word present in the review for example:- stem word for interesting is interest. The final phase is classification which is done by naïve bayes algorithm to classify the review into positive and negative reviews. In naïve bayes algorithm basically the probability of the given review is calculated for both positive and negative tag. Based on values obtained by calculation it is decided that whether the given review is positive review or negative review.

V. MATHEMATICAL MODEL

A documentation is an ordered sequence of word events in the multinomial model which are drawn from the similar vocabulary V. Assume that the length of documents are individualistic of class. Again with the same naïve bayes speculation: In a document the probability of each word event is independent of the word’s context in the document and position. Thus, each document d_i is drawn from a multinomial model distribution of words with as many independent trials as the length of d_i. This results the familiar “bag of words” illustration for the documents.

$$P(c | x) = \frac{P(x | c) P(c)}{P(x)}$$

Likelihood
Class Prior Probability
Posterior Probability
Predictor Prior Probability

$$P(c | X) = P(x_1 | c) \times P(x_2 | c) \times \dots \times P(x_n | c) \times P(c)$$

In calculating the given text either review is positive or negative the naïve bayes model is used which provides more accuracy compared to any other algorithm. Smoothing method is also used to divide the probability into chunks to avoid getting zero probability in calculation.



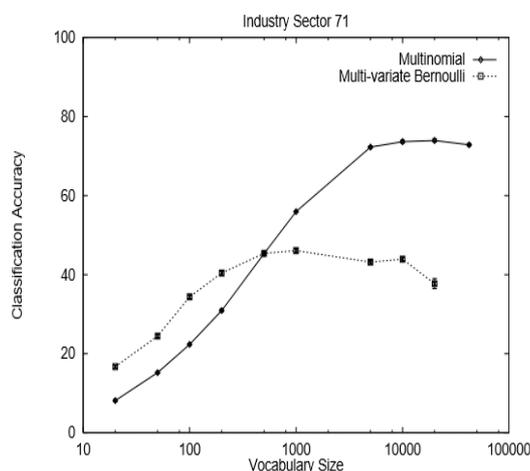
VI. RESULTS

Based on Unit testing results, each and every single module of application is working (user login with proper username and password). By integration testing, all the information is saved properly in database and information is updated properly to another required user. Finally based on system testing the entire system is working as expected such as web page loading, web page respond etc.

By comparing the multinomial and multivariate algorithm of naïve bayes, the multinomial naïve bayes algorithm is efficient than Bernoulli algorithm. The comparison is done between multinomial and Bernoulli for different vocabulary size and obtained different accuracy as shown in below table:-

SI No	Vocabulary size		Classification accuracy	
	Multinomial	Bernoulli	Multinomial	Bernoulli
1	25	25	7	14
2	75	75	14	22
3	100	100	20	35
4	225	225	30	40
5	775	775	45	45
6	1000	1000	55	46
7	7075	7075	70	42
8	10000	10000	72	43
9	50000	50000	72	39
10	75000	75000	72	-

Based on above values the below graph is plotted which clearly shows that as the vocabulary size increases the accuracy of multinomial algorithm increases and accuracy of Bernoulli decreases after some particular point.



By the above graph it is clear that multinomial naïve bayes algorithm provide 96-98 percentage of accuracy as compared to other algorithms.

VII. CONCLUSION

ERP system will reduce all the manual work of the employees and administration. The manual data entry work is converted into automated work. The employee who was working in a

single place with a desktop, can now work at any time and from anywhere.

The entering of data to excel sheet and storing in a single system consumes more time and energy which is resolved by using ERP system with centralized database. If any employee is in need of some data, then they need to contact the administrator for data. Hence ERP System is automated to web application with a centralized database so that users can access the data and also share the data with the employee and team members. The main usage of the application is assigning task to the particular user automatically based on review provided by the client during marketer and client meeting. By this method the time is saved and also the development process gets faster.

The application is successfully working as expected from development side and the client side as well.

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