Prediction of sales in Supermarket

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Abstract— Most of the vendor, shopkeeper like to estimate the future trades. Many household products are sold by various shopkeepers of the retail store, stores are geographically located at various locations. Supply chain inefficiencies occurs, when market potential is not evaluated by the retailers. Many times it is not easy for retailers to understand and predict the market condition. Predicting system will help to overcome the problem faced by the retailers as well as whole-sellers of grocery stores. The aim of this project is to predict the future sales of the item according to the need of customer. The application will come-up with quick and accurate results, which will also contain the graphical representation. In recent time prediction is gaining more attention, may be due to the fact that if the trend of the market is successfully predicted the vendor may be better guided. The Prediction helps to know the Retailers the demand of the product. The project attempts to predict whether the products are in stock or not and the product scope in the future will be higher or lower than it is on a given day .It encompasses a variety of statistical techniques from Data Mining, Prediction Modelling that analyst current and historic fact to make Prediction about future.

Keywords— Key Data Mining, Prediction, Java, Naive Bayes**.**

1. INTRODUCTION

As we all are very curious about our future ,and very excited to know about what will happen in next moment? Similarly retailers, shopkeepers are also excited to know about there business, sales, and many other factors. By acquiring some measures which can cause damage or reduce the profit can be avoided. The main aim of Prediction is predict the sale of items as per the customer requirement on the basis of historical data. The retailers sell the household products to gain Profit, there are many grocery stores located at different geographical location most of the time retailers fail to understand and fulfil the customers need due to inefficiency of product and daily changing needs of customer. This increase the communication gap between customer and retailers. To avoid this types of Problems which may reduce profit in the business, we can study the historic data of purchase and sell and by analyzing the Historic data we can predict the future sale of the product. The sale of the Product changes by change in season. Consider an example sale of dry coconut is more in the season of winter in the geographical region like Maharashtra

Prediction software will help to predict the sale of product by analyzing the historic data, which will help to guide the retailer in the major factor like financial investment .Many retailers are interested in financial investment but they need time to time guidance and accurate result .Because many of the time retailers ignore randomness. In this paper we predict the sale by using three modules they are, MySQL, java, holtwinters. MySQL is Relational Open source Database which will store the Historic data. Java is High Level Programming Language which is used for Processing Data. Java interface provide interface between data stored in the database and user. Holtwinters provide interactive visualization of data in the form of statistical graph.

2. RESEARCH BACKGROUND

A. Fundamentals

The main aim of software is to obtain maximum profit by knowing the future scope, item sale and where to invest profitably. To be successful the organization should be able to know the customers requirement of each store in an assigned geographical region, the several combination of region, several combination of location of allocation options, the options are evaluated with certain models of algorithm this is helpful in final decision of configuration of store network.

According to the search information Supermarket is a chain, with stores of all around the country and its current board set out a challenge to all the Data Scientist out there to help them create a model that can predict the Sales, Per-Product for each store. Store has collected the information of Sales data from previous year with the information owner hopes we can identify the products and this information helps them to take correct measures to ensure the success of their business.

B.Challenges

There are many challenges in the retail store network planning some of them are retailers fail in the evaluation of potential of the market. Many retailers, shopkeepers ignore the seasonal randomness. The inefficiencies, occurs in the supply chain when the products have great demand and they are not available. The retailers face the difficulties in inventory management system. Many of the time retailers ignore the competition in the market.

3. LITERATURE SURVEY

A. Spectrum Software[1]

The Retail market of today has never been more challenging due to global competition.

From simplicity at the Point of Sale (POS) to the complexity of a complete company overview with the mere click of a mouse - Spectrum is the future of retail, delivering the retail experience of tomorrow, without the wait.

i. Pros

- Unified Multi-Channel Customer Experience
- Rapid Mind to Market: Real–time Execution of Complex Retail Strategies
- Multi-Platform, Multi-Device Capability
- Customer Loyalty Program with Central Management and Local Flexibility
- Business Intelligence Engine for Dynamic Business Decisions and Strategizing

ii. Cons

- High complexity
- Seasonal prediction

B. Sleek Bill[2]

Sleek bill is a simple and efficient Indian billing software which has been specially designed for the Indian market. The software assists in making your invoicing operations efficient. It is a fast and highly scalable solution which can be used to generate quick and detailed reports, backup/restore data, print/e-mail invoices, and perform GST calculations.

Helps create GST compliant invoices along with the bill of supply with ease.

i. Pros

- It is easy to use and navigate
- It helps in the creation of standard invoices
- Provides good user experience
- Has a well-designed UI
- Provides excellent customer support

ii. Cons

- It has small fonts
- Receipts and reports can only be exported in limited formats such as excel.

C. Marg Software[5]

MARG ERP 9+ is an on-premise ERP solution used by small, midsize and enterprise businesses. It offers different modules customized to the needs of retailers, distributors and manufacturers in a variety of industries. The solution offers android apps for customers, storeowners and suppliers.

i. Pros

- Marg erp software is a solution to manage all types of sales, distribution and education of multiple business unit.
- It manage different business unit using same software without paying any additional cost

ii. Cons

- No multi-currency transactions
- No Linux supports.
- Only android platform

4. METHODOLOGY[6]

Holt in the year 1957 and Winters in year 1960 extended Holt's method to capture the seasonality. The Holt-Winters seasonal prediction method comprises the forecast equation and three smoothing equations — one for the level ℓt, one for the trend bt, and one for the seasonal component st, with corresponding smoothing parameters α, β∗ and γ. We use m to denote the frequency of the seasonality, i.e., the number of seasons in a year. For example, for quarterly data m=4, and for monthly data m=12

There are two variations to this method that differ in the nature of the seasonal prediction. The additive method is chosen when the seasonal variations are constant through the series, while the multiplicative method is chosen when the seasonal variations are changing with the level of the series..

Holt-Winters' additive method

The component form for the additive method is:

$$y_{t+h|t}=\ell t+hbt+st+h-m(k+1)$$

$$\ell t=\alpha(yt-st-m)+(1-\alpha)(\ell t-1+bt-1)$$

$$bt=\beta*(\ell t-\ell t-1)+(1-\beta*)bt-1$$

$$st=\gamma(yt-\ell t-1-bt-1)+(1-\gamma)st-m,$$

where k =integer part of (h−1)/m,

(yt−st−m)=seasonal observation

(ℓt−1+bt−1)= Non seasonal prediction for time t.

(yt−ℓt−1−bt−1)=Average between current seasonal index and seasonal index of same season

The equation for the seasonal prediction is often expressed as

st=γ∗(yt−ℓt)+(1−γ∗)st−m..

Holt-Winters' multiplicative method

The component form for the multiplicative method is:

yt+h|t=(ℓt+hbt)st+h−m(k+1)

ℓt=αyt/st−m+(1−α)(ℓt−1+bt−1)

bt=β∗(ℓt−ℓt−1)+(1−β∗)bt−1

st=γyt/(ℓt−1+bt−1)+(1−γ)st−m

5. PREDICTION PROCESS

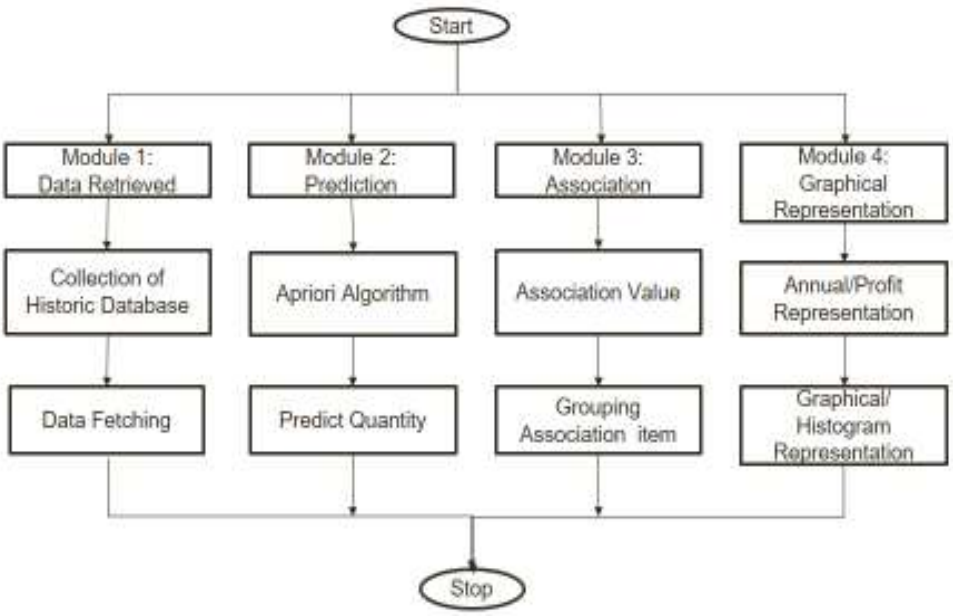

Fig-1: Architecture

The software is divided into four modules they are Data Retrial Module, Prediction Module, Association Module, and Graphical Representation Module.

A. Data Retrieval Module:

Data is collected from Historical Database as a source. Data will be fetched from existing billing software. Data may be in any format, this data will be converted into pdf format for further analysis.

B. *Prediction Module:*

Fetched data will be compute using Naive Bayes algorithm [3] and Holtwinters algorithm. Predicted values will be obtained from the processed data.

C. *Association Module:*

Arrangement of frequent item set in store according to the perspective of customers by using Apriori algorithm. Example: Milk, butter, bread.

D. *Graphical Representation Module:*

Generated Result will be displayed in Graphical format of above module.

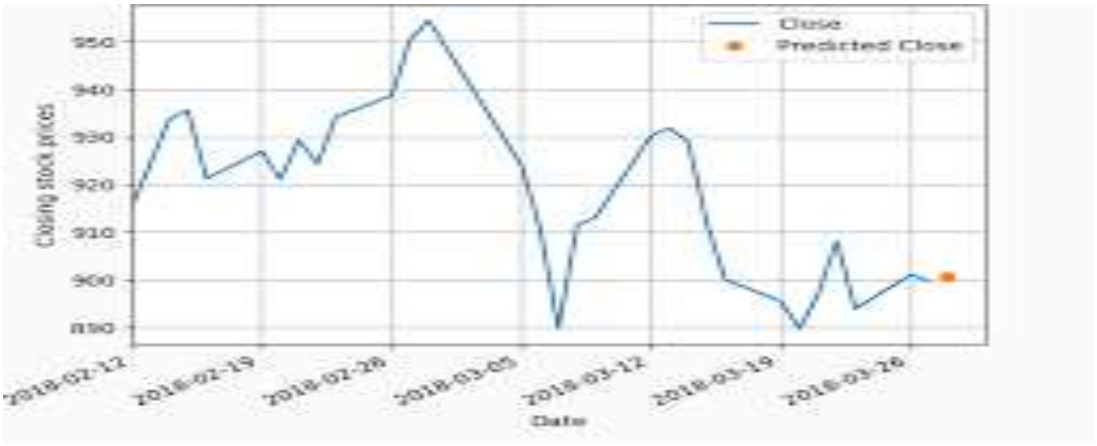

Fig-2: The sales prediction.

6. MATHEMATICAL MODULE

Appendix A:

System S as a whole can be defined with the following main components.

S= {I, O,}

S=Software

Input I = {Input1 }

Where,

Input1=Database or historic data

Output O = Output1

Where,

{Output}=Predicted quantity given

{Initial State}= Attachment of historical data.

{Final State}= Display Predicted value

Feasibility Study:

A key part of the preliminary investigation that reviews anticipated costs and benefits and recommends a course of action based on operational, technical, economic, and time factors. The purpose of the study is to determine if the systems request should proceed further.

Technical Feasibility:

The system being developed is economic. It is cost effective in the sense that it has eliminated the registered work completely. The system is also time effective because the calculations are automated which are made at the end of the

paper or as per the student requirement. The result obtained contains fewer errors and are highly accurate as the data is required.

Economic feasibility:

The technical requirement for the system is economic and it does not use any other additional Hardware and software.

Behavioural Feasibility:

The system working is quite easy to use and learn due to its simple but attractive interface. User requires no special training for operating the system.

Feasibility Assesment:

A key part of the preliminary investigation that reviews anticipated costs and benefits and recommends a course of action based on operational, technical, economic, and time factors. The purpose of the study is to determine if the systems request should proceed further.

Three key considerations involved in the feasibility analysis are:

Economic Feasibility Technical Feasibility Operational Feasibility

Economic Feasibility:

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Technical Feasibility:

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8. CONCLUSION

From the analyzed data we obtain relevant data, we conclude that our proposed model gives the accurate predicted results to the grocery store about the sales, and future scope of product according to seasonal randomness. The predicted results are much more closer to the actual result which will increase the profit. This model can further be improved by working on Accuracy of Predicted result.

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