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# Certificate

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# Application of RFM (Recency, Frequency, Monitory) Analysis in Healthcare's

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***Abstract*—The emerging and out fast growing technology Big data is data sets that are so voluminous and complex that traditional data-processing application software are inadequate to deal with them. Big data challenges include capturing data, data storage, data analysis, search, sharing, transfer, visualization, querying, updating, information privacy and data source. In the area of health care it places a very important role for analyzing the Varity of information regarding the sales, diseases and in the generation of reports for NGO (Non Govt. Organization) and other organization. As the amount of data generated by health care is very important and by applying RFM (Recency, frequency, monitory) analysis with the huge data generated by healthcare will result in the accurate predictions of diseases, sales of medicines in the particular regions and this approach will help in Varity of prospective for taking the corrective measure to make business intelligent.**

***Index Terms*— RFM** (Recency, Frequency, Monitory**),** Business Intelligence (BI), Big Data.

## I. INTRODUCTION

**Business Intelligence (BI)** is a technology with software tools that transforms the raw data sets into meaningful information for business analysis. The main aim of BI is to generate new strategies that helps and pushes the firm to increase profit level in this competitive business world. And helps to Identify new opportunities and implementing an effective strategy based on insights can provide business with competitive market advantage and long term stability. The **Big Data** is a surrounding of many data sets and these data sets are big and complex to process by traditional data processing applications. The technical means of building a BI system is to Identify and collect the data that resides in various internal and potentially external sources and to make that data available for reporting and analysis. Almost every application in an enterprise collects and stores data, and usually the data will reside in a relational database, but could also be stored in other formats.

RFM stands for Recency, Frequency and Monetary value. RFM analysis is a marketing technique used for analyzing customer behavior such as how recently a customer has purchased (recency), how often the customer purchases (frequency), and how much the customer spends (monetary). This RFM technique can be applied to healthcare's as how much medicines customer has purchased, how often customer purchases medicines, and how much the customer spends money. From this information we can accurately decide which disease are there in particular region and the number of patients increased or decreased and the amount of medicine sales with respect to particular company, quality, and volume.

## II. LITERATURE REVIEW

[1]The major drawback of healthcare is record keeping such as maintaining the patient data, requirement detail and other information in hard copy form this paper provides modern digital solutions to improve and provide cost effective, quality structure for maintain the large amount of data of health care's. This result in disease surveillance, population health management, supports clinical decisions.

[2] This paper delivers research importance on business intelligence and big data analytics with evidence based medicine practices and describes how analytics can be used to support EBM (Evidence based medicine) as each hospitals maintains evidence of patients and research generates the trails, day to day information from hospitals will give rise more and more opportunities for structuring and analyzing data.

[3] This paper is giving the business analysis framework for identifying the evolution, applications, and emerging research areas of business intelligence and analytics. The present research in the field of business intelligence and analytics is analyzed along with challenges and opportunities rested with BI&A (Business intelligence and application), research and education are identified. Authors are giving BI&A 1.0 for structured data which help in the analysis of data and text, BI&A 2.0 for un structured data which help in web analysis, BI&A 3.0 mobile and sensor based content for mobile and network analysis. The BI & A 1.0 data analysis influenced our work.

[4] RFM (Recency, Frequency and Monetary) model applied by much business in the areas like long history, particularly in direct marketing. By introducing this approach the company management can effectively identify valuable customers and then develop effective marketing strategy. This paper aims to provide a comprehensive review on the application of RFM model. This paper provides a comprehensive review on the application of RFM model. And depicts the definition and the scoring scheme of RFM. Later, this paper summarizes how RFM model has been applied in various areas

[5] This paper is giving the insight of high responsive customers in marketing promotions and improve overall response rate. This helps in decision making, Future revenue forecast, Customer profitability, Predictions concerning the alteration of customers. In this Paper it is shown that the knowledge of RFM scoring of active users can rank them according to the pyramid mode.

## III. PROBLEM DEFINITION

By Combining Business intelligence, big data, and RFM analysis will create very good opportunities because these three techniques helps in growth of business which is essential in modern competitive business world. It will lead to competitive advantage for our internal business management and strategy development.

Competitive world demands the new technique for the growth of the business. The Business Intelligence with big Data and RFM Model help this fact because it has fantastic growth capabilities which help to meet the demands. Here you are going to create the solutions and design infrastructure so that we can give the best alternative for the problems of health care data analysis. We can derive many plans which help in betterment of healthcare business, For example:

**Customer Profitability**
If a particular customer is purchasing the medicines in particular healthcare center like medicals, hospitals etc. what are the discount offers that he can get?

**Increase Sales**
By analyzing the overall data that he had over a period he can predict the future sales, decide discount offers.

**A mean of comparison**
Consider the specific city, in this specific region let us consider we have around 20 medicals we need a way to compare the sales reports and status of the medicals down to each level. The existing approach has web enabled maintenance system with some amount of storage which is used by stand alone medicals or by group of braches.

## IV. PROPOSED WORK

This paper proposes an application which generates the comparative sales report from this report we can analyze the number of sales of each medicines with respect to particular city. From this we can decide further option to grow business of healthcares industry. By having a sight on medicine sold over a period we can clearly survey incline or declined number in the diseases and in finding the reason of sales in particular medicines, it is possible to learn the customer behavior why he purchased particular

medicines regularly over a period this helps the healthcares to plan the strategies to increase the profit. The information generated by combining the sales report of medicals can be used by some of the NGO for the necessary needs. Totally it is the technological survey idea without the physical presence of sales person. The RFM analysis has been used in many of the business like retail industry, banking, insurance, shopping portals to study the needs and behavior of the customer in this paper the same idea is applied to healthcare.

**Identification:** a fact that the healthcare still lags in incorporating BI, and all healthcares have intension to grow in size. But this adoption of BI helps to make good strategy and calculated thinking. It not only helps in growth but also in quality. Will healthcare business intelligence (BI) be the answer that hospitals are looking for as they move to data-driven healthcare improvements and cost reductions? Yes … provided it's built on the foundation of a data warehouse.

The technical means of building a BI system is to:
1) Identify and collect the data that resides in various internal and potentially external sources.
2) To make that data available for reporting and analysis.

Almost every application in an enterprise collects and stores data, and usually the data will reside in a relational database, but could also be stored in other formats. In our work we are planning to implement a small business intelligence which helps in extracting features like percentage of drug sales in a particular area, sales drop down in particular area, sales abrupt increase in particular region under consideration etc which in terns gives inputs for identifying and finding solution for following questions which technically called as data mining

Why a sale of a particular drug has increased?
Why a sale of a particular drug has decreased?
Why a sale of a drug has increased abruptly?
How nutrition drug can be increased?
How to calculate average percentage of drug required to specific location?

By taking monthly sales report of the medicals we are going to analyze the diseases and then the organization can decide which product has the highest sales rate so that organization can decide next move for the benefits. And we can create the social awareness of the disease increase and decrease by comparing the data on the monthly or weekly basis. It also helps to some of the NGO who wants to serve the people.

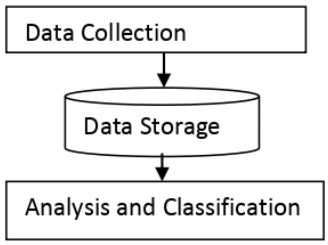


Figure 1. The above Flowchart Describe the dataflow in the application.

The data can be collected from the Hospitals and Medical shops and also from the Diagnostic centers in this work we have considered the shimoga city hospitals both government and private and many of the medical and also some of diagnostic centers. Collected data is stored in the local database as different entities from these data we are analyzing which type of disease is there in the particular area. For example consider the medical shop of gandhinagar area if the diabetics tablets are selling more compare to other then diabetic patients are more in that particular area likewise we can judge what are the diseases are there? And our analysis helps to take remedial action.

Form this we are classifying the business to take necessary action for the future improvement. Medicals can see sales report regularly and can order the fast moving drugs. Drug manufacturing company's can decide and improve their business, for government and NGO's can view the information to help the needy of people, in this modern era health is wealth the medicine company's and medicals and hospitals are providing good health care service all are generating the large amount of data on a daily basis so we can collect and segment the information and make analysis for improving business of medicals hospitals and drug manufacturing companies. As the world is growing faster the amount of data adding day by day is very huge and maintenance of this data is also a difficult task the

use of data warehousing and Business Intelligence provides hard and useful infrastructure so that users can meet the modern business management and it also helps internally for the growth of the organization.

The outcomes of this project will satisfy the life needs and it will wow our customer because the design and technology will meet the demands. While working with the project we created a data set of 60000 entries and then estimated the percentage of the diseases based on the amount of tablets sold in the medicals and hospitals. The below chart will give the clear information about the percentage factor of the disease in the particular city like this we can implement this globally.

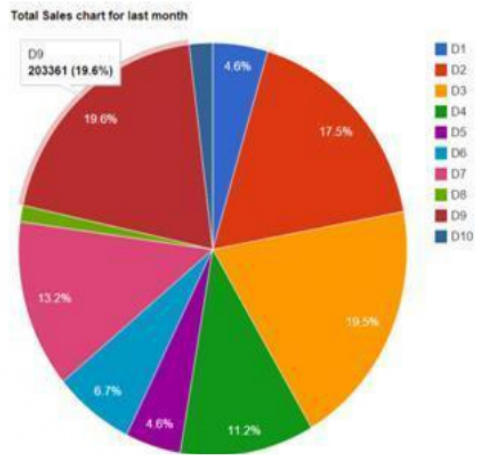


Figure 2: The above chart indicates the 10 different types of diseases. Percentages in the graph are the amount of the diseases in the particular area example shimoga city. The graph is the result of the application which indicates the diseases percentage chart is generated based on the amount of medicines sold by the each medical of a particular city.

## V. CONCLUSION

The Big Data, RFM analysis and Business intelligence enabled projects will help organization in wide range of prospective the application of RFM analysis can lead organization towards profit. Understanding these concepts and how to apply them within the process groups will help you manage these projects successfully. RFM analytics can provide to improve the applicability of medical investigative studies. It provides an opportunity to make possible to find the effective and precision estimation of disease and evaluation of the sales report of the drugs so that the drug organization can decide the further steps in business. The analysis helps to take future profitable measures.

## REFERENCES

[1]. Wullianallur Raghupathi, Viju Raghupathi "Big data analytics in healthcare: promise and potential".

[2]. Omar El-Gayar, Prem Timsina, "Opportunities for Business Intelligence and Big Data Analytics in Evidence Based Medicine"

[3]. Hsinchun Chen, Roger H. L. Chiang, Veda C. Storey "BUSINESS INTELLIGENCE AND ANALYTICS: FROM BIG DATA TO BIG IMPACT"

[4]. A Jo-Ting Wei 1 , Shih-Yen Lin 2 and Hsin-Hung Wu 3 "review of the application of RFM model"

[5]. VASILIS AGGELIS ,WINBANK, PIRAEUS BANK, Athens GREECE "Customer Clustering using RFM analysis"

[6]. Hsinchun Chen, Roger H. L. Chiang, Veda C. Storey "BUSINESS INTELLIGENCE AND ANALYTICS: FROM BIG DATA TO BIG IMPACT".

[7]. Omar El-Gayar, Prem Timsina, "Opportunities for Business Intelligence and Big Data Analytics in Evidence Based Medicine"