

A Project Report on

**ESTIMATION AND PREDICTION OF  
HOSPITALIZATION AND MEDICAL CARE COSTS:**

**A Comprehensive Analysis of Health Care.**

by

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### **ABSTRACT**

Medical costs are one of the most common recurring expenses in a person's life. Based on different research studies, BMI, ageing, smoking, and other factors are all related to greater personal medical care costs. The estimates of the expenditures of health care related to obesity are needed to help create cost-effective obesity prevention strategies. Obesity prevention at a young age is a top concern in global health, clinical practice, and public health. To avoid these restrictions, genetic variants are employed as instrumental variables in this research. Using statistics from public huge datasets, the impact of body mass index (BMI) on overall healthcare expenses is predicted. A multiviewer learning architecture can be used to leverage BMI information in records, including diagnostic texts, diagnostic IDs, and patient traits. A hierarchy perception structure was suggested to choose significant words, health checks, and diagnoses for training phase informative data representations, because various words, diagnoses, and previous health care have varying significance for expense calculation. In this system model, linear regression analysis, naive Bayes classifier, and random forest algorithms were compared using a business analytic method that applied statistical and machine-learning approaches. According to the results of our forecasting method, linear regression has the maximum accuracy of 97.89 percent in forecasting overall healthcare costs. In terms of financial statistics, our methodology provides a predictive method.

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Overview**

Data visualization in the healthcare industry is the representation of complex medical stats in a digestible graphical format. It allows users to easily obtain qualitative insights, changes, patterns, and trends while drawing valuable conclusions...even without developed math skills.

The medical professional community has recently discovered the additional opportunities and powers granted by digital medical data graphical representations of different types, such as...Charts, Graphs, Diagrams and flowcharts ,Tables, Maps, Info graphics, Dashboards

More and more medical data is being ingested, stored, and organized in electronic systems like custom EMR/EHR software. This makes clinical data visualizations accessible through an increased number of digital tools, including...Smartphones, tablets, and computers, Apps, websites, modules, and widgets, Interactive software dashboards, Exported documents and spread sheets.

Data visualization in the healthcare industry is no longer an option. The global market of healthcare data analytics is estimated to grow 3.5 times in just six years, from \$11.5 billion in 2019 to \$40.8 billion in 2025. Meanwhile, more than half of the healthcare organizations worldwide name data integration as the first technology they plan to adopt by the end of 2021.

While many factors influence the boom in data analytics and visualization tools, the most recent and obvious one is the pandemic. The COVID-19 outbreak drove the health tech adoption, which naturally increased the volumes of data available in digital format. To bring relevant information into focus, healthcare organizations implement tools for data integration and visualization.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Existing Problem**

The existing problem of medical care and hospitalization are poor design of systems and processes, the system's inability to respond to changing patient demographics and related requirements, a failure to assimilate the rapidly growing and increasingly complex science and technology base, slow adoption of information technology innovations needed to provide care, little accommodation of patients' diverse demands and needs, and personnel shortages and poor working conditions.

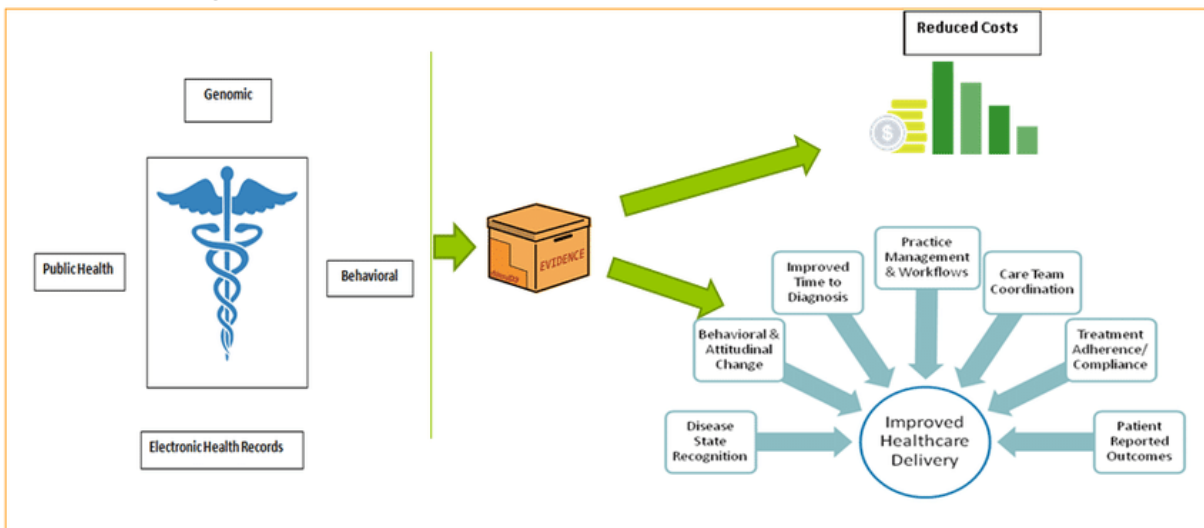
#### **2.2 Proposed Solution**

With multiple factors contributing to rising health care cost growth, there will likely need to be multiple options for arresting or at least mitigating that trend. Currently, researchers and policymakers are examining whether comparative effectiveness could inform and improve clinical care and achieve savings.<sup>14</sup> In addition, limiting benefits to only those therapies that provide clear value the patients may result in valuable cost containment.

## **CHAPTER 3**

### **THEORITICAL ANALYSIS**

#### **3.1 Block Diagram**



## 3.2 Hardware/Software Designing

### Hardware Requirements:

- Computer or Laptop: A modern computer or laptop with sufficient processing power and memory to handle data analysis tasks efficiently.
- Operating System: Windows, macOS, or Linux operating system compatible with the chosen software tools.
- Storage Space: Adequate storage space to store the datasets and analysis results.

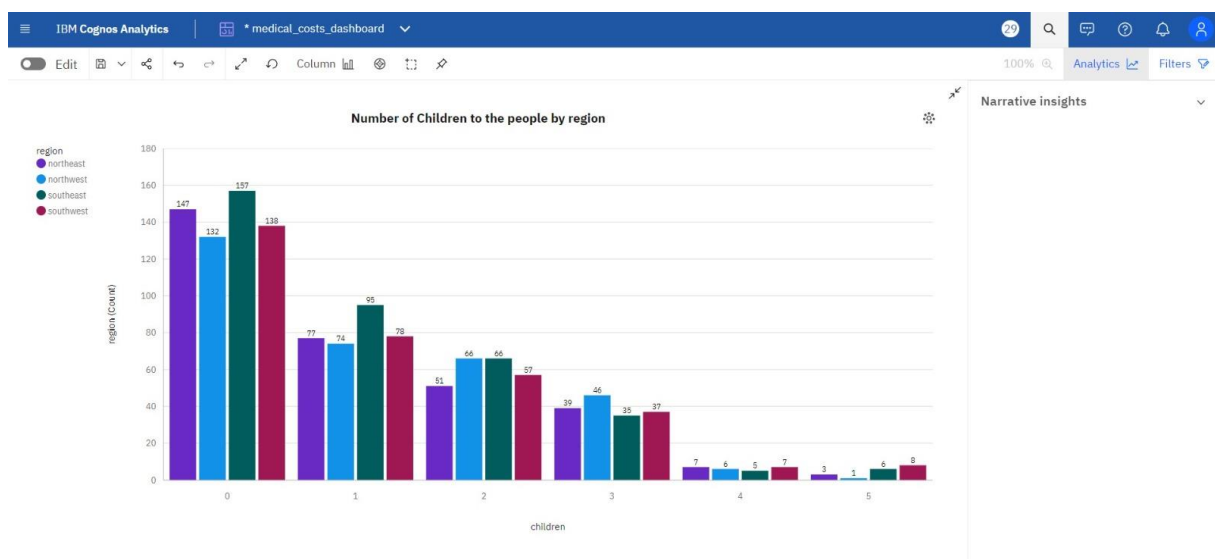
### Software Requirements:

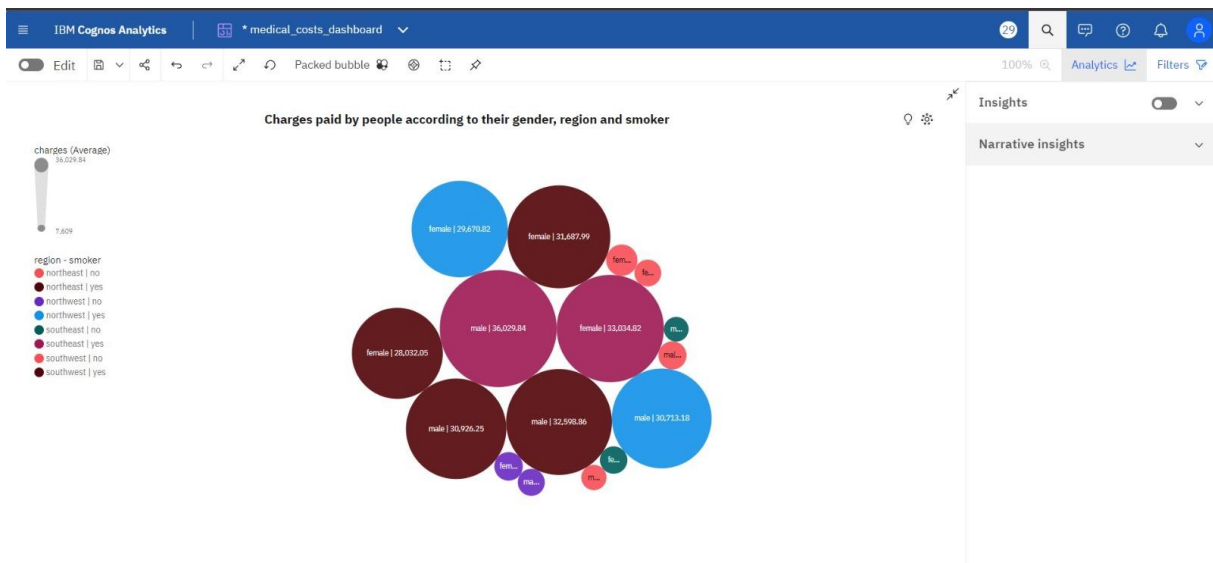
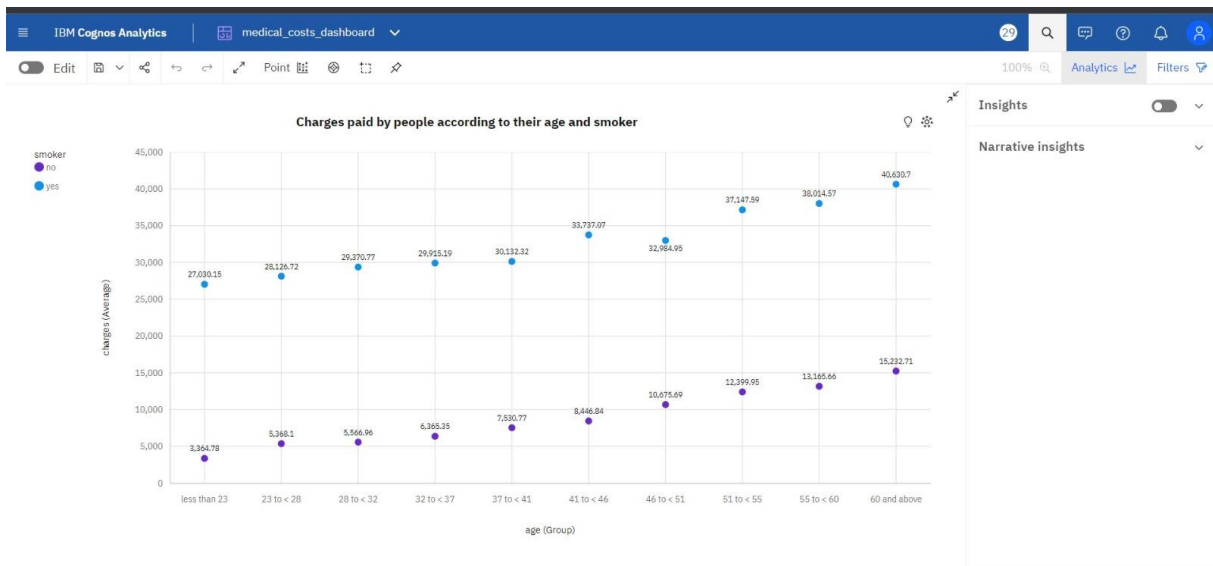
- Web Development Tools: HTML, CSS and a web framework like FLASK to build the user interface for accessing and displaying the analysis results.
- Version Control Software: Git to manage code versions and collaboration with other team members.
- Document Preparation: Word processing software like Microsoft Word for creating project documentation and reports

## CHAPTER 4

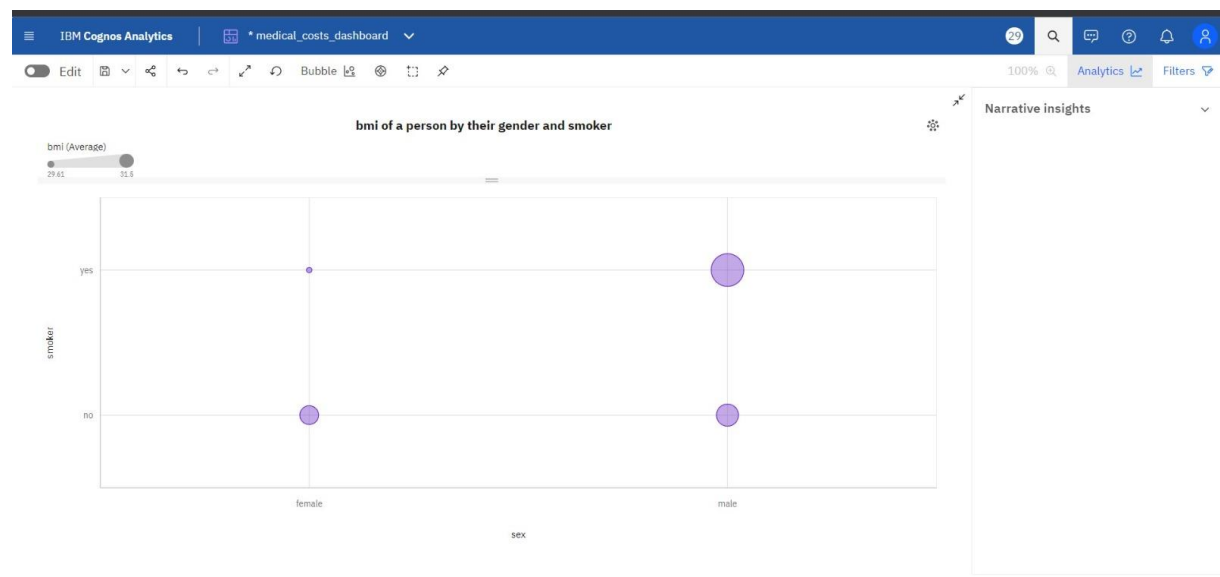
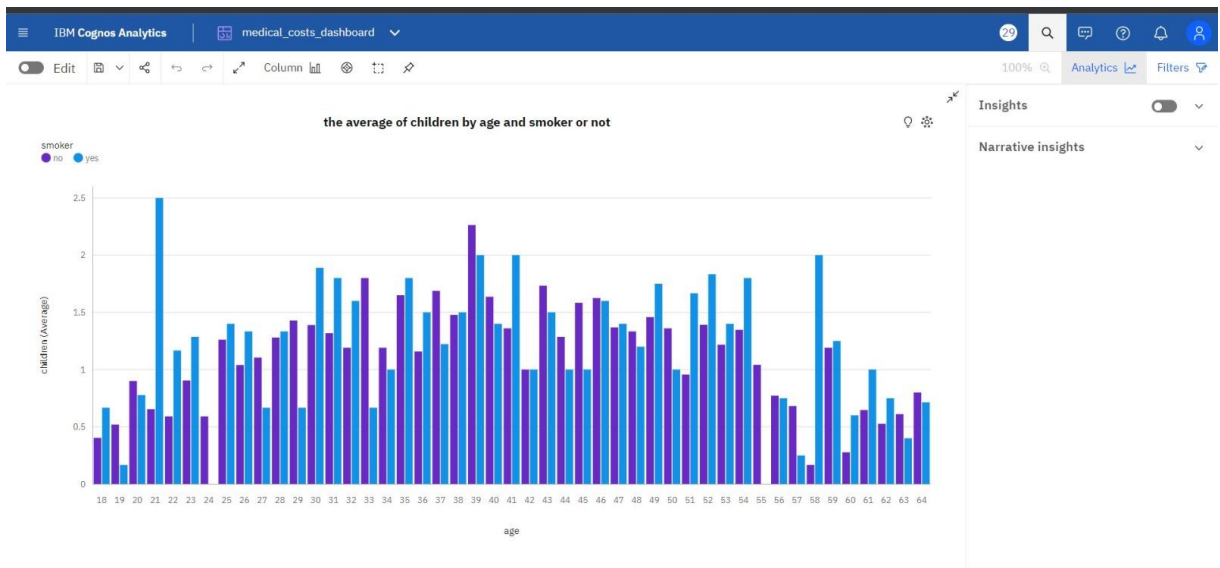
### EXPERIMENTAL RESULTS

#### 4.1 Final Output









## **CHAPTER 5**

### **ADVANTAGES/ APPLICATIONS**

#### **5.1 Advantages and Disadvantages**

##### **Advantages:**

The benefits of data visualization in healthcare are numerous and significant. By implementing and adopting different visualization tools in the healthcare sector, healthcare providers can enhance overall healthcare provision, improve patient care, and detect fraud and errors within healthcare organizations.

##### **1. Improvement of overall patient care**

Utilizing visualization of healthcare data positively impacts the general provisioning of healthcare, supports healthcare providers in clinical decision-making, and facilitates their ability to predict and react to potential threats.

Visualizing patient health data in real-time is crucial for improving the quality of care and enabling healthcare providers to make necessary clinical decisions based on the patient's situation.

##### **2. Disease trend and pattern recognition**

Determining trends in healthcare is vital for making decisions regarding healthcare provision. Identifying and assessing disease patterns among specific populations is crucial for raising awareness about modifying lifestyles and addressing potential health threats..

##### **3. Simplified data presentation**

The primary purpose of data presentation is to simplify complex data so that it can be easily interpreted by any audience regardless of their background. Utilizing presentation tools to illustrate disease prevalence and the factors affecting it makes medical data valuable and easily accessible to any intended audience.

### **Disadvantages:**

One of the major drawbacks in the application of big data in healthcare industry is the issue of lack of privacy. Application of big data technologies involves monitoring of patient's data, tracking of medical inventory and assets, organizing collected data, and visualization of data on the dashboard and the reports.

## **5.2 APPLICATIONS**

### **1. Staff Prediction:**

One of the major concerns that worries healthcare facilities is the allocation of nurses and other staff for a particular patient in a particular period of time. Allocating too many workers is going to shoot up the labor costs. Healthcare data analytics helps in effective allocation and staff management by predicting which worker will be allocated where and at what time.

### **2. Strategic Planning**

Healthcare data analytics helps managers in making predictions regarding resource availability, treatment facilities, checkups, etc. This has promoted strategic decision-making and also boosted the trust and faith of patients in medical treatments.

### **3. Fraud Reduction**

Healthcare analytics has not only helped in predictions and decision-making but also in data security by identifying pattern changes in network traffic—predicting possible breaches, identifying vulnerabilities, etc. These developments in healthcare data analytics have also helped in smooth claim settlements and cash advances to patients.

### **4. Electronic Health Records (EHRs)**

The major benefit of using healthcare data analytics is the utilization of the large amount of data lying here and there. EHRs are a means to store patient-related

data in an organized manner. They are like digital records that can be accessed anytime by the concerned parties for the patient's treatment. EHRs usually store data such as past medical history, allergies, lab results, doctors' diagnoses, etc.

## **CHAPTER 6**

### **CONCLUSION**

#### **6.1 CONCLUSION**

This review article highlighted the importance of data visualization techniques in healthcare from the standpoint of the following main benefits: improving the healthcare provided, prompt diagnosis of the disease, recognizing the patterns, simplifying the presentation of the healthcare data, accelerating healthcare performance, and improving error detection. The concept of visualization has been one of the significant innovations implemented and adopted in various healthcare facilities. Data visualization has several advantages and hence most healthcare facilities have embraced and implemented it in their day-to-day functioning. Moreover, the benefits of visualization techniques are clearly reflected in their effectiveness in the decision-making process, resulting in improved patient safety and quality of care. In addition, identifying the pattern and disease recognition via the presented data can provide vital knowledge in terms of treatment, diagnosis, and even adopting new policies in healthcare facilities. Also, it enhances the transparency of medical billing by reducing errors and fraud cases in healthcare facilities. Therefore, visualization techniques in healthcare sectors encompass many stakeholders, such as patients, healthcare practitioners, payers, and healthcare management. Also, we discussed the main limitations and challenges faced while conducting this literature review. Lastly, this review provides insight into the potential directions that future efforts on this topic can adopt.