- : Project Documentation & Report :-

PROJECT TITLE :-

Estimation And Prediction Of Hospitalization And Medical Care Costs

TEAM :-

Team ID : LTVIP2023TMID08565

Team Size : 5

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1.INTRODUCTION:-

1.1 OVERVIEW :

Estimation and Prediction of Hospitalization and Medical Care Costs is a data analytics project focused on analyzing and forecasting the expenses associated with hospitalization and medical treatments. The primary goal is to develop models that can accurately estimate the costs incurred by patients and healthcare providers for various medical procedures and hospital stays.

Data Collection and Preprocessing:-

A comprehensive dataset was collected from kaggle Which includes age,sex,region,charges,smoker,BMI. The collected data underwent thorough preprocessing to handle missing values, remove inconsistencies, and ensure data quality.

Exploratory Data Analysis (EDA):-

EDA was conducted to gain a deep understanding of the dataset. Visualizations and summary statistics helped in understanding the characteristics of the data and guided further analysis.

Creating a Flask web application:-

For Estimation and Prediction of Hospitalization and Medical Care Costs data involves building an interface where We can input relevant information, and the application will use the predictive model to estimate the medical care costs.

1.2 PURPOSE :-

The Estimation and Prediction of Hospitalization and Medical Care Costs project plays a vital role in datadriven decision-making, cost optimization, and improving patient care in the healthcare industry.

It empowers various stakeholders with actionable insights to make informed choices and enhance the overall efficiency of the healthcare system.

By undertaking the Estimation and Prediction of Hospitalization and Medical Care Costs project, several significant achievements and benefits can be realized in the healthcare industry and beyond.

KEY OUTCOMES:

1. Cost Optimization

2. Improved Financial Planning

3. Transparency and Informed Decision-making

4. Enhanced Patient Care

5. Tailored Insurance Coverage

2. LITERATURE SURVEY:

The prevalence of obesity, which is defined as a body mass index (BMI) greater than 30, has increased dramatically in the United States since the late 1990s.

So much so that recently obesity has been officially recognized as a disease by the American Medical Association, an action that could put more emphasis on the health condition by doctors and insurance companies to minimize its adverse effects. Currently, rates of obesity exceed 30% in most sex and adult age groups, whereas its prevalence among children and adolescents, defined as a BMI of more than the 95th percentile, has reached 17%.

The alarming rates of the high prevalence of obesity have posed a significant public health concern as well as a substantial financial burden on our society because obesity is known to be a risk factor for many chronic diseases, such as type 2 diabetes,myocardial infarction, cancer,hypertension,asthma,stroke and other conditions.

To understand the economic burden of obesity, several studies have attempted to estimate the attributable costs of obesity, following the

burden-of-illness literature on other disease areas. A previous cost-of-illness study estimated that healthcare spending attributable to the rising prevalence of obesity has increased by 27% between 1987 and 2001.

2.1 Existing problem:-

Solving the Estimation and Prediction of Hospitalization and Medical Care Costs involves a systematic approach that combines data analysis, model development and evaluation.

2.2 Proposed Solution:-

Proposing a solution for the estimation and prediction of hospitalization and medical care costs involves a combination of data-driven techniques, advanced analytics, and domain expertise.Collect comprehensive and diverse data related to hospitalization and medical care costs from various sources, including electronic health records, insurance claims, and administrative databases.The success of the proposed solution depends on the availability of quality data, collaboration with healthcare experts, and a commitment to continuous improvement based on real-world feedback. Healthcare cost estimation and prediction are complex tasks, and a multidisciplinary approach is crucial for achieving accurate and reliable results

3. THEORITICAL ANALYSIS:-

Creating a detailed block diagram for Estimation and Prediction of Hospitalization and Medical Care Costs involves breaking down the process into key steps and components.

Below is a high-level block diagram outlining the main stages and elements involved in estimating and predicting hospitalization and medical care costs.

The block diagram illustrates the end-to-end process of estimating and predicting hospitalization and medical care costs, starting from data collection and preprocessing to deploying the final models for cost estimation and future cost prediction.

3.1 Block Diagram;-

Data Collection:

- Gather relevant data sources, which may include patient demographics, medical history, diagnosis, treatments, hospitalization duration, medication costs, and any other factors that impact medical care costs.

Data Preprocessing:

- Clean and preprocess the data to handle missing values, outliers, and inconsistencies. This step is essential to ensure the data is suitable for analysis.

Feature Engineering:

- Extract relevant features from the data that are likely to impact hospitalization and medical care costs. This might include age, gender, diagnosis codes, comorbidities, and more.

Cost Estimation Model:

- Develop a model to estimate hospitalization and medical care costs based on the features identified in the previous step. This could involve various techniques such as regression analysis, decision trees, or machine learning algorithms.

Cost Prediction Model:

- Build a predictive model to forecast future hospitalization and medical care costs for patients. This model could consider time-series data and other temporal factors to make accurate predictions.

Model Evaluation:

- Evaluate the performance of both the cost estimation and prediction models using appropriate metrics, such as mean squared error, root mean squared error, or R-squared.

Cost Analysis and Visualization:

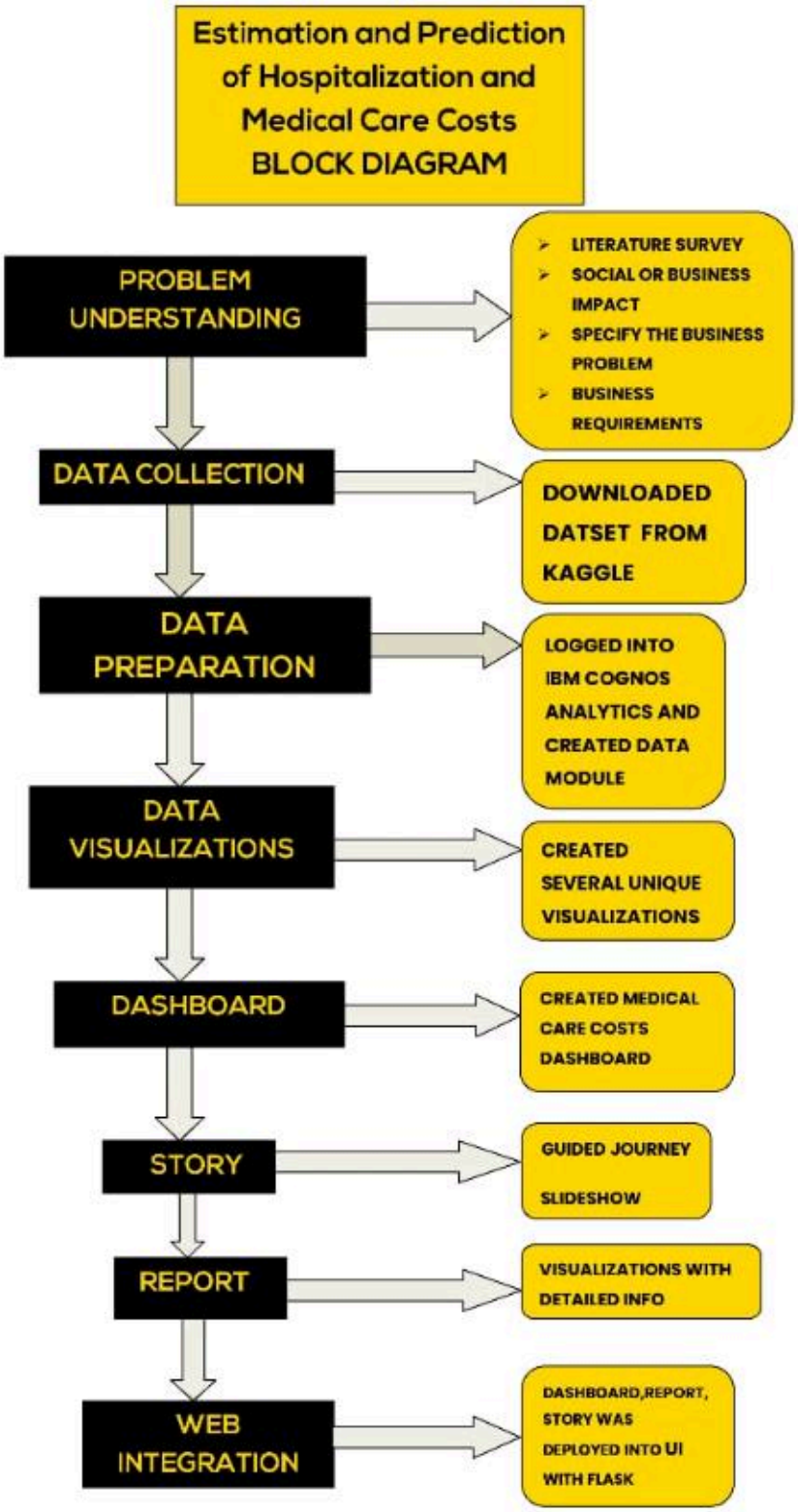
- Analyze the results to gain insights into the factors influencing hospitalization and medical care costs. Visualization tools can help present the findings in a more understandable format.

Model Deployment:

- Integrate the developed models into the healthcare system to provide real-time cost estimates and predictions for patients.

Continuous Monitoring and Updating:

- Regularly monitor the performance of the models and update them as necessary to ensure accuracy and relevance with changing healthcare trends and practices.


Estimation and Prediction of Hospitalization and Medical Care Costs BLOCK DIAGRAM
PROBLEM UNDERSTANDING
LITERATURE SURVEY
SOCIAL OR BUSINESS IMPACT
SPECIFY THE BUSINESS PROBLEM
BUSINESS REQUIREMENTS
DATA COLLECTION
DOWNLOADED DATSET FROM KAGGLE
DATA PREPARATION
LOGGED INTO IBM COGNOS ANALYTICS AND CREATED DATA MODULE
DATA VISUALIZATIONS
CREATED SEVERAL UNIQUE VISUALIZATIONS
DASHBOARD
CREATED MEDICAL CARE COSTS DASHBOARD
STORY
GUIDED JOURNEY SLIDESHOW
REPORT
VISUALIZATIONS WITH DETAILED INFO
WEB INTEGRATION
DASHBOARD,REPORT, STORY WAS DEPLOYED INTO UI WITH FLASK

3.2 SOFTWARE OR HARDWARE DESIGNING :-

Software Requirements:

1. IBM cognos analytics Tool.

2. Flask.

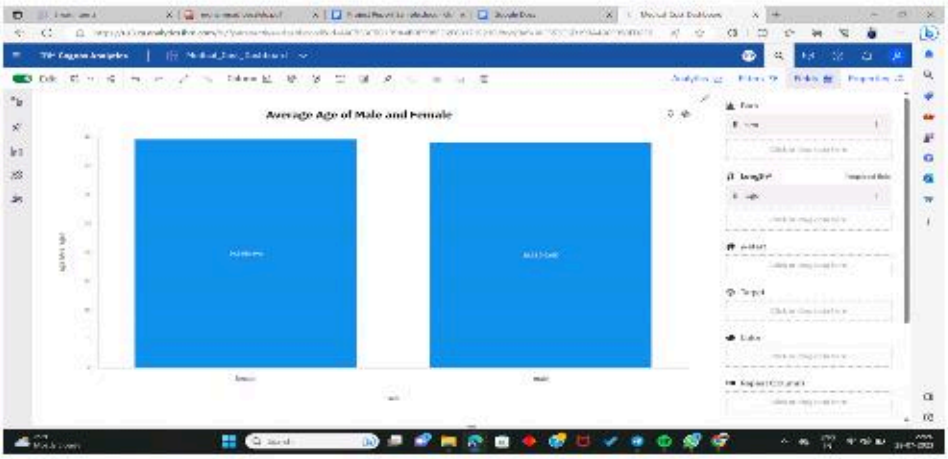
3. Integrated Development Environment (IDE)-Spyder.

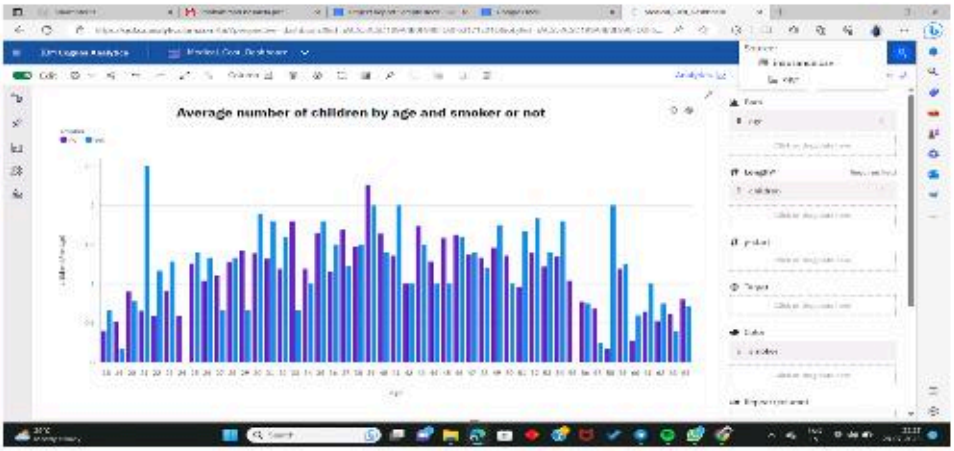
Hardware Requirements:-

Minimum System Requirements(RAM-4GB,Quad core Processor Or above)

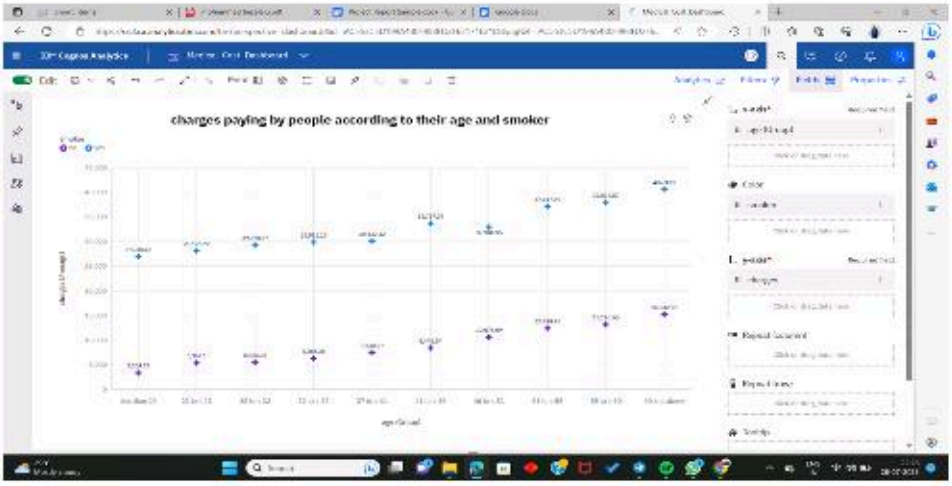
4. RESULT :-

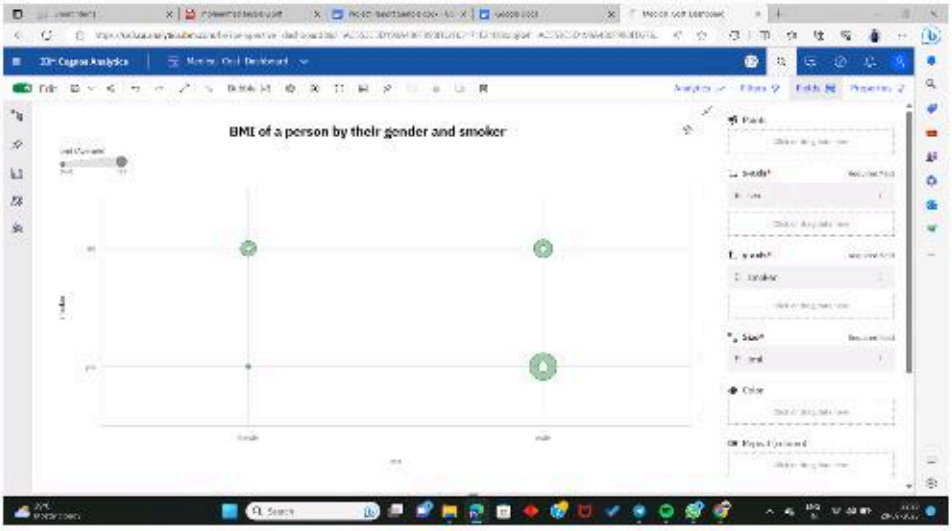
DATA VISUALIZATIONS :-

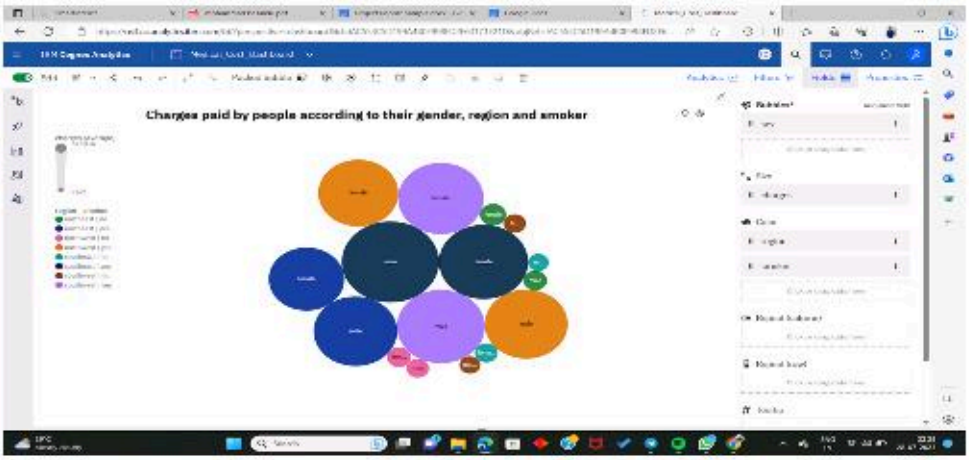


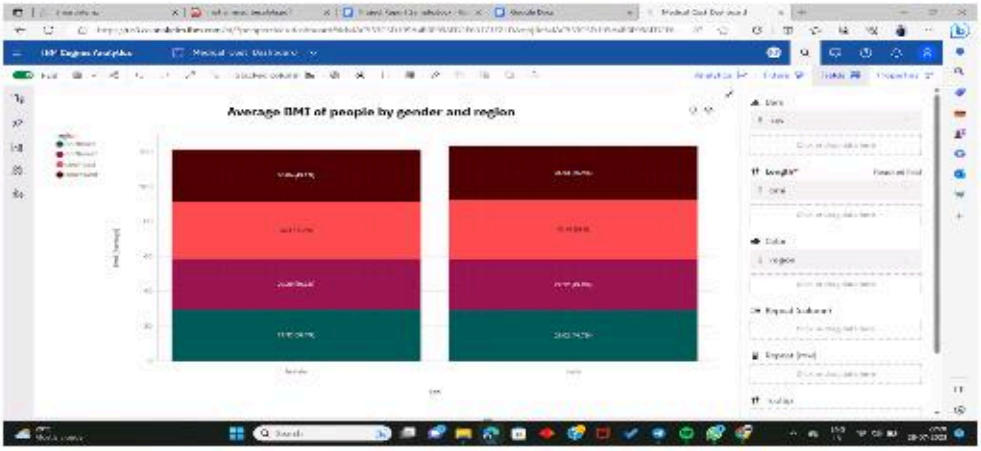


Average age of people according to their region and gender

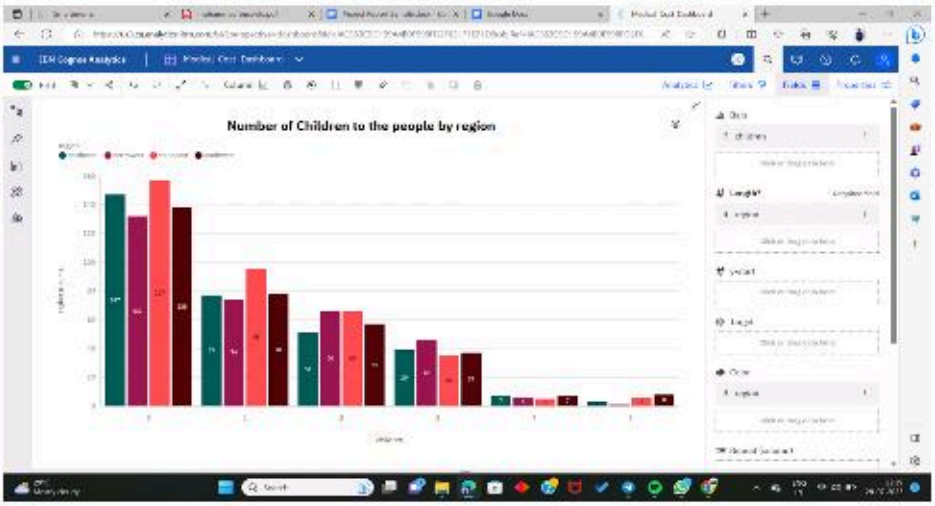

charges paying by people according to their age and smoker

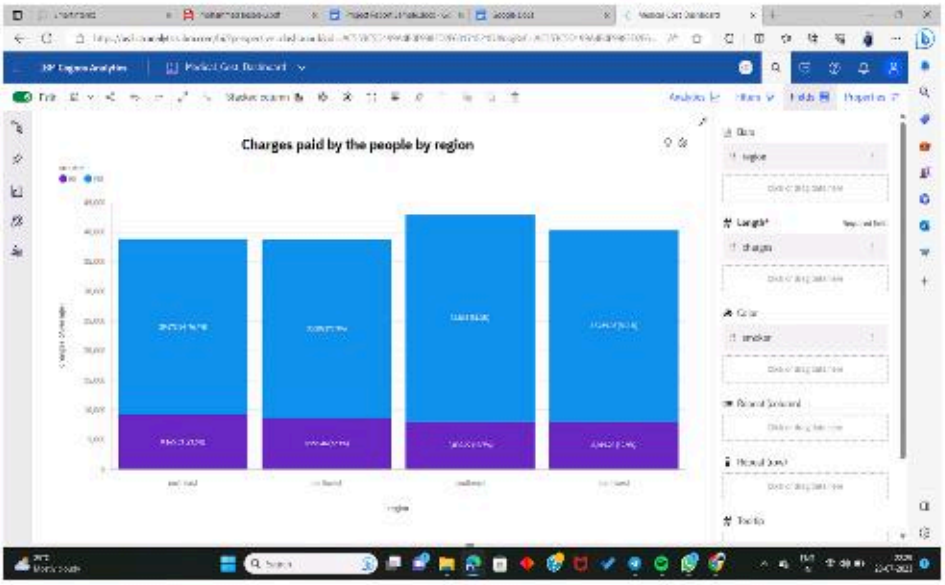

BMI of a person by their gender and smoker


Charges paid by people according to their gender, region and smoker


Average BMI of people by gender and region

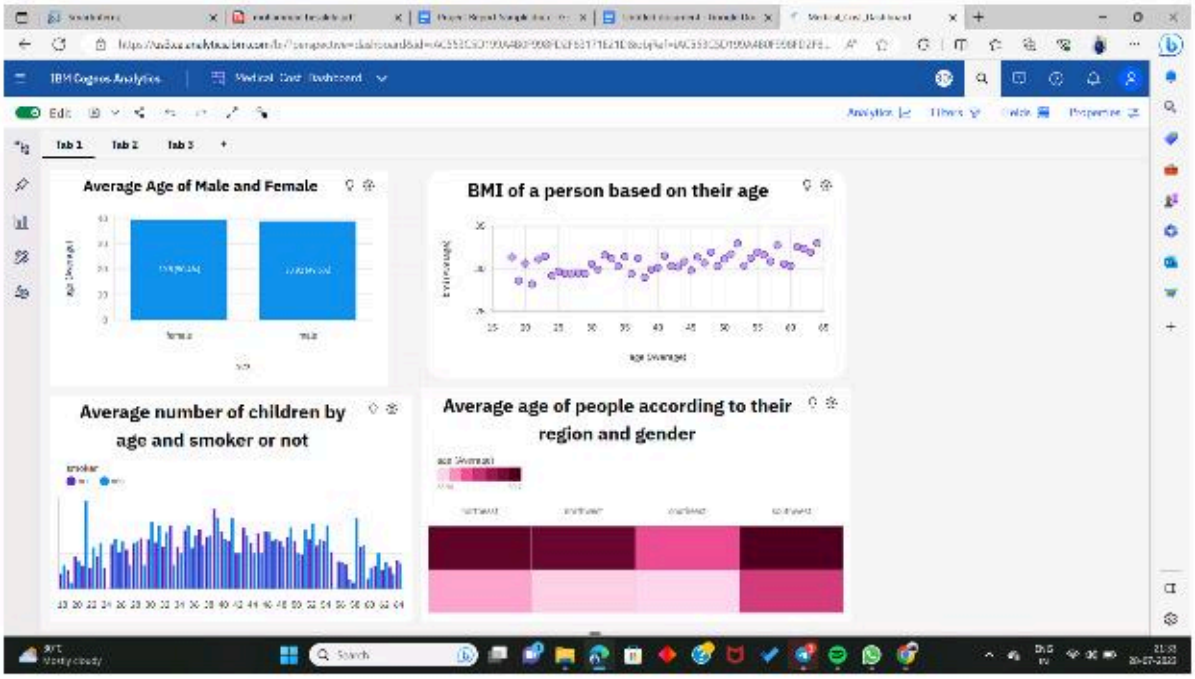
Top 100 charges paid by people based on BMI and colored by region

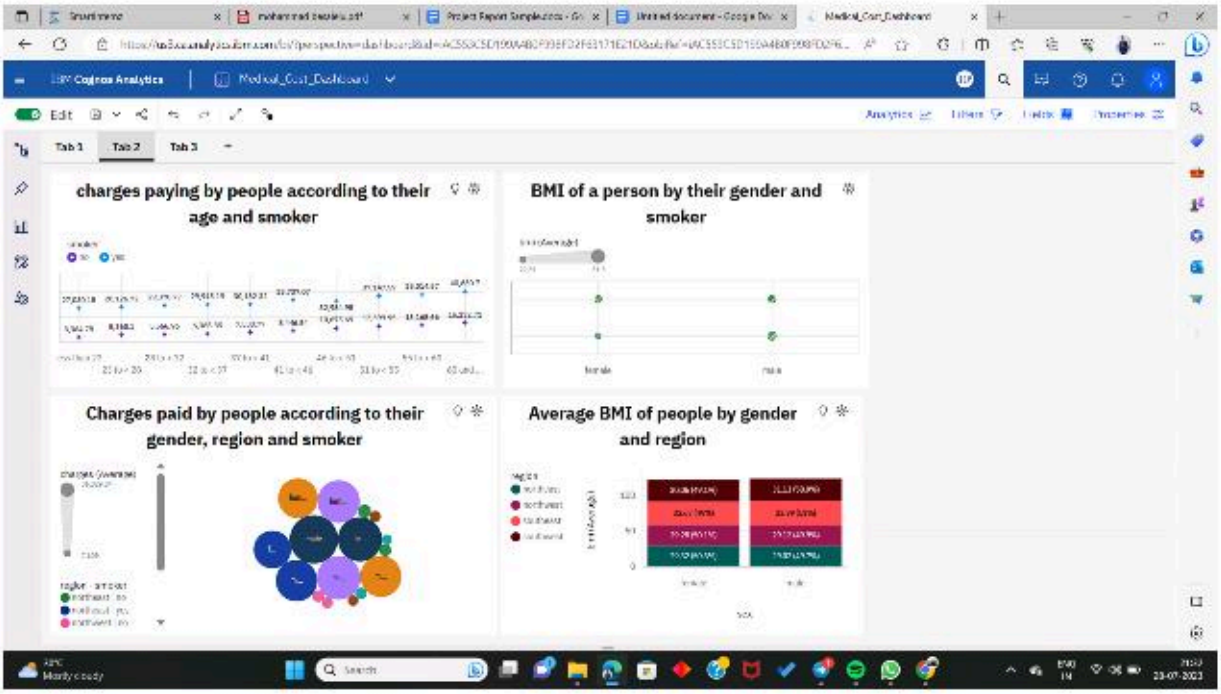

Number of Children to the people by region


Charges paid by the people by region

Charges based on number of children

MEDICAL CARE COSTS DASHBOARD :-

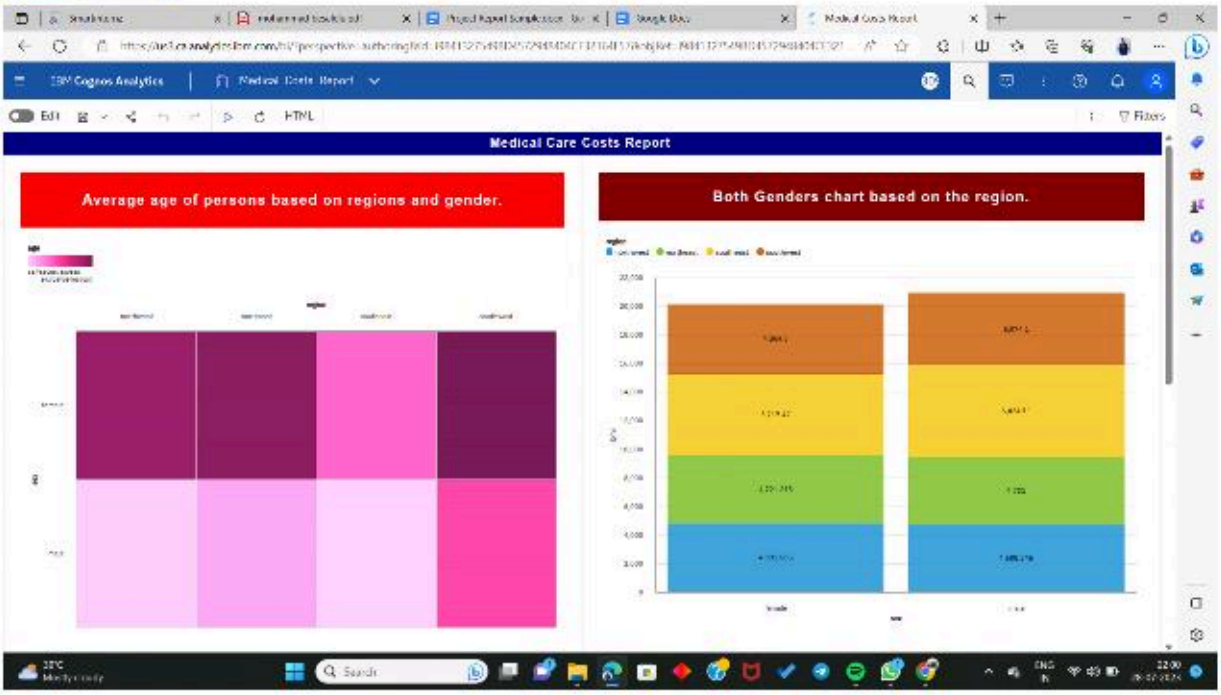




Medical_Cost_Dashboard
Edit
Tab 1
Tab 2
Tab 3
Top 100 charges paid by people based on BMI and colored by region
Number of Children to the people by region
Charges paid by the people by region
Charges based on number of children
region

REPORT

(PAGE 1)



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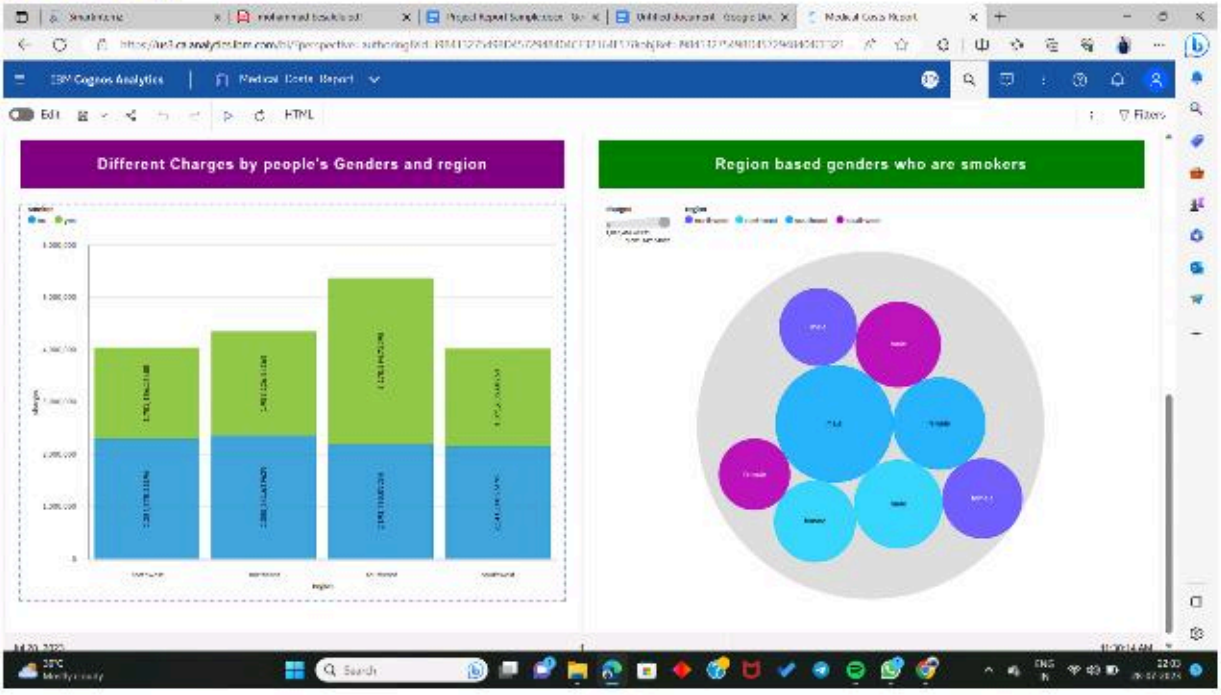
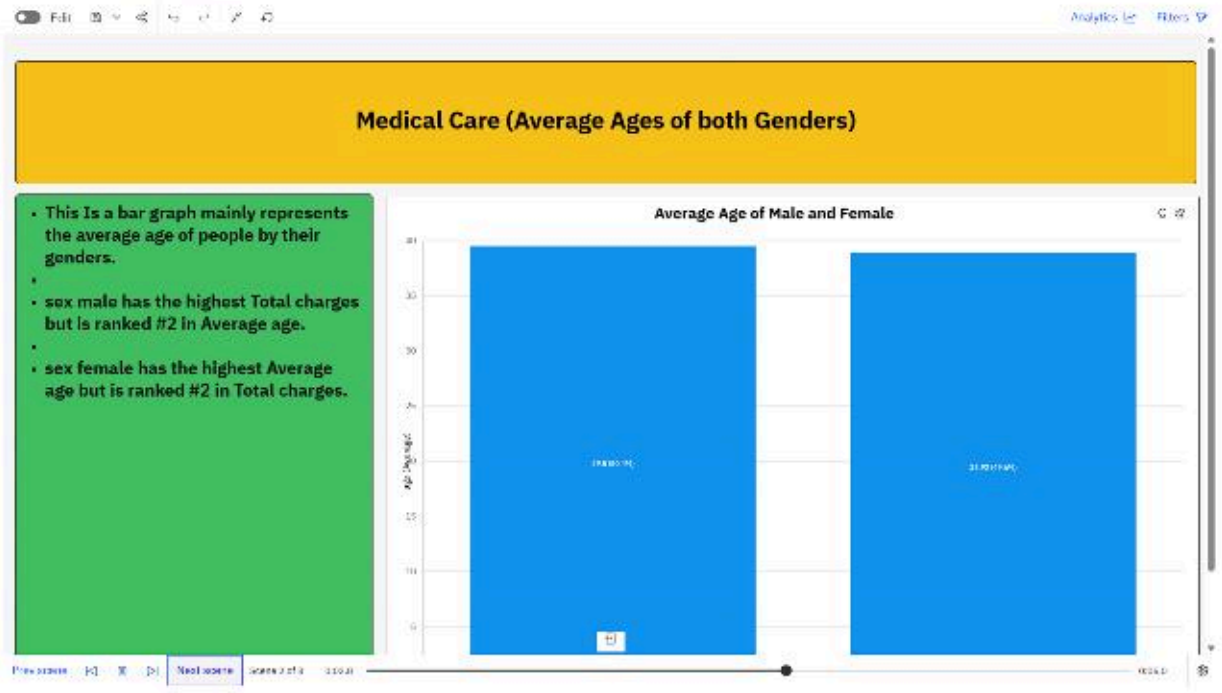


MEDICAL CARE STORY (SLIDESHOW) :-



Medical Care (BMI)

- bmi and age have a weak positive linear association, being bmi = 28.8 + 0.04743 * age
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- The average of bmi is 30.66.
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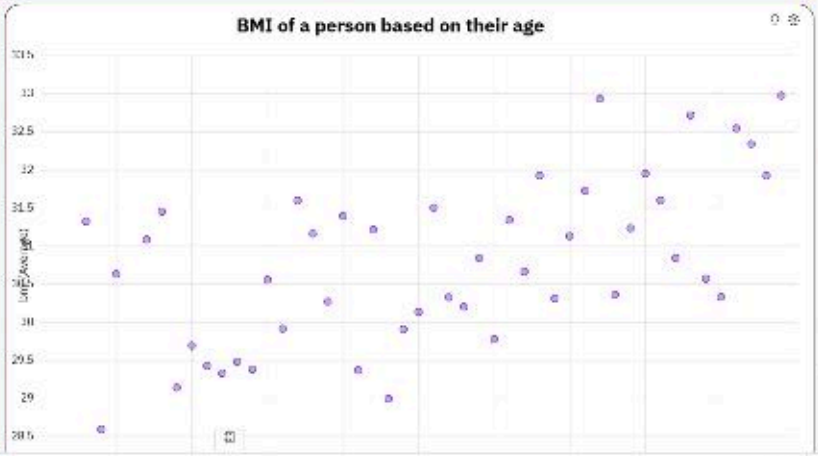
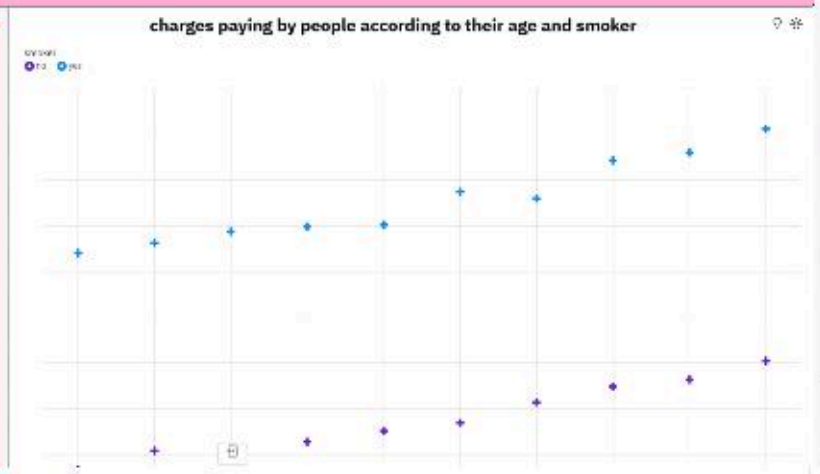
- The total number of results for age, across all ages, is almost 1500.



Medical Charges Paid by People

- charges is unusually high when the combination of age (Group) and smoker is 60 and above and yes.
-
- smoker moderately affects charges (62%).
-
- Across all values of age (Group) and smoker, the average of charges is over thirteen thousand.



Person difference by gender and smoker

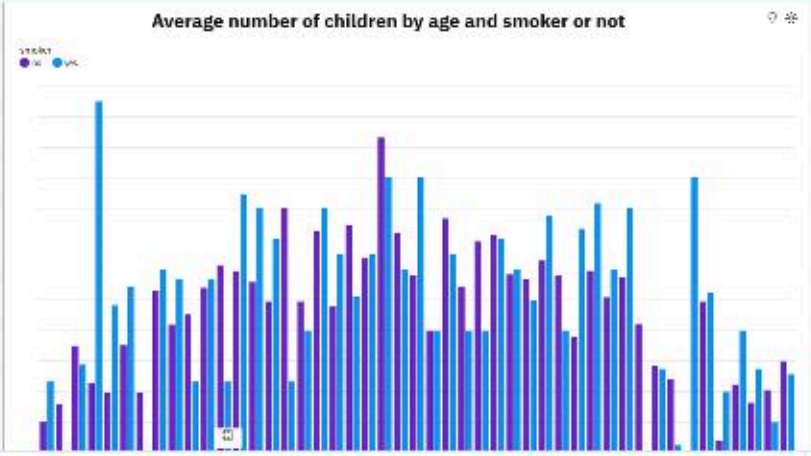
- Males and smokers have the highest average BMI value compared to all.
- The total number of results for bmi, across all sexes, is almost 1500.
- The total number of results for smoker, across all sexes, is almost 1500.

Medical Charges paid by People

- male is the most frequently occurring category of sex with a count of 676 items with charges values (50.5 % of the total).
- The average values of charges range from over 7500 to over 36 thousand.
- region - smoker moderately affects charges (63%).

Smoker by age of children

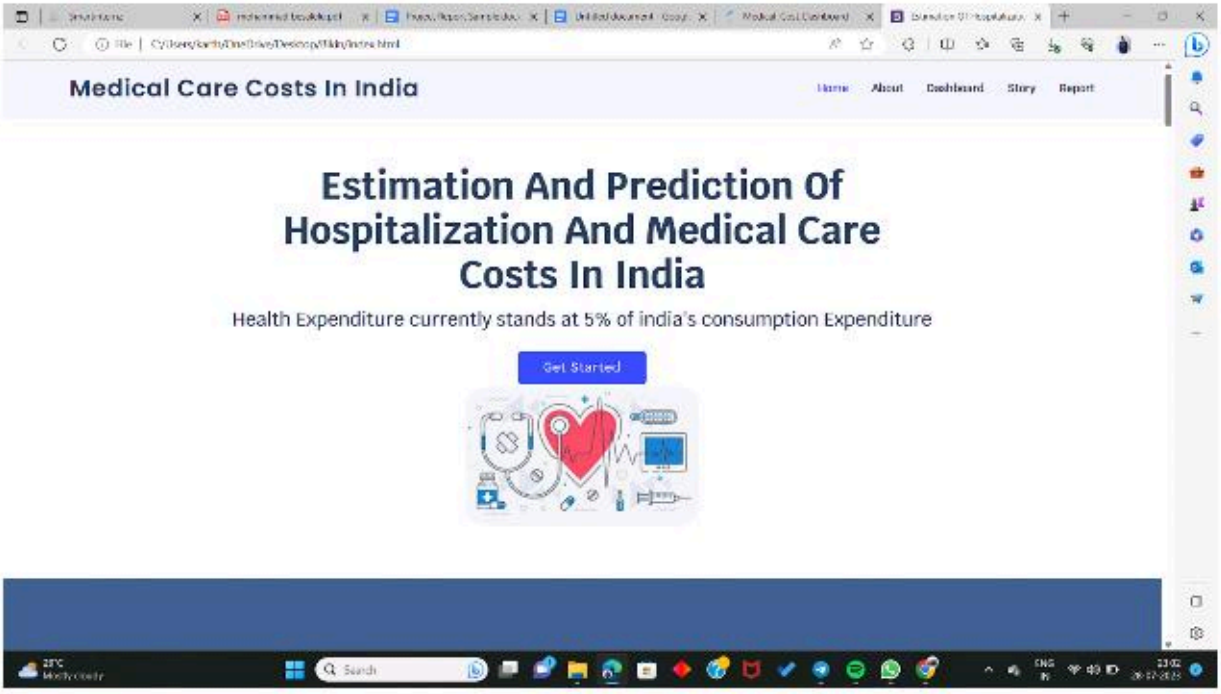
- 18 (5.2 %) and 19 (5.1 %) are the most frequently occurring categories of age with a combined count of 137 items with children values (10.2 % of the total).
- children is most unusual when age is 39, 19, 18 and 58.
- The average values of children range from 0 to 2.5.
- Over all ages and smokers, the average of children is 1.095.

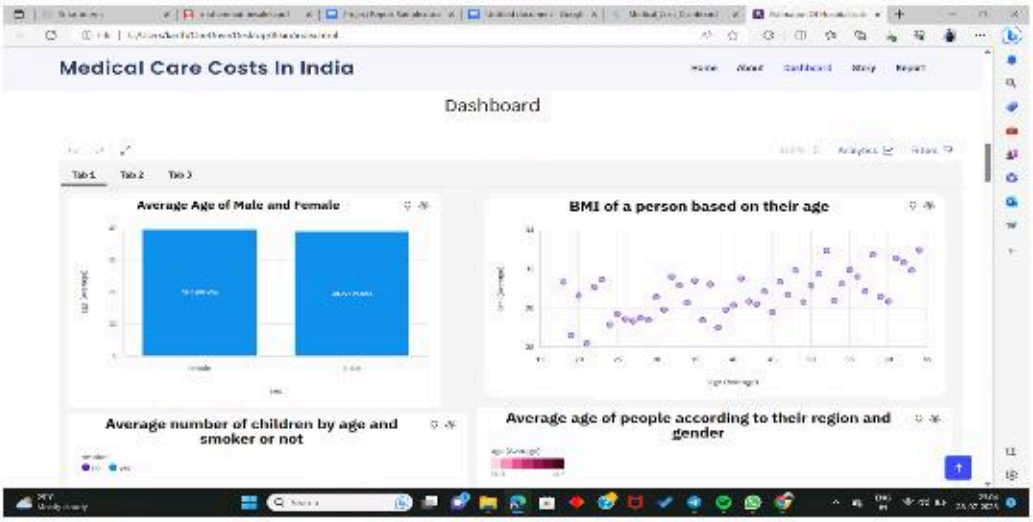


Smoking is not only injurious to health but also for wealth

“A cigarette says: Today you turn me into ashes, but tomorrow is my turn.” – Karthikeyan

WEB INTEGRATION :-




Medical Care Costs In India
Home
About
Dashboard
Story
Report
Dashboard
Tab 1
Tab 2
Tab 3
Average Age of Male and Female
BMI of a person based on their age
Average number of children by age and smoker or not
Average age of people according to their region and gender

Medical Care Costs In India
Home
About
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Report
Story
Medical Care Costs Story
HEALTHCARE
COSTS

Medical Care Costs In India
Home
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Report
Medical Care Costs Report
Average age of persons based on regions and gender.
Both Genders chart based on the region.

5. ADVANTAGES :-

1. Cost Optimization.

2. Informed Decision-making.

3. Improved Patient Care.

4. Tailored Insurance Coverage.

5. Fraud Detection.

6. Research and Policy Development.

6. DISADVANTAGES :-

Data Privacy Concerns.

1. Data Quality.

2. Model Complexity.

3. Limited Predictability.

4. Ethical Considerations.

5. Overemphasis on Costs.

6. APPLICATIONS :-

The Estimation and Prediction of Hospitalization and Medical Care Costs project has several valuable applications in the healthcare industry and beyond.

1. Healthcare Cost Management.

2. Financial Planning.

3. Insurance Pricing and Coverage.

4. Resource Allocation.

5. Treatment Decision Support.

6. Patient Cost Transparency.

7. Policy Development.

8. Fraud Detection.

9. Benchmarking and Performance.

10. Research and Public Health.

11. Cost-Effective Healthcare Programs.

12. Long-Term Cost Control.

7. CONCLUSION :-

In conclusion, the Estimation and Prediction of Hospitalization and Medical Care Costs project holds significant value and potential for the healthcare industry.

By leveraging data analytics, exploratory data analysis,the project aims to achieve several important outcomes.

8. FUTURE SCOPE :-

The future scope of the Estimation and Prediction of Hospitalization and Medical Care Costs project is vast And holds great potential in transforming the healthcare industry.

Overall, the future scope of the Estimation and Prediction of Hospitalization and Medical Care Costs project is dynamic and transformative.

As technology continues to evolve and data-driven decision-making becomes increasingly prevalent, the project's applications have the potential to revolutionize healthcare cost management, resource allocation, and patient care on a global scale.

-: PROJECT REPORT :-