Estimation and Prediction of Hospitalization and Medical Care Costs

1.INTRODUCTION

PROJECT REPORT

Project Title: Estimation and Prediction of Hospitalization and Medical Care Costs.

Team Size: 3

Team Leader: PUDI MOUNIKA

Team Member: CIRUKULA SWARNALATHA

Team Member:POTHALA CHANDRA SEKHAR

Faculty Mentor:MR. INJAMURI MALLIKHARJUNA RAO

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:

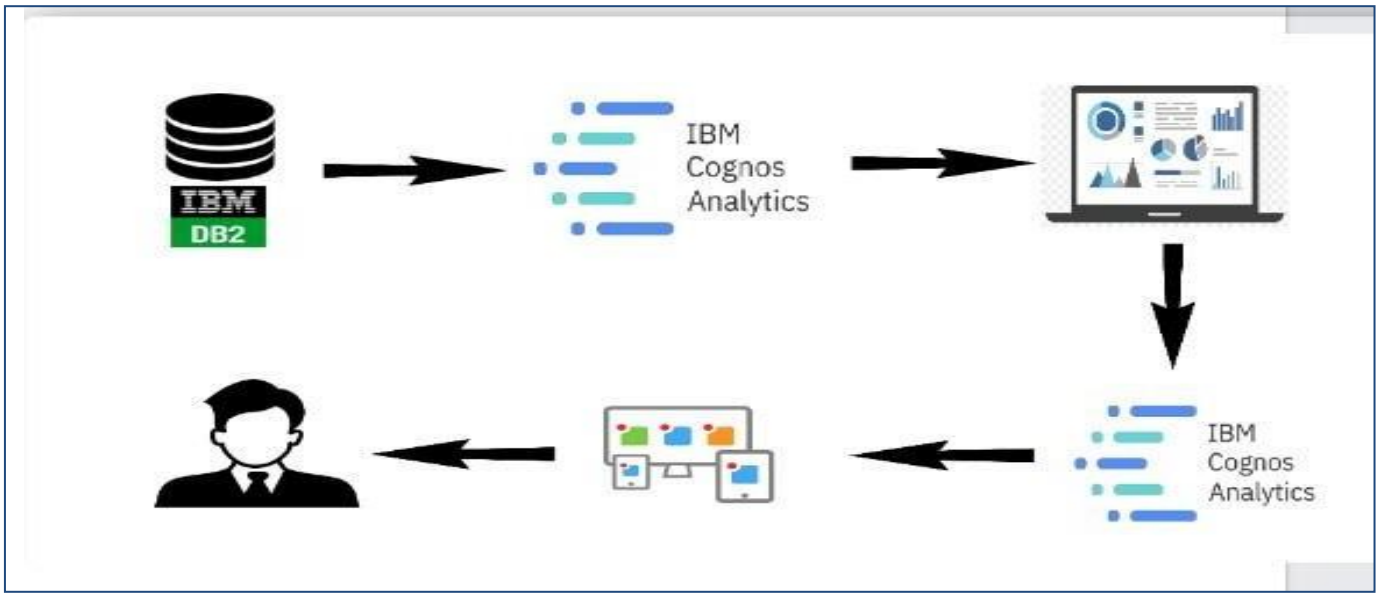
For Estimation and Prediction of Hospitalization and Medical Care Costs data involves building an interface where We can input relevant information, and the application will use the predictive model to estimate the medical care costs.

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:

- **Cost Optimization**
- **Improved Financial Planning**
- **Transparency and Informed Decision-making**
- **Enhanced Patient Care**
- **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.

Existing Problems

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

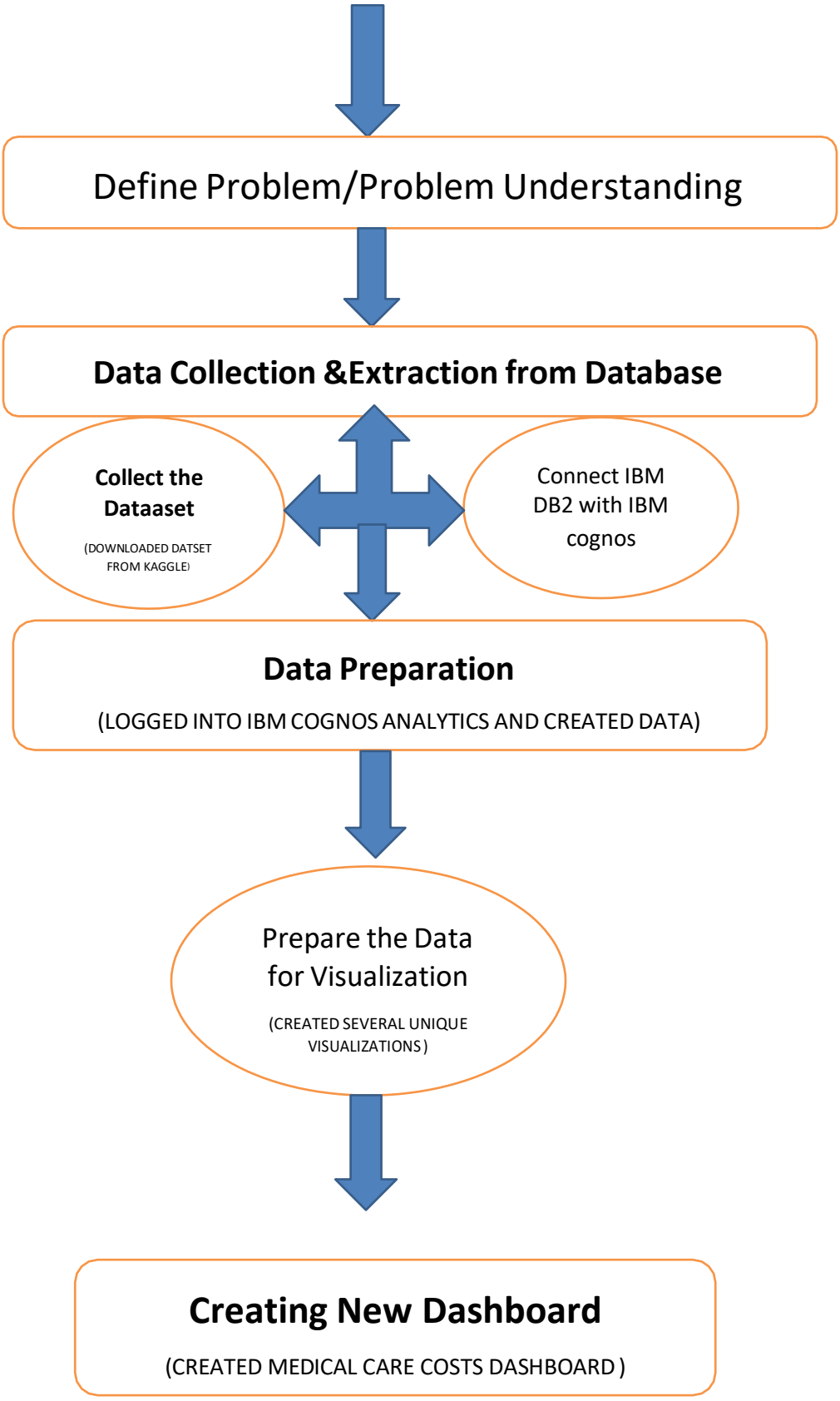
Proposed Solutions

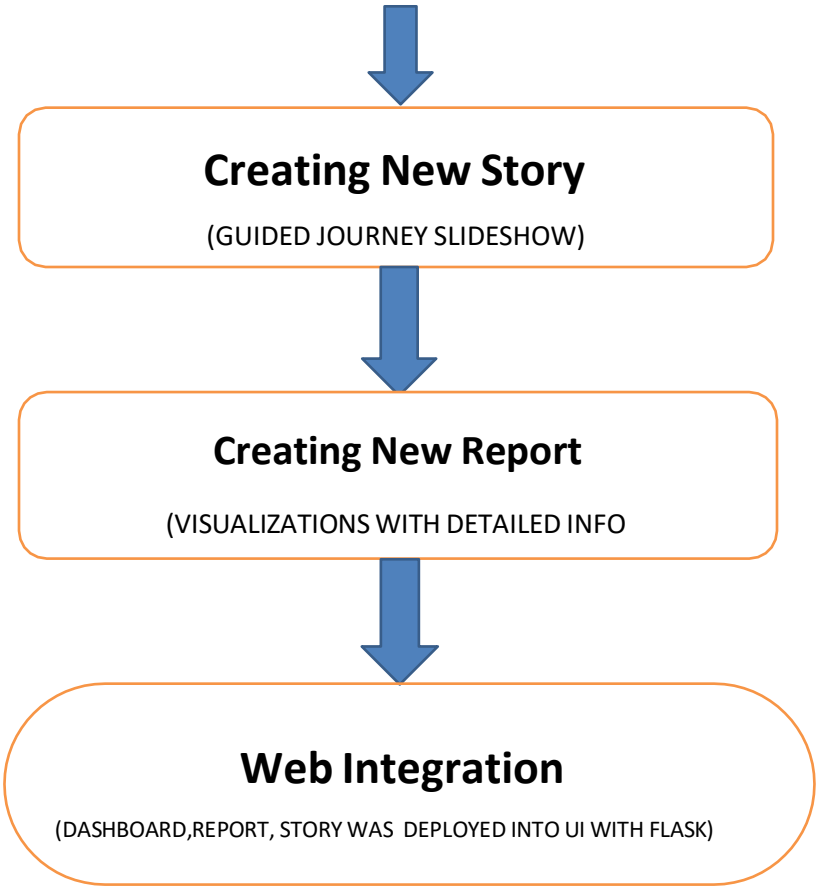
Proposing a solution for the estimation and prediction of hospitalization and medical care costs involves a combination of data-driven techniques, advanced analytics, and domain expertise. Collect comprehensive and diverse data related to hospitalization and medical care costs from various sources, including 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

3.1 **Block diagram:**

Estimation and Prediction of Hospitalization and Medical care costs


Define Problem/Problem Understanding
Data Collection &Extraction from Database
Collect the Dataaset
(DOWNLOADED DATSET FROM KAGGLE)
Connect IBM DB2 with IBM cognos
Data Preparation
(LOGGED INTO IBM COGNOS ANALYTICS AND CREATED DATA)
Prepare the Data for Visualization
(CREATED SEVERAL UNIQUE VISUALIZATIONS)
Creating New Dashboard
(CREATED MEDICAL CARE COSTS DASHBOARD)



SOFTWARE OR HARDWARE DESIGNING

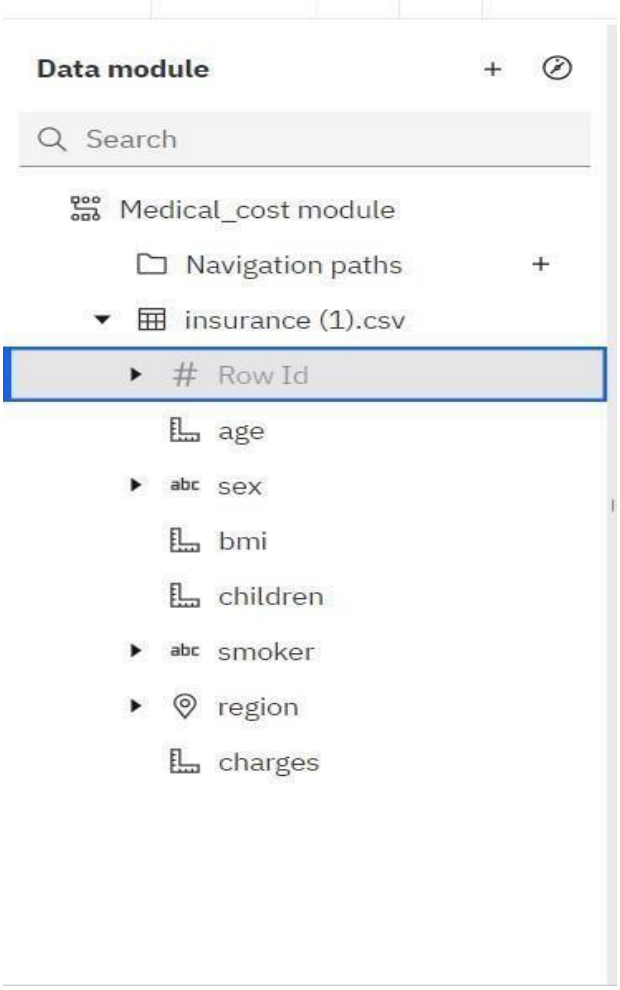
Software Requirements:

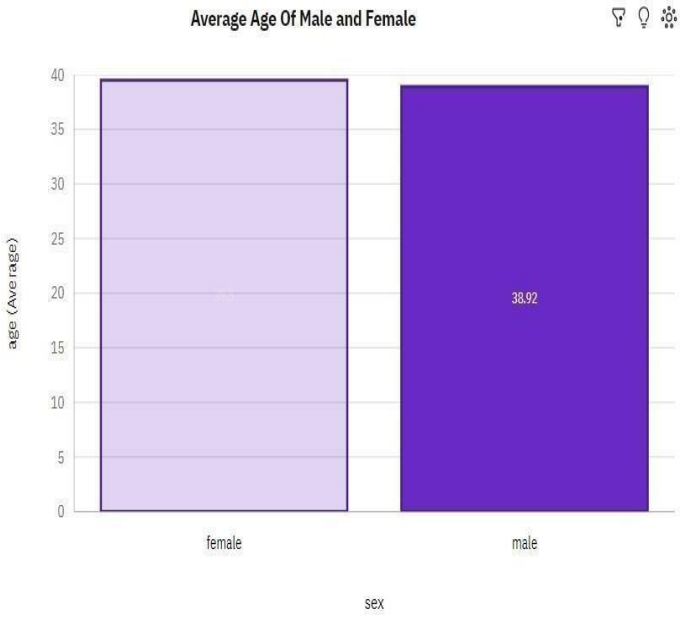
- **IBM cognos analytics Tool**
- **Flask**
- **Integrated Development Environment (IDE)- Spyder**

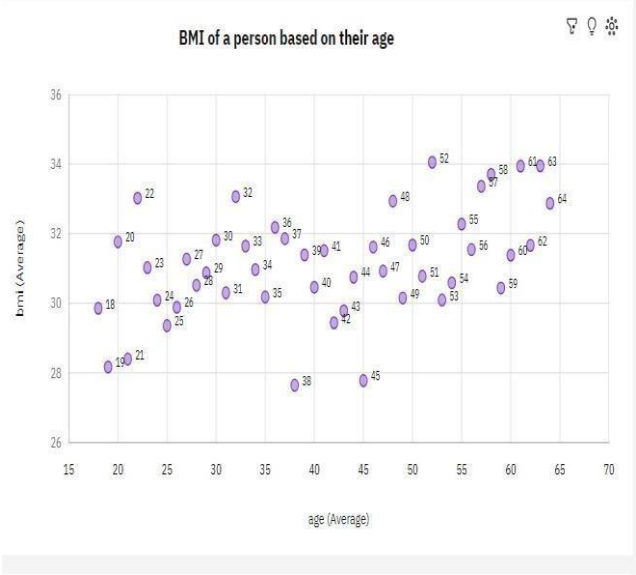
Hardware Requirements:

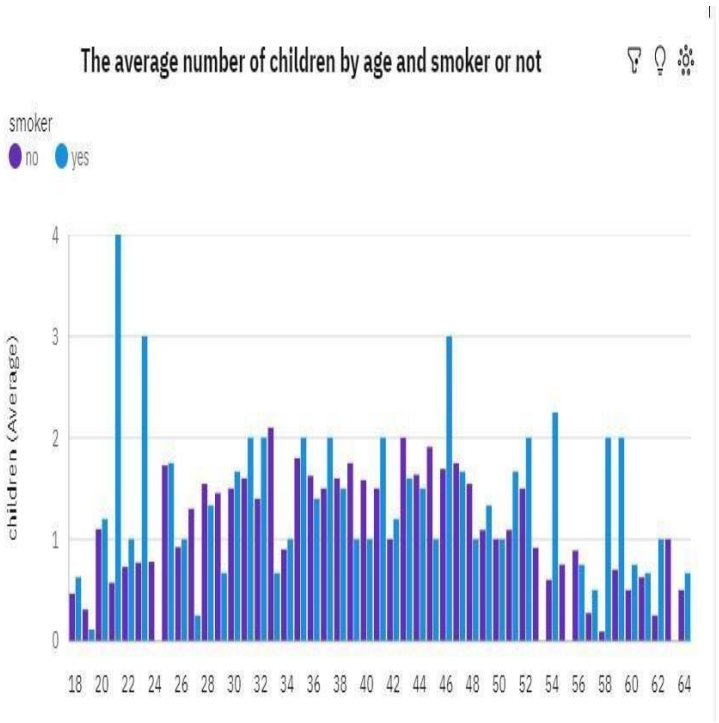
- Processor
- Memory (RAM)
- Storage
- Graphics Processing Unit (GPU)
- Internet Connection

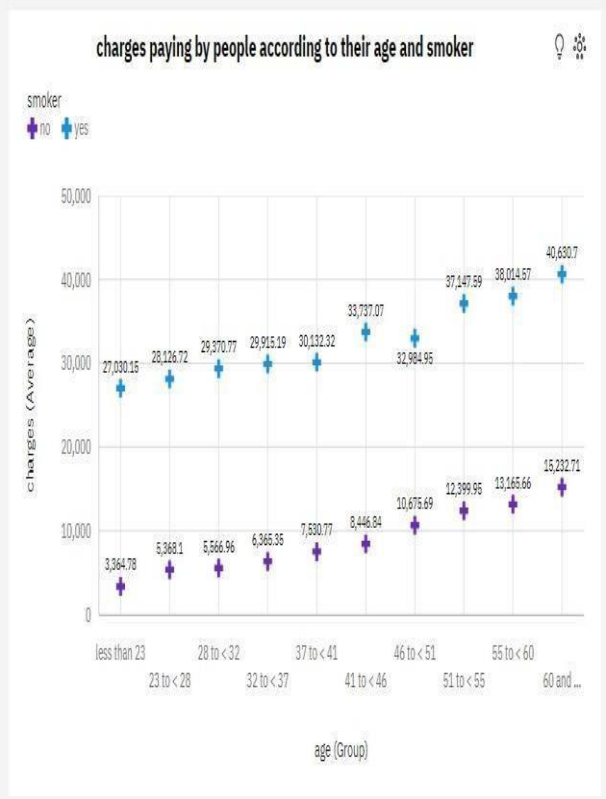
4.RESULT

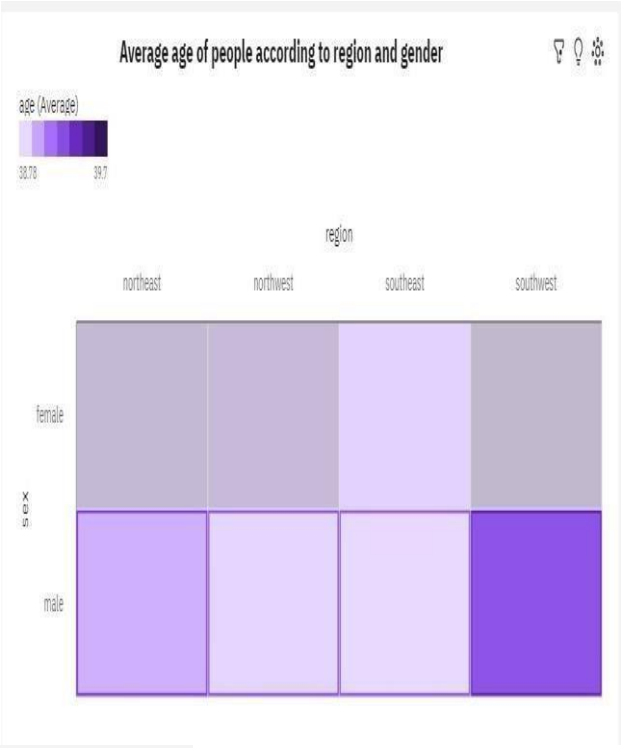

Data module
Search
Medical_cost module
Navigation paths
insurance (1).csv
Row Id
age
sex
bmi
children
smoker
region
charges

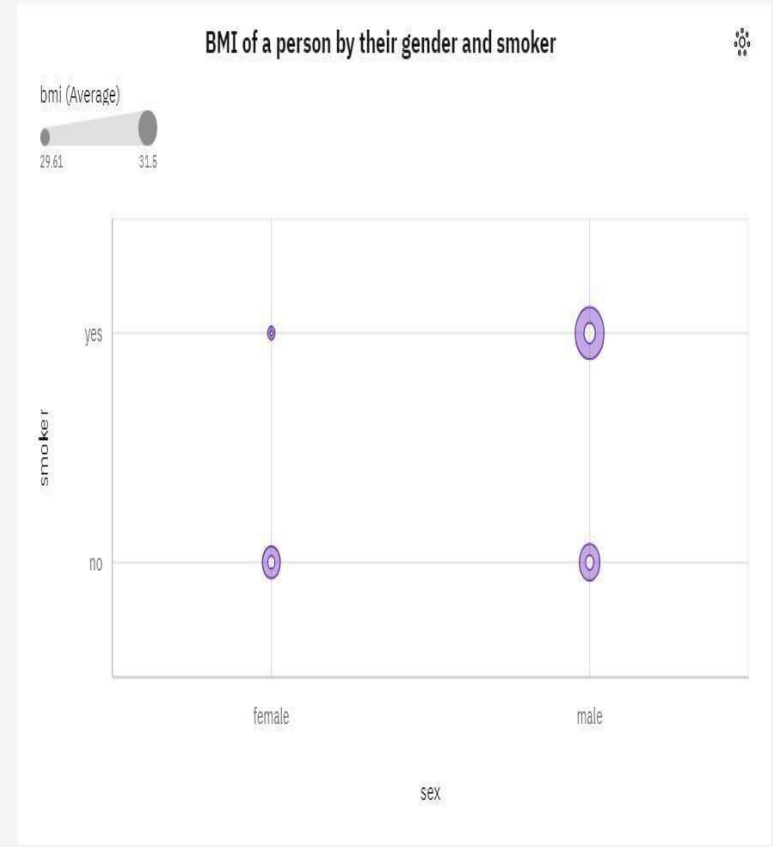

Average Age Of Male and Female
40
35
30
25
20
15
10
5
0
age (Average)
38.92
female
male
sex

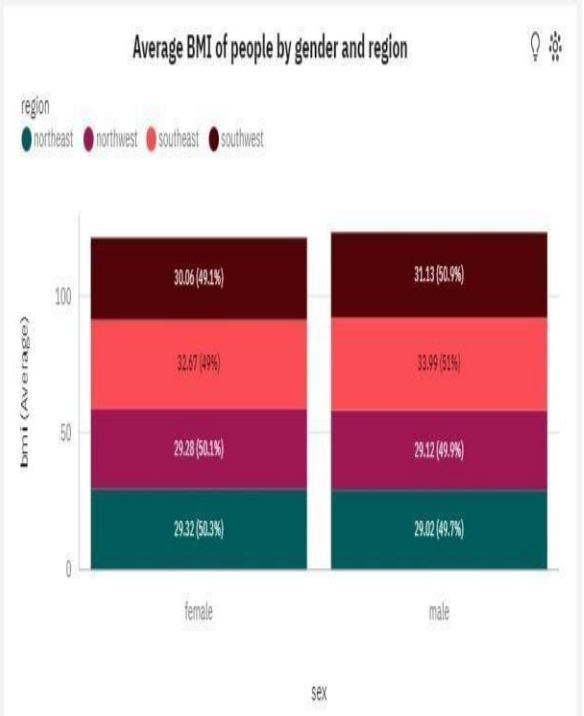

BMI of a person based on their age
bmi (Average)
age (Average)

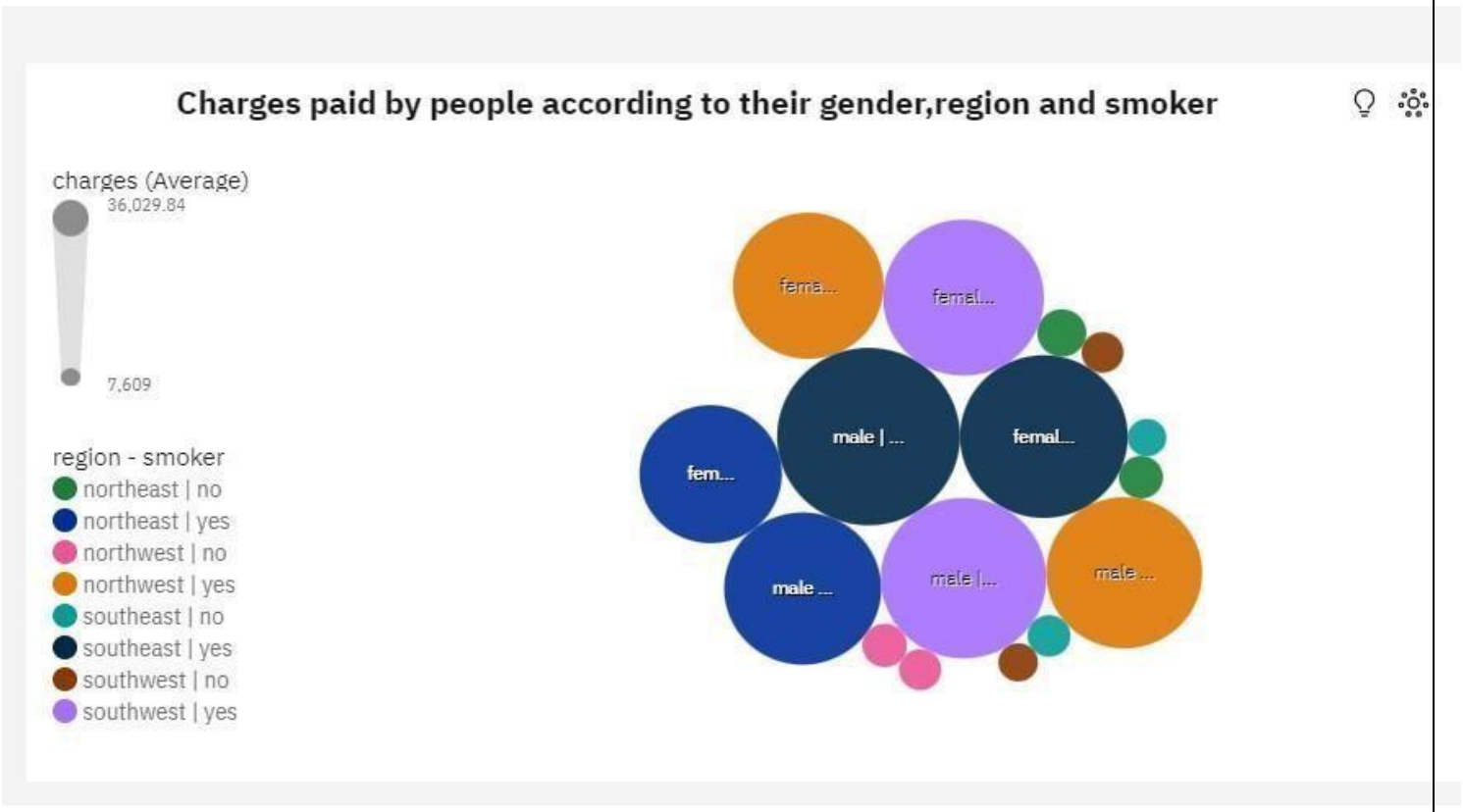

The average number of children by age and smoker or not
smoker
no
yes
children (Average)


charges paying by people according to their age and smoker
smoker
no
yes
charges (Average)
50,000
40,000
30,000
20,000
10,000
0
27,030.15
28,126.72
29,370.77
29,915.19
30,132.32
33,737.07
32,984.95
37,147.59
38,014.57
40,630.7
3,364.78
5,368.1
5,566.96
6,365.35
7,530.77
8,446.84
10,675.69
12,399.95
13,165.66
15,232.71
less than 23
23 to < 28
28 to < 32
32 to < 37
37 to < 41
41 to < 46
46 to < 51
51 to < 55
55 to < 60
60 and ...
age (Group)

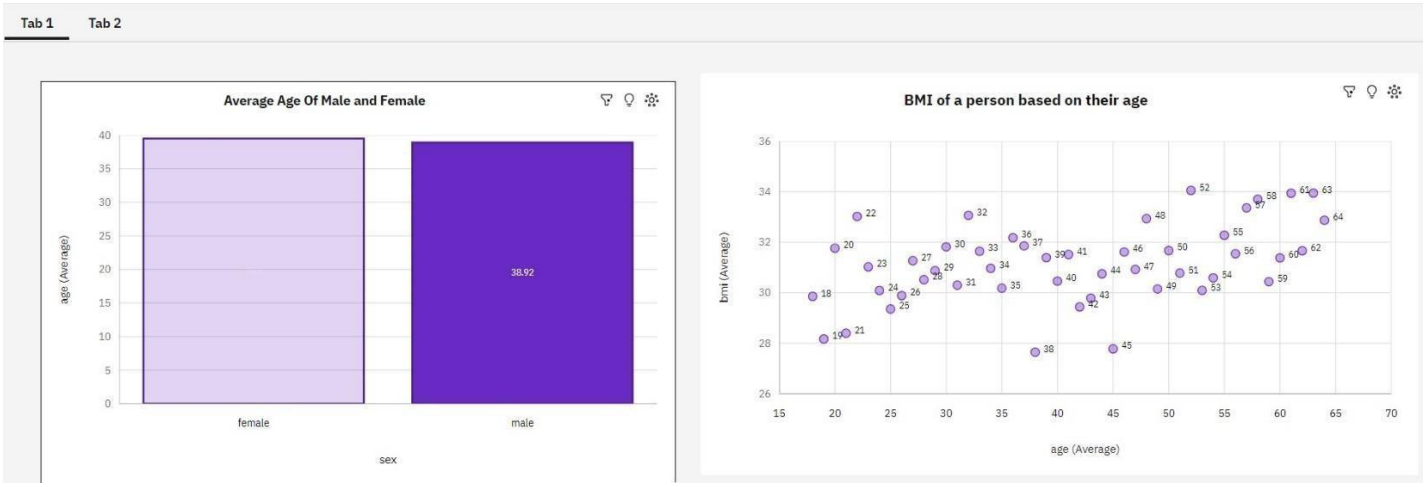

Average age of people according to region and gender
age (Average)
38.78
39.7
region
northeast
northwest
southeast
southwest
female
male
sex

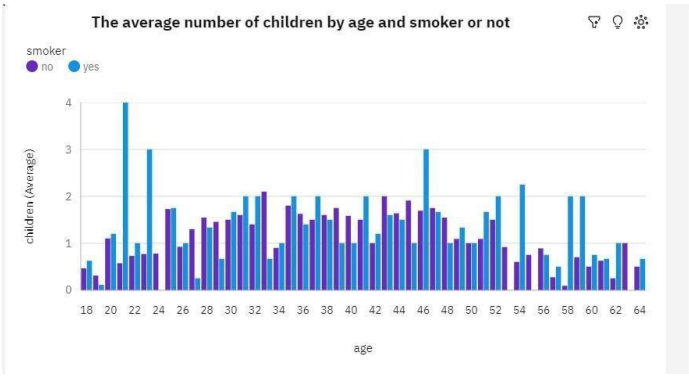

BMI of a person by their gender and smoker
bmi (Average)
29.61
31.5
yes
no
smoker
female
male
sex

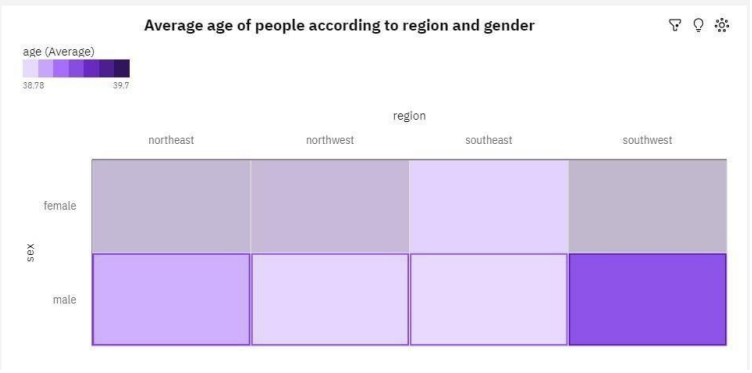

Average BMI of people by gender and region
region
northeast
northwest
southeast
southwest
bmi (Average)
100
50
0
30.06 (49.1%)
31.13 (50.9%)
32.67 (49%)
33.99 (51%)
29.28 (50.1%)
29.12 (49.9%)
29.32 (50.3%)
29.02 (49.7%)
female
male
sex


Charges paid by people according to their gender,region and smoker
charges (Average)
36,029.84
7,609
region - smoker
northeast | no
northeast | yes
northwest | no
northwest | yes
southeast | no
southeast | yes
southwest | no
southwest | yes
fema...
femal...
male | ...
femal...
fem...
male ...
male |...
male ...

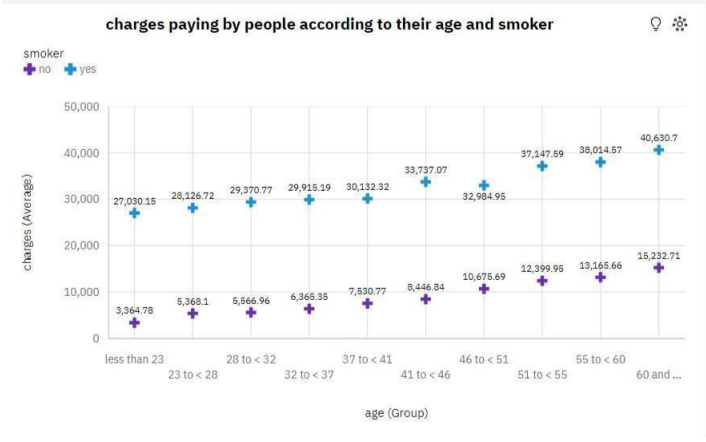
DASHBOARD

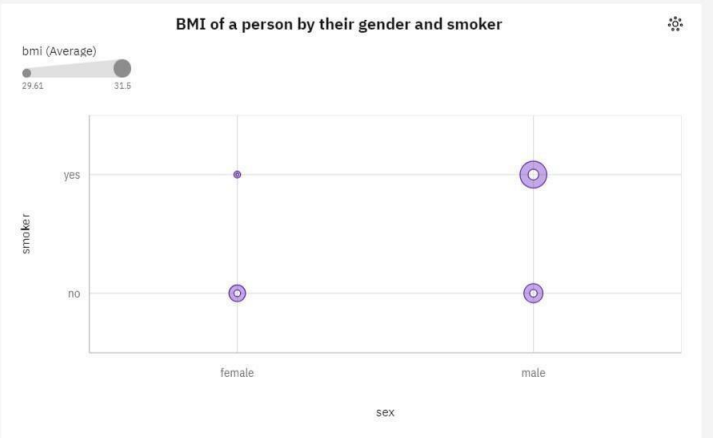

Tab 1
Tab 2
Average Age Of Male and Female
age (Average)
38.92
female
male
sex
BMI of a person based on their age
bmi (Average)
age (Average)


The average number of children by age and smoker or not
smoker
no
yes
children (Average)
age


Average age of people according to region and gender
age (Average)
38.78
39.7
region
northeast
northwest
southeast
southwest
sex
female
male

Tab 1 Tab 2


charges paying by people according to their age and smoker
smoker
no
yes
charges (Average)
age (Group)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29.61
31.5
smoker
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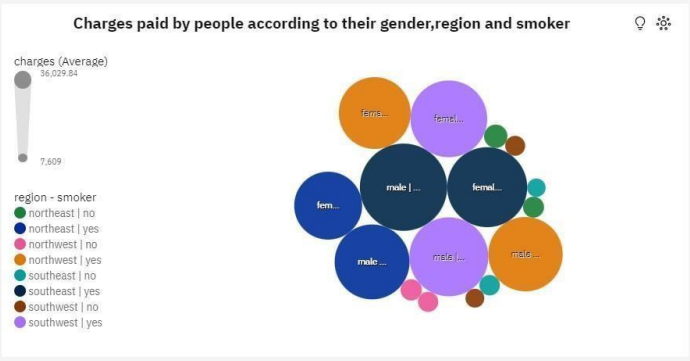
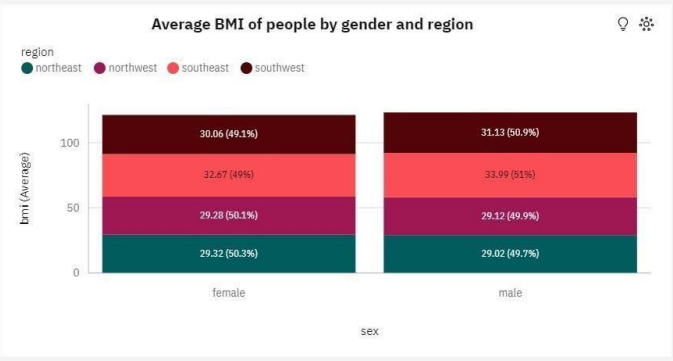
no
female
male
sex


Charges paid by people according to their gender,region and smoker
charges (Average)
region - smoker
northeast | no
northeast | yes
northwest | no
northwest | yes
southeast | no
southeast | yes
southwest | no
southwest | yes


Average BMI of people by gender and region
region
northeast
northwest
southeast
southwest
bmi (Average)
30.06 (49.1%)
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32.67 (49%)
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29.12 (49.9%)
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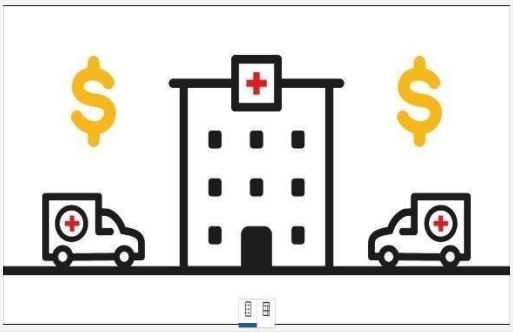
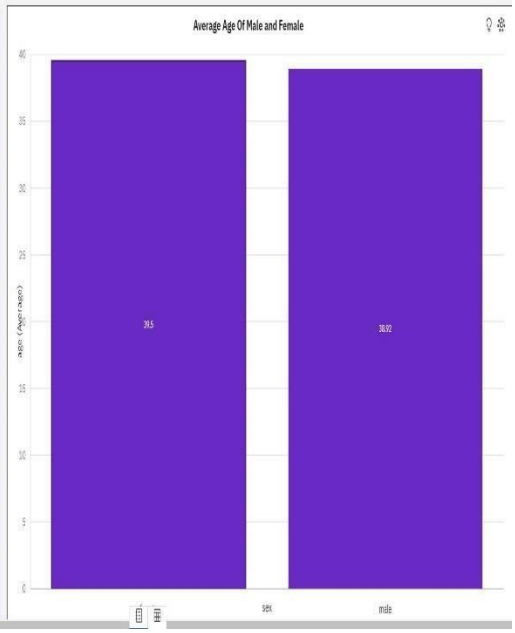
29.02 (49.7%)
female
male
sex

STORY

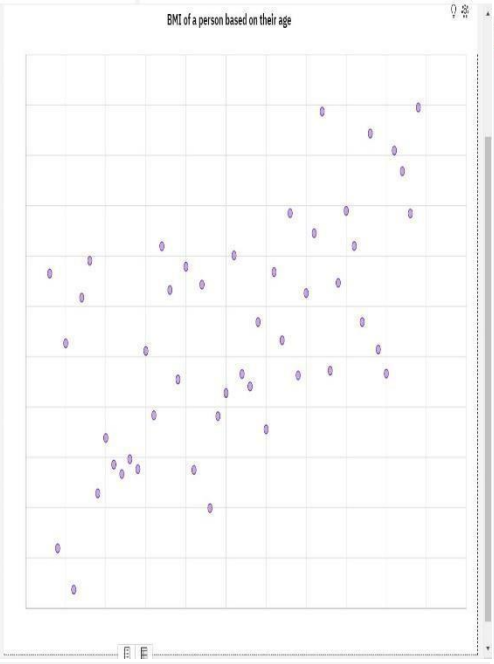
Medical Care Costs story



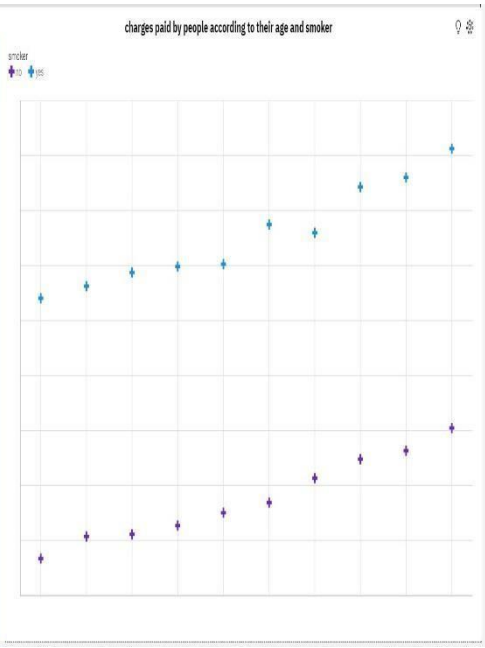
- This graph mainly represents the average age of males and females.
- The average age of females is higher despite having a little bit less number of females in the overall dataset
- The average value of age for males is38.92 and for females is39.5



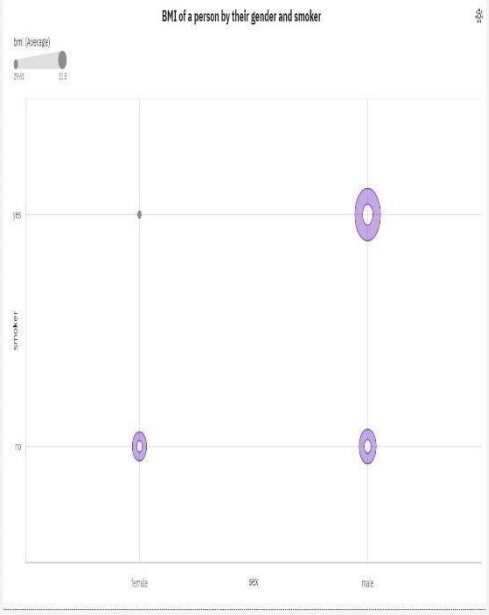
- As the age is increasing the average BMI of persons is also increasing, this means BMI and age are linearly proportional.
- The maximum value of BMI in the middle age group is little bit higher but, when the age is increasing the BMI value is decreasing



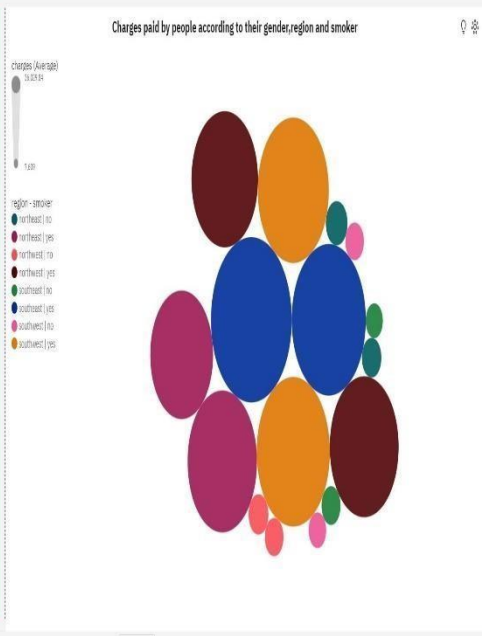
- Smokers of any age are paying more than non-smokers and the value is almost 3x to 5x higher
- Charges are getting increased as the age is also increasing in both scenarios
- Charges are unusually high when the age (Group) is 60 and above



- Males and smokers have the average BMI value compared to all.
- Females and smokers have less average BMI value compared to all.
- Incase of non- smokers, irrespective of gender their average BMI is almost similar

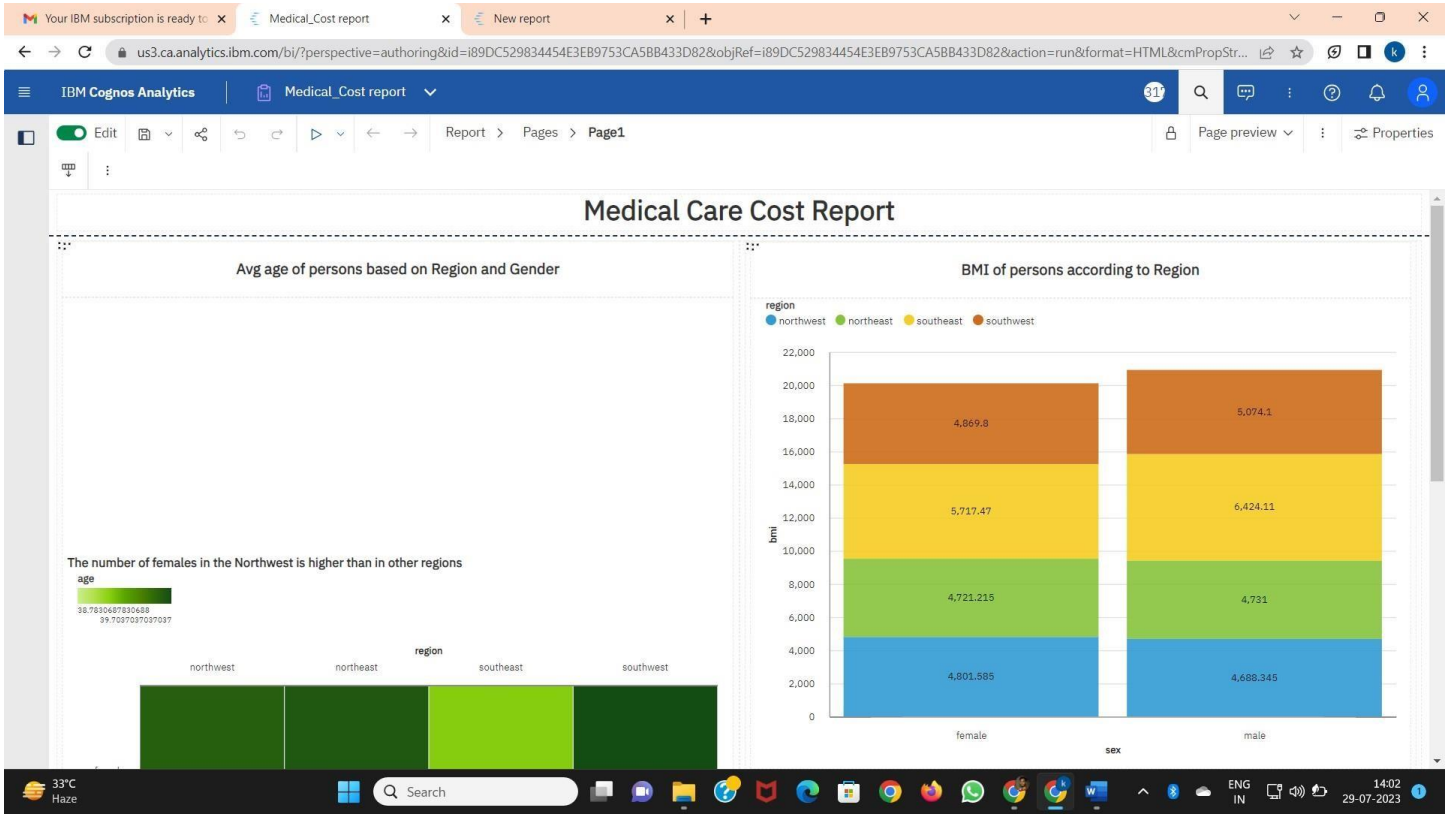


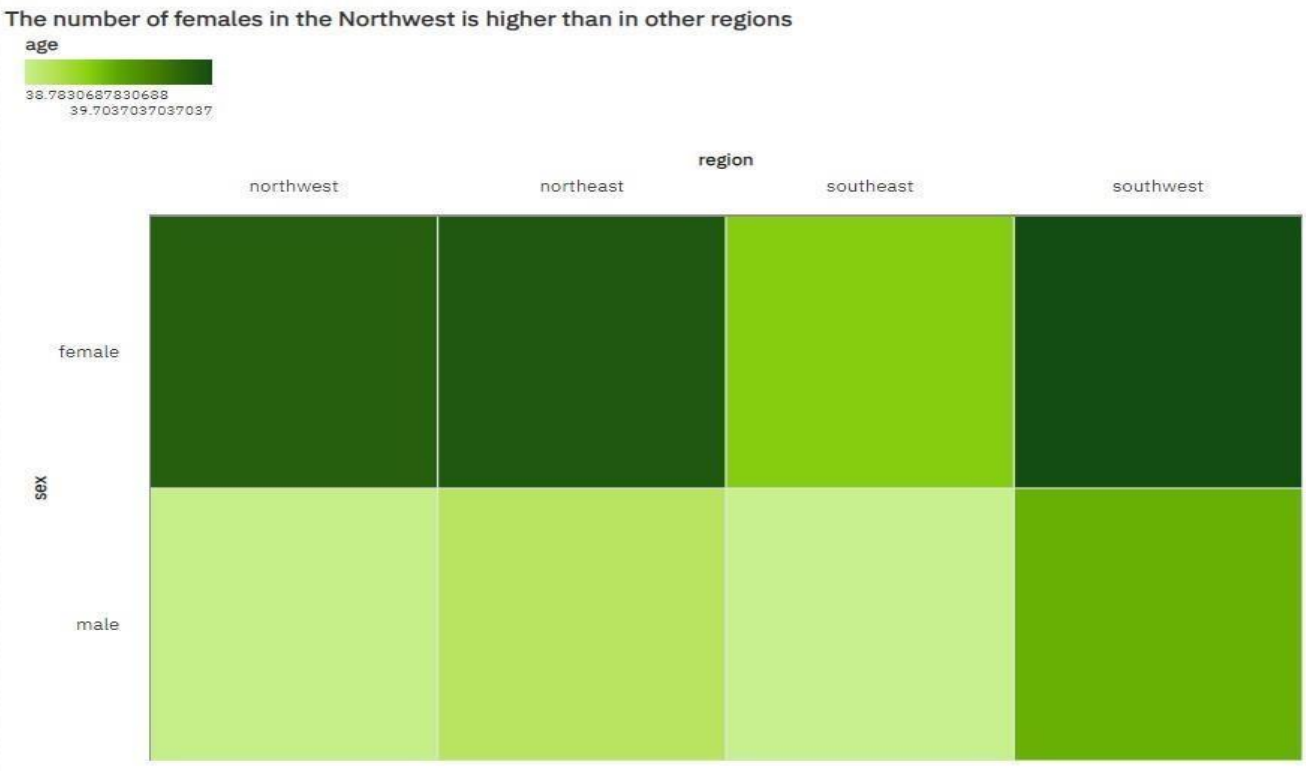
- Southeast region people, both men and women are paying more charges compared to other regions.
- Southeast region smokers are the ones who are paying more charges.
- Out of all we have seen, smokers tend to pay more charges irrespective of region.

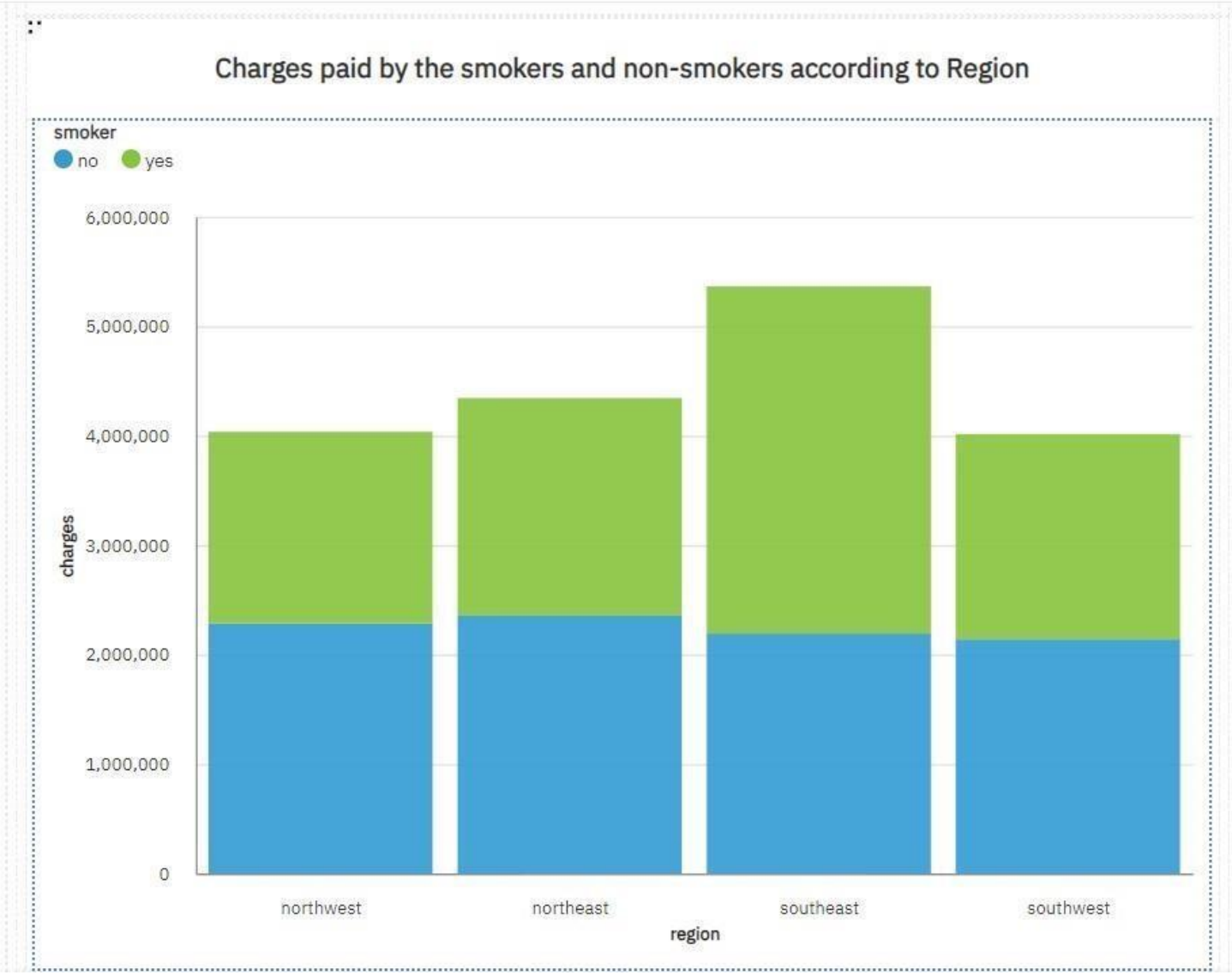


Smoking is not only injuries to Health but also to Wealth!

REPORT


Medical Care Cost Report
Avg age of persons based on Region and Gender
The number of females in the Northwest is higher than in other regions
age
38.7830687830688
39.7037037037037
region
northwest
northeast
southeast
southwest
BMI of persons according to Region
region
northwest
northeast
southeast
southwest
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
bmi
4,869.8
5,074.1
5,717.47
6,424.11
4,721.215
4,731
4,801.585
4,688.345
female
male
sex


The number of females in the Northwest is higher than in other regions
age
38.7830687830688
39.7037037037037
region
northwest
northeast
southeast
southwest
female
male
sex



WEB INTEGRATION

Medical Care Costs in India

Home About Dashboard Story Report

Dashboard

Activate Windows

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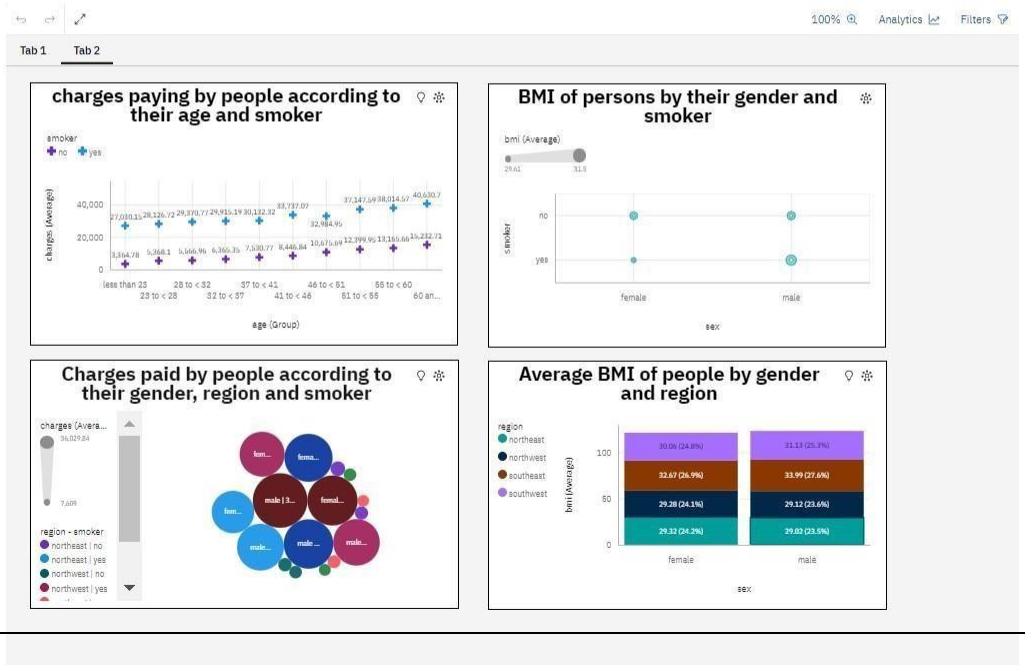
Medical Care Costs in India

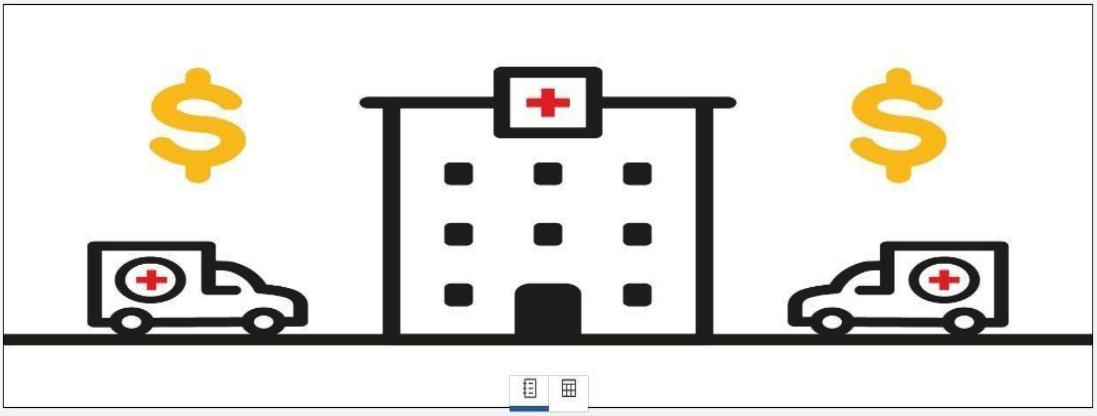
Home About Dashboard Story Report

Dashboard



Activate Windo

Medical Care Costs story



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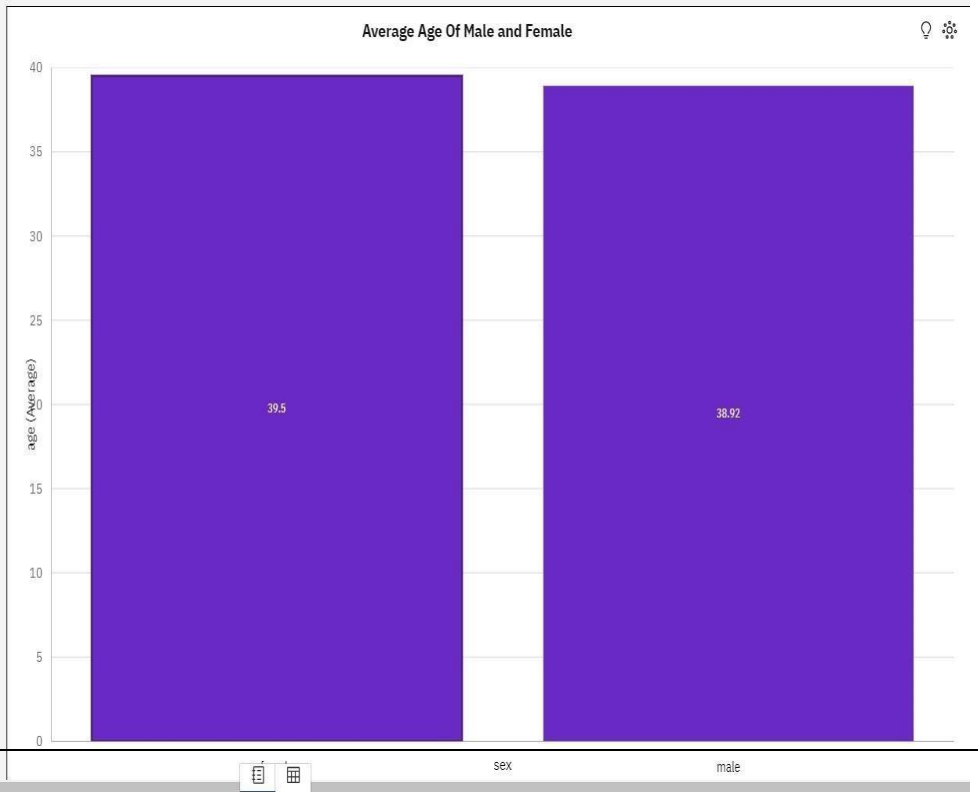

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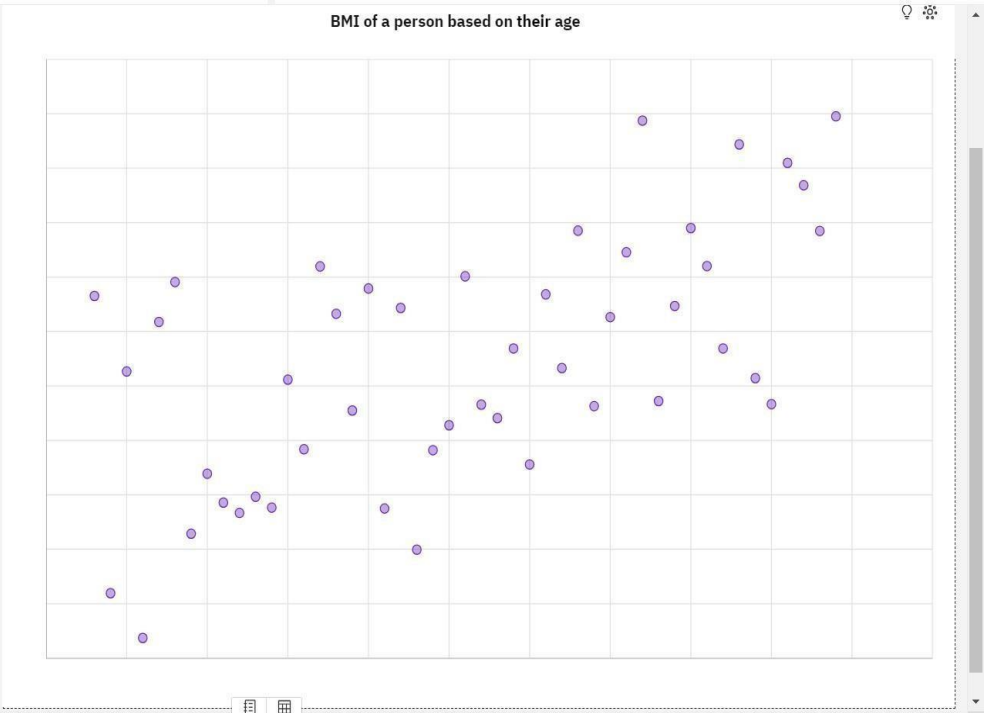

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Medical Care Costs in India

Home About Dashboard Story Report

Story

Analytics Filters

Medical Care Costs Story

- Smokers of any age are paying more than non-smokers and the value is almost 3x to 5x higher.
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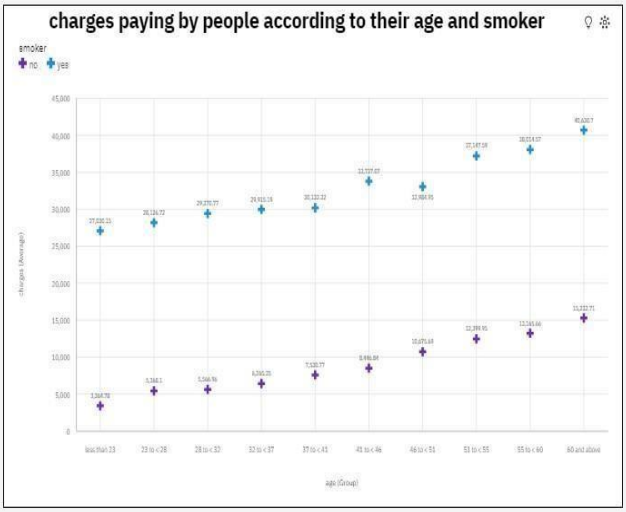
- charges are unusually high when the age (Group) is 60 and above.



Prev scene Next scene Scene 4 of 7

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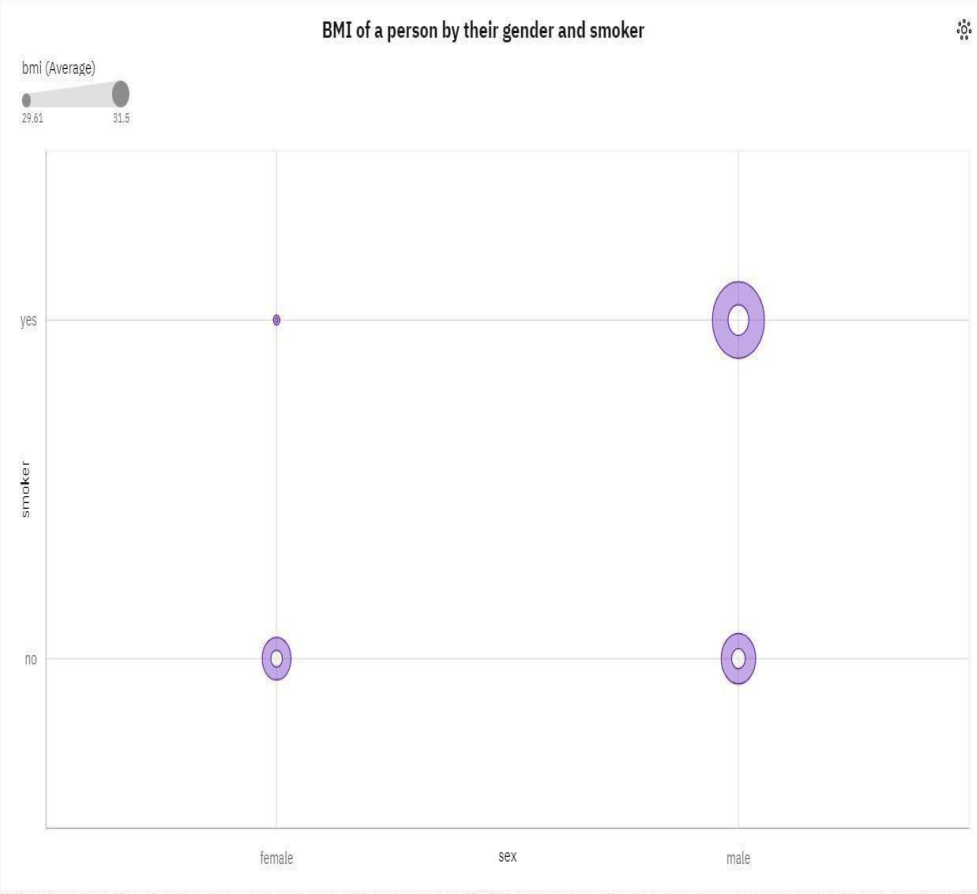

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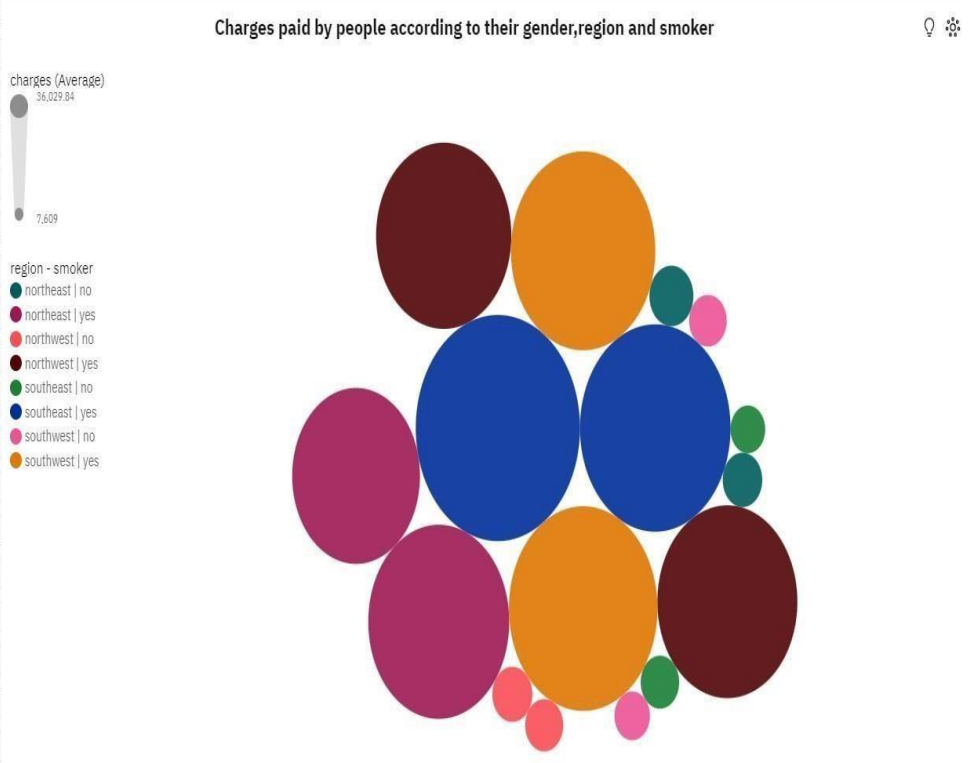


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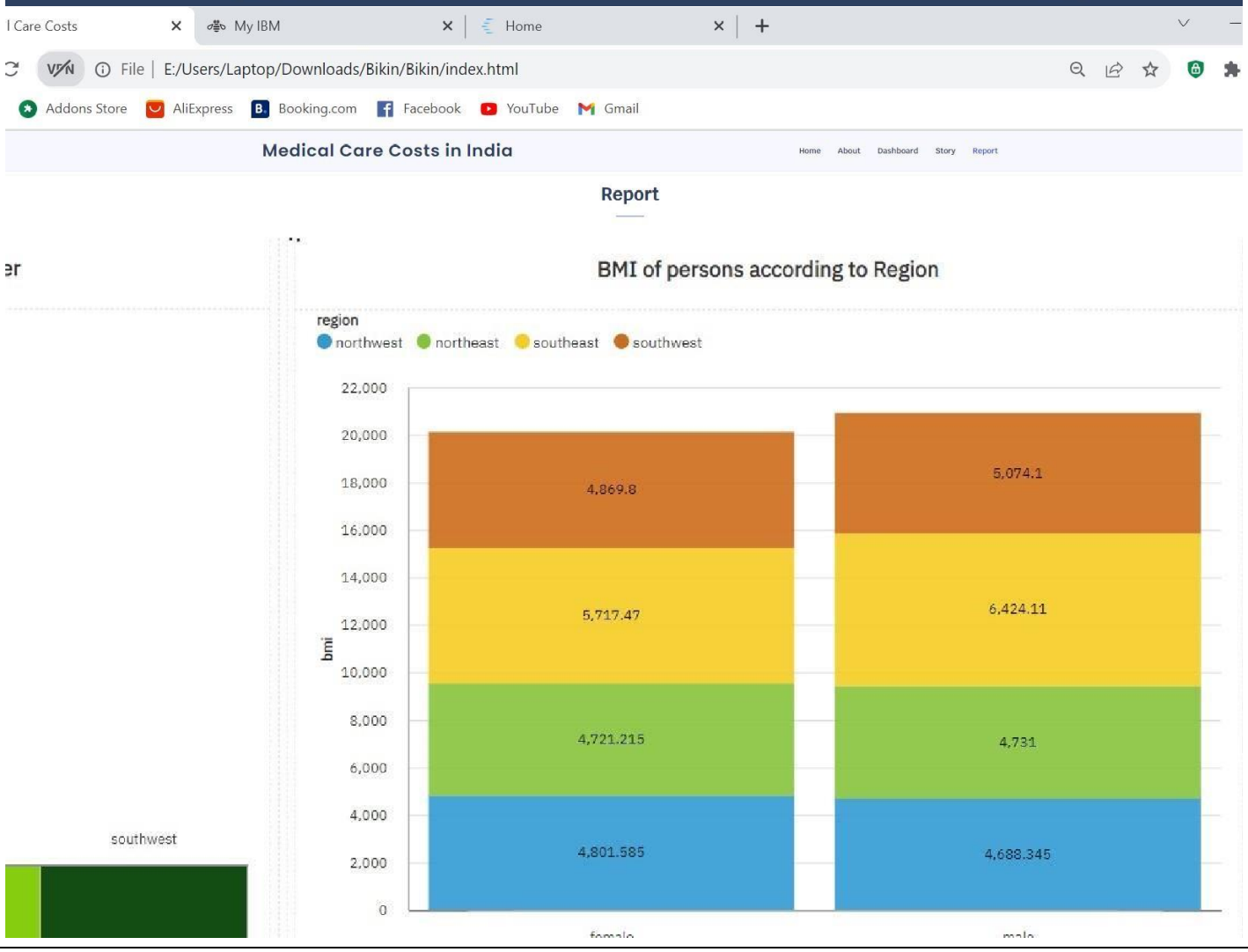
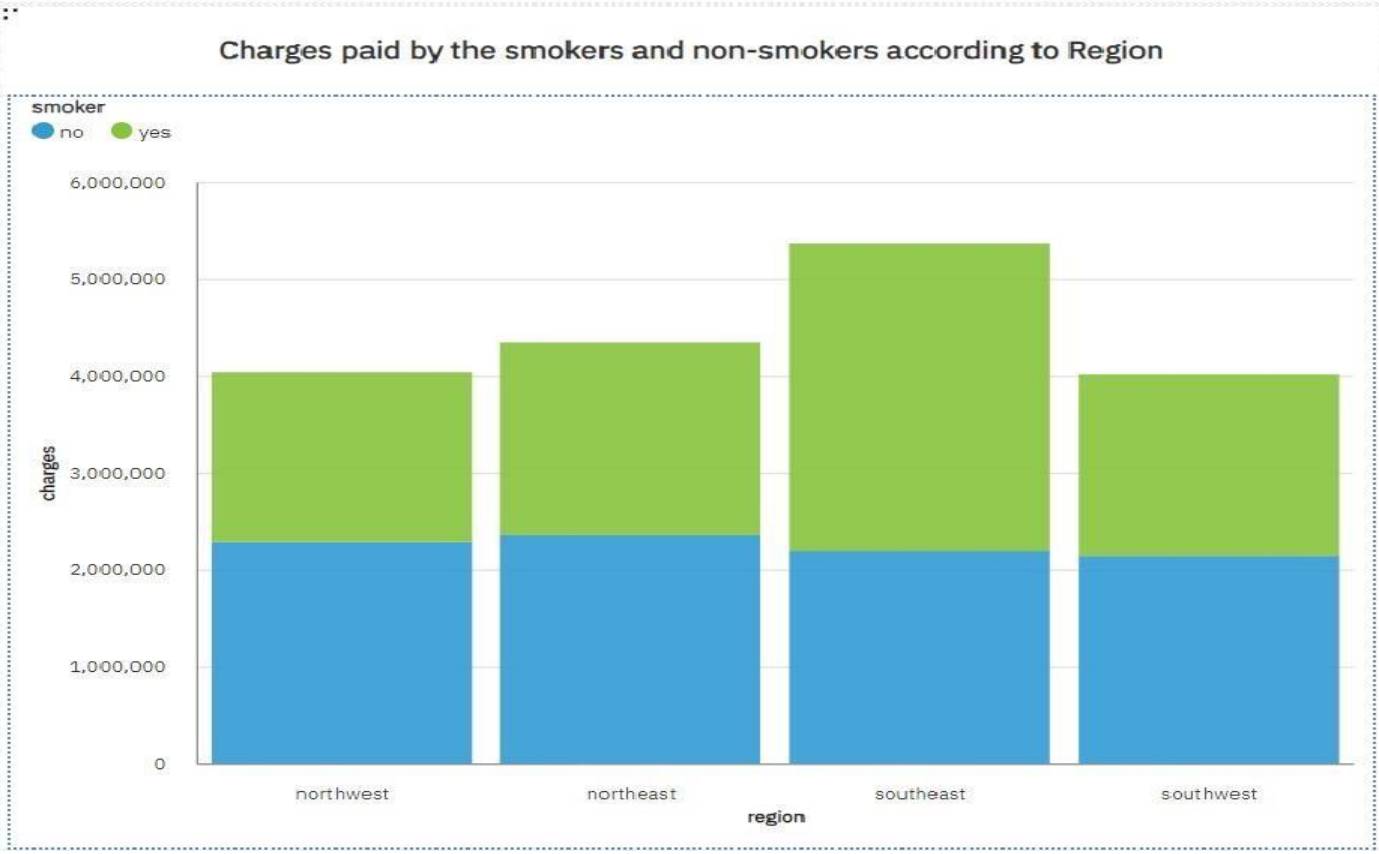
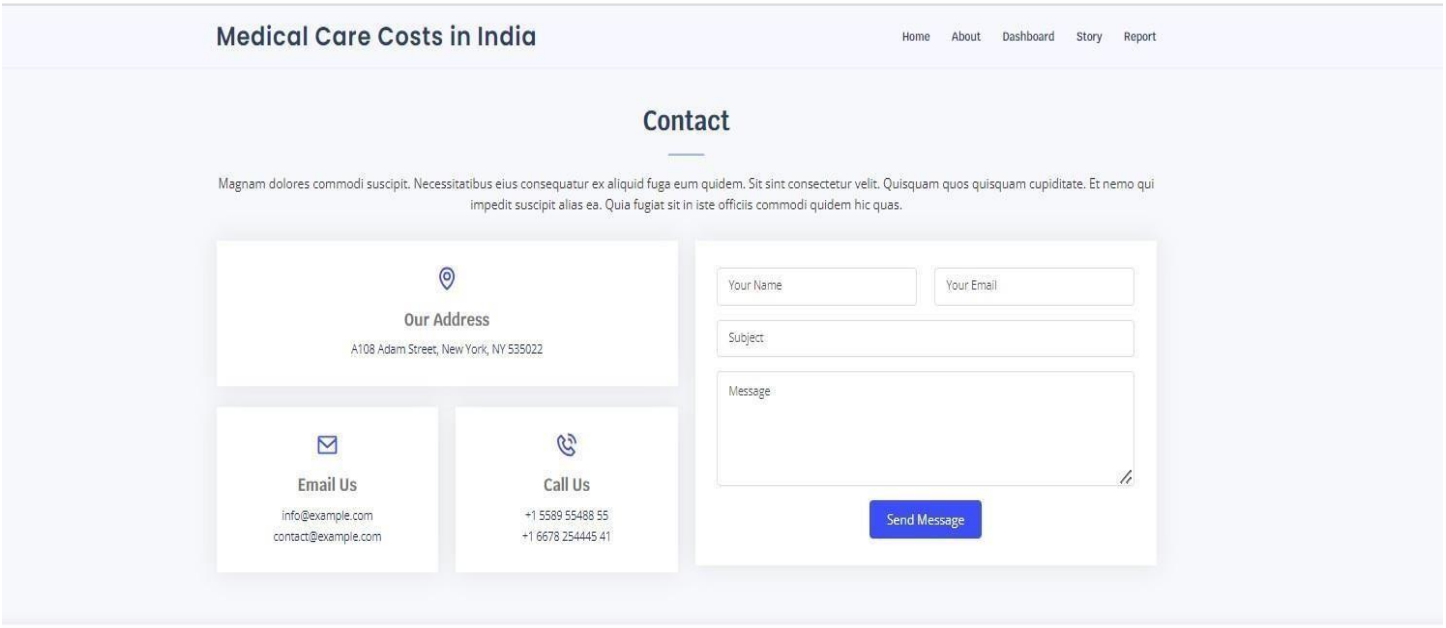
Booking.com
Facebook
YouTube
Gmail
Medical Care Costs in India
Home
About
Dashboard
Story
Report
Story
Analytics
Filters
Smoking is not only injuries to Health but also to Wealth!
Prev scene
Next scene
Activate Wind
Go to Settings to


I Care Costs
My IBM
Home
File | E:/Users/Laptop/Downloads/Bikin/Bikin/index.html
Addons Store
AliExpress
Booking.com
Facebook
YouTube
Gmail
Medical Care Costs in India
Home
About
Dashboard
Story
Report
Report
BMI of persons according to Region
region
northwest
northeast
southeast
southwest
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
bmi
4,869.8
5,717.47
4,721.215
4,801.585
5,074.1
6,424.11
4,731
4,688.345
female
male
southwest

The number of females in the Northwest is higher than in other regions





5.ADVANTAGES & DISADVANTAGES

Advantages:

- Cost Optimization
- Informed Decision-making
- Improved Patient Care
- Tailored Insurance Coverage
- Fraud Detection
- Research and Policy Development

Disadvantages:

- Data Privacy Concerns
- Data Quality
- Model Complexity
- Limited Predictability
- Ethical Considerations

- 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.

- **Healthcare Cost Management** **Financial Planning:**
- **Insurance Pricing and Coverage:**
- **Resource Allocation:**
- **Treatment Decision Support**
- **Patient Cost Transparency**
- **Policy Development**
- **Fraud Detection**
- **Benchmarking and Performance**
- **Research and Public Health**
- **Cost-Effective Healthcare Programs**
- **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. Lastly we have to create the web integration in the python folder. Download the bikin file and run the index.html in spyder.

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.