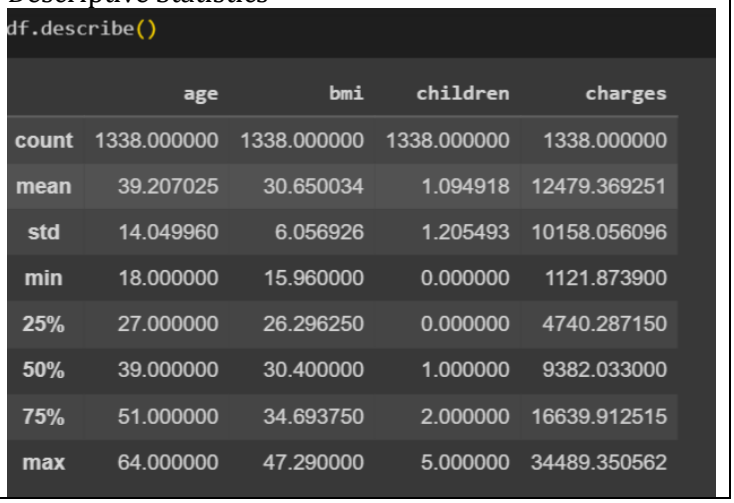
Data Collection and Preprocessing Phase

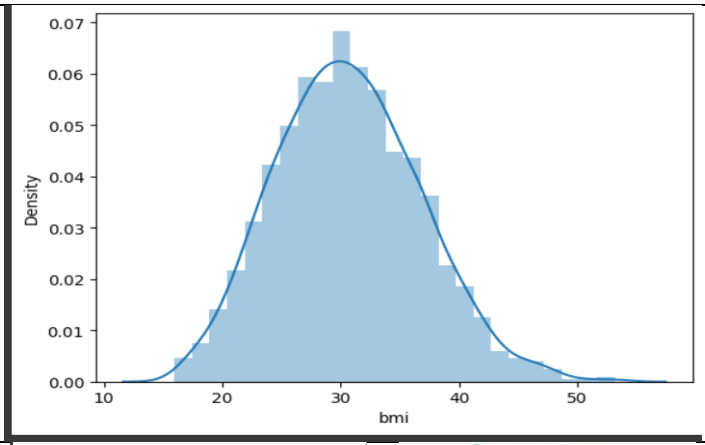
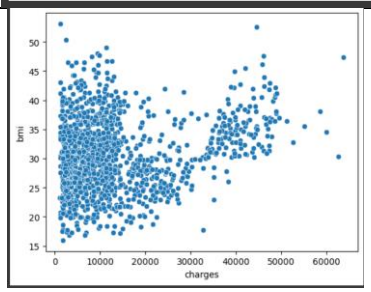
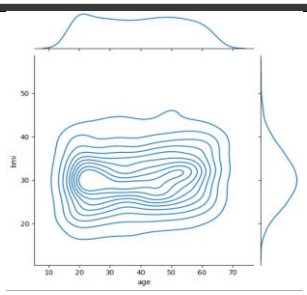
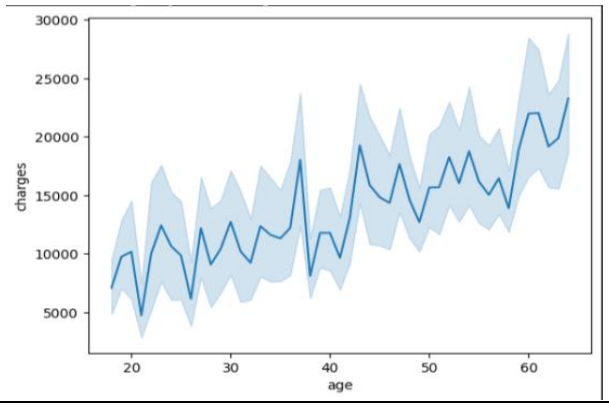
Date	4 July 2024
Team ID	team-739690
Project Title	Medical Cost Prediction
Maximum Marks	6 Marks

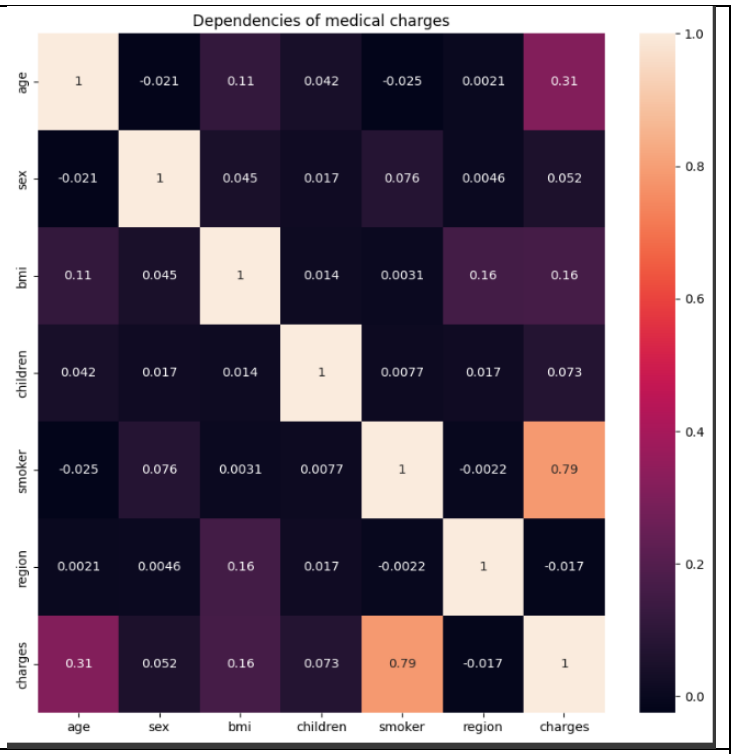
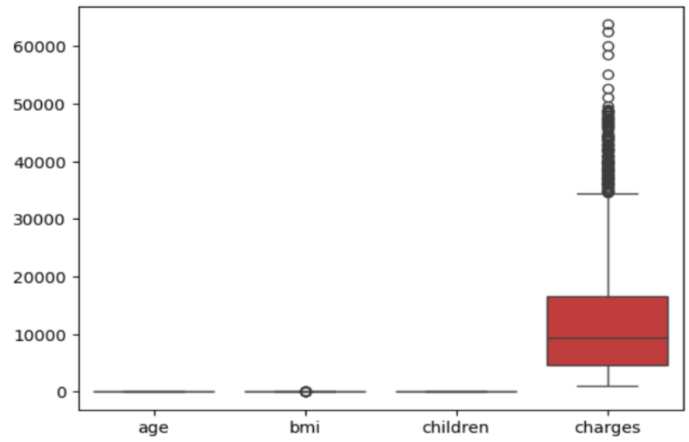
Data Exploration and Preprocessing Template

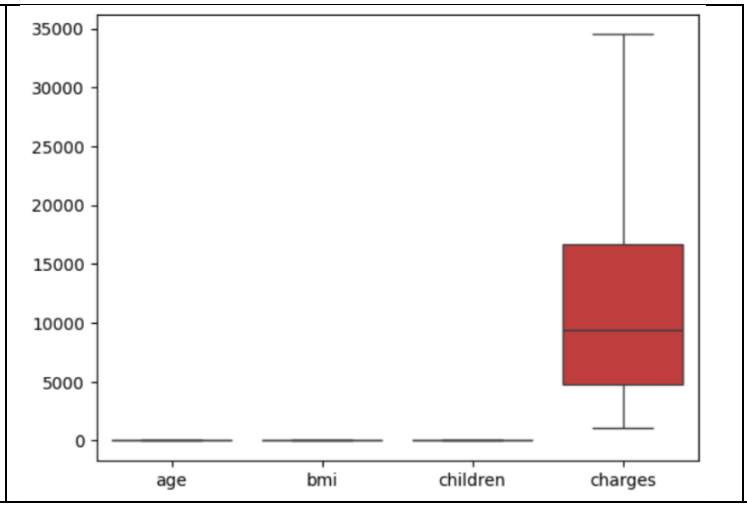
Data Exploration involves several key steps. They are importing libraries, loading the dataset, basic data overview, checking for missing values, visualizing the data distribution, correlation matrix. Data preprocessing involves the following steps they are handling missing values, encoding categorical variables, feature scaling, splitting the dataset.

Section	Description
Data Overview	Dimension: 1338 rows x 7 columns Descriptive Statistics `df.describe()` 

	age	bmi	children	charges
count	1338.000000	1338.000000	1338.000000	1338.000000
mean	39.207025	30.650034	1.094918	12479.369251
std	14.049960	6.056926	1.205493	10158.056096
min	18.000000	15.960000	0.000000	1121.873900
25%	27.000000	26.296250	0.000000	4740.287150
50%	39.000000	30.400000	1.000000	9382.033000
75%	51.000000	34.693750	2.000000	16639.912515
max	64.000000	47.290000	5.000000	34489.350562

Univariate Analysis	
Bivariate Analysis	  

Multivariate Analysis	
Outliers and Anomalies	



Data Preprocessing Code Screenshots	
Loading Data	Read The Dataset `df=pd.read_csv("/content/insurance .csv")`

Handling Missing Data	`df[df.isnull().any(axis=1)]`
	
	`age sex bmi children smoker region charges`
	
	`df.info()`
	
	`<class 'pandas.core.frame.DataFrame'>`
	`RangeIndex: 1338 entries, 0 to 1337`
	`Data columns (total 7 columns):`
	` #  Column  Non-Null Count  Dtype`
	`---  ------  --------------  -----`
	` 0  age  1338 non-null  int64`
	` 1  sex  1338 non-null  object`
	` 2  bmi  1338 non-null  float64`
	` 3  children  1338 non-null  int64`
	` 4  smoker  1338 non-null  object`
	` 5  region  1338 non-null  object`
	` 6  charges  1338 non-null  float64`
	`dtypes: float64(2), int64(2), object(3)`
	`memory usage: 73.3+ KB`
	
	`df.isnull().sum()`
	
	`age 0`
	`sex 0`
	`bmi 0`
	`children 0`
	`smoker 0`
	`region 0`
	`charges 0`
	`dtype: int64`

Denoising(Removing Outliers)	

Removing Outliers

```
IQR = df['bmi'].quantile(0.75)-df['bmi'].quantile(0.25)
IQR
```

```
8.3975
```

```
lowerBound=df['bmi'].quantile(0.25)-(1.5*IQR)
lowerBound
```

```
13.7
```

```
upperBound=df['bmi'].quantile(0.75)+(1.5*IQR)
upperBound
```

https://colab.research.google.com/drive/1UB1Cw03nppHGIBKZthMnmBbCZF

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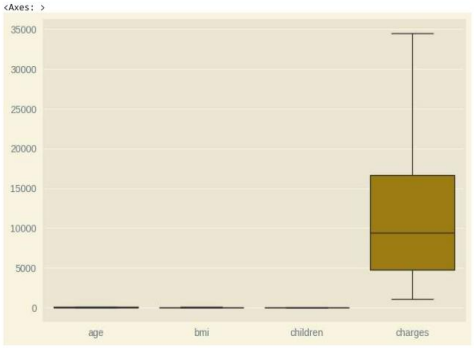
```
47.290000000000006
```

```
df['bmi']=np.where(df['bmi']>upperBound,upperBound,df['bmi'])
df['bmi']=np.where(df['bmi']<lowerBound,lowerBound,df['bmi'])
```

```
sns.boxplot(df)
```

```
<Axes: >
```



Data Transformation

```
from sklearn.preprocessing import LabelEncoder
```

```
label_encoder = LabelEncoder()
```

```
df.head()
```

	age	sex	bmi	children	smoker	region	charges
0	19	female	27.900	0	yes	southwest	16884.92400
1	18	male	33.770	1	no	southeast	1725.55230
2	28	male	33.000	3	no	southeast	4449.46200
3	33	male	22.705	0	no	northwest	21984.47061
4	32	male	28.880	0	no	northwest	3866.85520

```
df['sex'] = label_encoder.fit_transform(df['sex'])
df['smoker'] = label_encoder.fit_transform(df['smoker'])
df['region'] = label_encoder.fit_transform(df['region'])
```

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```
df.head()
```

	age	sex	bmi	children	smoker	region	charges
0	19	0	27.900	0	1	3	16884.92400
1	18	1	33.770	1	0	2	1725.55230
2	28	1	33.000	3	0	2	4449.46200
3	33	1	22.705	0	0	1	21984.47061
4	32	1	28.880	0	0	1	3866.85520

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<tr>
<td>Save Processed Data</td>
<td>Save as Pickle
Pickle is useful for saving and loading data frames in binary format


```
import pickle
import warnings

with open("rf.pkl","wb")as f:
  pickle.dump(rf,f)
```

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