mini-project-1

March 20, 2023

0.0.1 Importing Libraries

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
```

0.0.2 Data Collection and Analysis

[2]:
```
# Loading data from CSV file to Pandas Dataframe

df = pd.read_csv('insurance.csv')
```

[3]:
```
# First 5 rows of the Dataframe

df.head()
```

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

[4]:
```
# Number of rows and columns

df.shape
```

[4]:
```
(1338, 8)
```

[5]:
```
# Getting Information about Dataset

df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1338 entries, 0 to 1337
Data columns (total 8 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   age             1338 non-null   int64
 1   sex             1338 non-null   int64
 2   bmi             1338 non-null   float64
 3   children        1338 non-null   int64
 4   smoker          1338 non-null   int64
 5   region          1338 non-null   int64
 6   charges         1338 non-null   float64
 7   insuranceclaim  1338 non-null   int64
dtypes: float64(2), int64(6)
memory usage: 83.8 KB
```

[6]:

```
# checking for Missing values

df.isnull().sum()
```

[6]:

```
age               0
sex               0
bmi               0
children          0
smoker            0
region            0
charges           0
insuranceclaim    0
dtype: int64
```

[7]:

```
# Statical Information of dataset

df.describe()
```

[7]:

```
               age          sex          bmi     children       smoker  \
count  1338.000000  1338.000000  1338.000000  1338.000000  1338.000000
mean     39.207025     0.505232    30.663397     1.094918     0.204783
std      14.049960     0.500160     6.098187     1.205493     0.403694
min      18.000000     0.000000    15.960000     0.000000     0.000000
25%      27.000000     0.000000    26.296250     0.000000     0.000000
50%      39.000000     1.000000    30.400000     1.000000     0.000000
75%      51.000000     1.000000    34.693750     2.000000     0.000000
max      64.000000     1.000000    53.130000     5.000000     1.000000

            region       charges  insuranceclaim
count  1338.000000   1338.000000     1338.000000
mean      1.515695  13270.422265        0.585202
std       1.104885  12110.011237        0.492871
min       0.000000   1121.873900        0.000000
25%       1.000000   4740.287150        0.000000
```

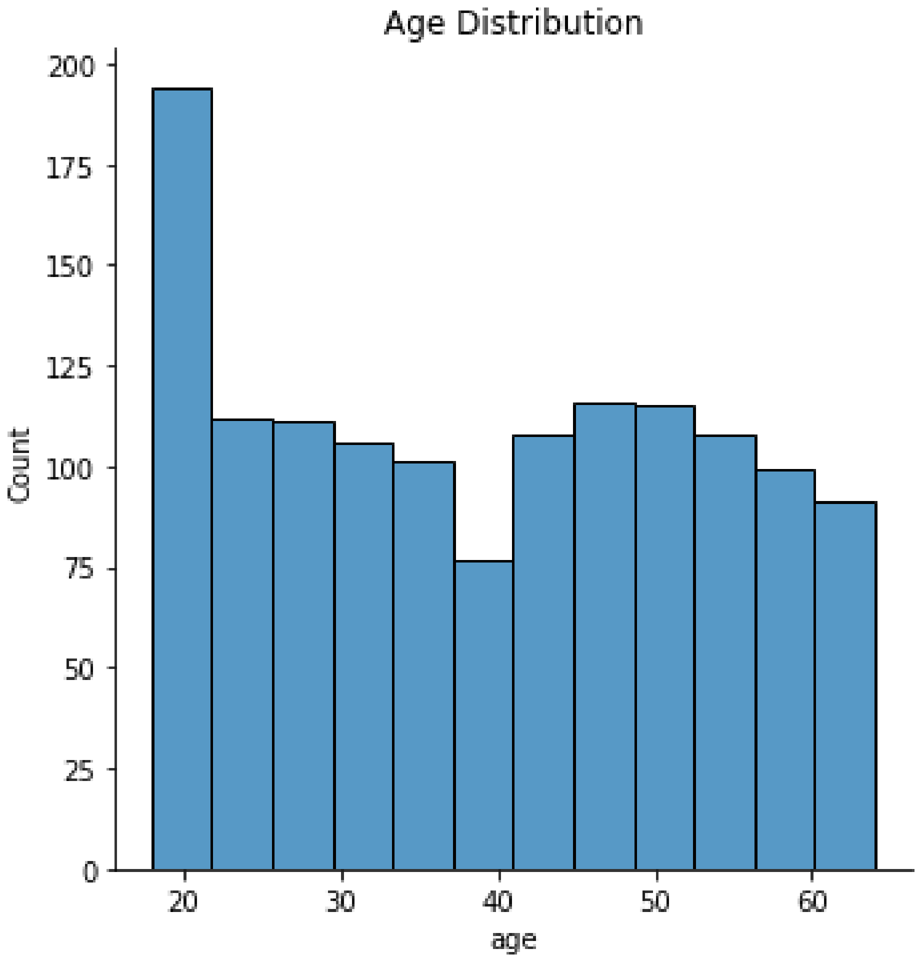
```
50%        2.000000   9382.033000        1.000000
75%        2.000000  16639.912515        1.000000
max        3.000000  63770.428010        1.000000
```

[19]:

```
# Checking for Age distribution

plt.figure(figsize=(5,6))
sns.displot(df['age'])
plt.title('Age Distribution')
plt.show()
```

```
<Figure size 360x432 with 0 Axes>
```



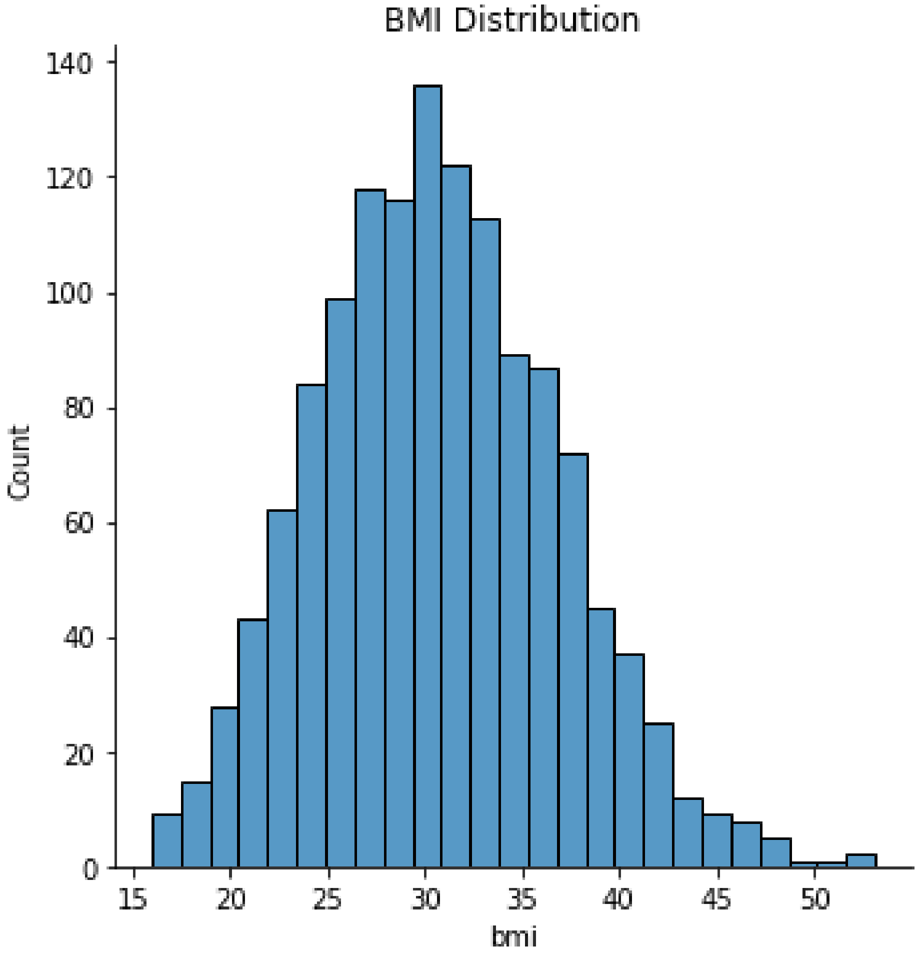
[20]:

```
# Checking for BMI distribution

plt.figure(figsize=(5,6))
sns.displot(df['bmi'])
```

```
plt.title('BMI Distribution')
plt.show()
```

```
<Figure size 360x432 with 0 Axes>
```

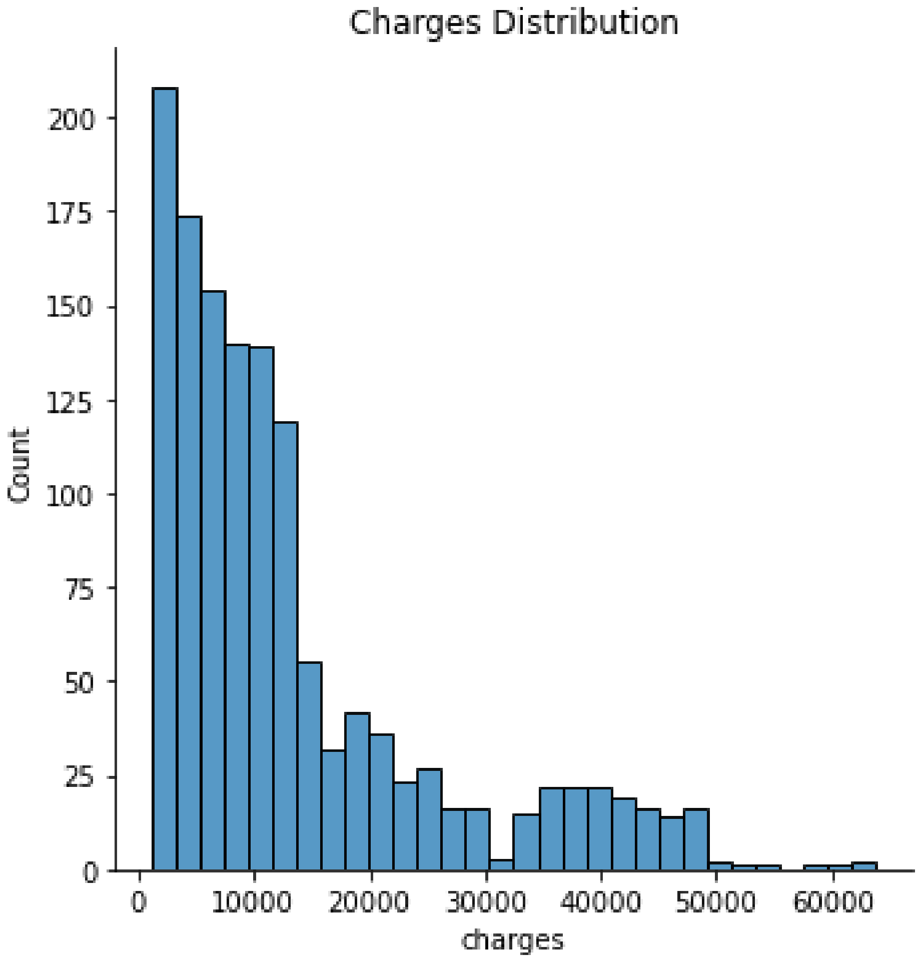


[21]:

```
# Checking for Charges distribution

plt.figure(figsize=(5,6))
sns.displot(df['charges'])
plt.title('Charges Distribution')
plt.show()
```

```
<Figure size 360x432 with 0 Axes>
```



0.0.3 Splitting Feature & Target

[8]:
```
X = df.drop(['insuranceclaim'],axis=1)
y = df['insuranceclaim']
```

[9]:
```
# Feature

X
```

[9]:
```
      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
…   …  …     …       …     …     …          …
```

```
1333    50    1   30.970          3         0         1   10600.54830
1334    18    0   31.920          0         0         0    2205.98080
1335    18    0   36.850          0         0         2    1629.83350
1336    21    0   25.800          0         0         3    2007.94500
1337    61    0   29.070          0         1         1   29141.36030

[1338 rows x 7 columns]
```

```
[10]: # Target

      y
```

```
[10]: 0       1
      1       1
      2       0
      3       0
      4       1
             ..
      1333    0
      1334    1
      1335    1
      1336    0
      1337    1
      Name: insuranceclaim, Length: 1338, dtype: int64
```

0.0.4 Splitting data into Training & Tetsing Data

```
[11]: X_train,X_test,y_train,y_test = train_test_split(X,y,test_size=0.
       ↪30,random_state=42)
```

```
[12]: # Printing shape

      print("X_train :",X_train.shape)
      print("X_test :",X_test.shape)
      print("y_train :",y_train.shape)
      print("y_test :",y_test.shape)
```

```
X_train : (936, 7)
X_test : (402, 7)
y_train : (936,)
y_test : (402,)
```

0.0.5 Model Training

[13]:
```
# Loading the Decision Tree Classification model

from sklearn.tree import DecisionTreeClassifier

dt = DecisionTreeClassifier()
```

[14]:
```
# Fitting the model

dt.fit(X_train,y_train)
```

[14]:
```
DecisionTreeClassifier()
```

0.0.6 Model Evaluation

[15]:
```
# Checking Accuracy on Training Data

acc1 = dt.score(X_train,y_train)
print("Accuracy on Training data :",acc1)
```

```
Accuracy on Training data : 1.0
```

[16]:
```
# Prediction on Testing Data

y_pred = dt.predict(X_test)
print(y_pred)
```

```
[0 1 1 1 1 1 0 1 1 1 0 0 0 1 1 1 0 1 0 1 0 0 1 1 1 1 1 0 1 1 0 1 1 0 0 1 0
 1 1 1 0 1 1 0 0 0 0 0 1 0 1 0 1 1 1 0 0 1 1 1 1 1 0 0 1 0 0 1 0 1 0 0 1 0
 1 1 0 0 0 1 1 1 0 1 1 1 0 1 0 0 1 1 1 0 1 0 1 1 0 0 0 1 1 0 0 0 0 1 0 1 1
 1 1 1 1 1 1 1 0 0 1 0 1 1 0 0 1 1 1 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 0 1 0 1
 0 0 1 1 1 1 0 1 1 0 1 1 0 0 1 0 0 1 1 1 1 1 0 1 1 0 1 1 1 1 0 0 1 1 0 1 0
 1 0 1 1 1 0 1 0 1 1 1 0 1 1 0 0 1 1 0 1 1 1 0 1 0 0 0 1 1 0 1 0 1 0 1 1 1
 0 1 1 1 0 1 1 0 1 0 0 1 0 1 0 1 1 1 0 1 1 0 0 1 0 1 0 1 1 0 0 0 1 1 1 1 0
 0 0 0 1 1 1 0 1 1 0 0 0 0 0 1 0 1 1 1 0 1 1 1 1 1 1 1 1 1 0 1 1 1 0 0 0 0
 1 0 1 1 1 0 0 1 1 1 1 1 0 1 0 0 1 1 0 0 1 1 1 0 1 0 0 1 0 1 0 0 1 1 1 1 1
 1 1 0 0 1 1 1 1 0 0 0 1 0 0 1 0 1 0 0 0 1 1 1 1 1 0 1 1 1 0 1 1 0 1 0 0 0
 1 1 0 0 1 1 1 1 1 1 0 1 0 0 1 1 1 1 1 0 0 1 0 0 1 0 0 1 1 1 1 0]
```

[17]:
```
# Checking Accuracy on Testing Data

acc2 = dt.score(X_test,y_test)
print("Accuracy on Tetsing data :",acc2)
```

```
Accuracy on Tetsing data : 0.9751243781094527
```

[18]:

```
# I used different Classification model on Same dataset and I got the Accuracy␣
 ↪as :

# Logistic regression : 0.815920398
# Support Vector Machine : 0.6082089552238806
# Naive bayes score : 0.7723880597014925
```