Descriptive Analytics for Mixed Data

In [ ]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [ ]:
```
# Load data
df = pd.read_excel('desciptive.xlsx')
```

In [ ]:
```
df.head()
```

Out[ ]:

	id	calcium	iron	protein	vitamin A	vitamin C	age	sex	bmi	children	smoker
0	1	522.29	10.188	42.561	349.13	54.141	38	male	19.300	0	yes
1	2	343.32	4.113	67.793	266.99	24.839	41	female	31.600	0	no
2	3	858.26	13.741	59.933	667.90	155.455	30	male	25.460	0	no
3	4	575.98	13.245	42.215	792.23	224.688	18	female	30.115	0	no
4	5	1927.50	18.919	111.316	740.27	80.961	61	female	29.920	3	yes

Data Cleaning

In [ ]:
```
# remove unwantend columns
df.drop(columns='id',inplace=True)
```

In [ ]:
```
df.head()
```

Out[ ]:

	calcium	iron	protein	vitamin A	vitamin C	age	sex	bmi	children	smoker	r
0	522.29	10.188	42.561	349.13	54.141	38	male	19.300	0	yes	sout
1	343.32	4.113	67.793	266.99	24.839	41	female	31.600	0	no	sout
2	858.26	13.741	59.933	667.90	155.455	30	male	25.460	0	no	nort
3	575.98	13.245	42.215	792.23	224.688	18	female	30.115	0	no	nort
4	1927.50	18.919	111.316	740.27	80.961	61	female	29.920	3	yes	sout

Task 1: Quantitive Data Analysis

- Compute average, median, and mode values for the quan3ta3ve.
- Construct a sales (charges) data frequency distribu3on.
- Ascertain data spread by calcula3ng range, variance, and standard devia3on.
- Develop visual aids like histograms, box plots, or bar graphs to depict sales figures.

In [ ]:
```
# df.dtypes
# df.columns.to_list()
```

- Compute average, median, and mode values for the quantitative.

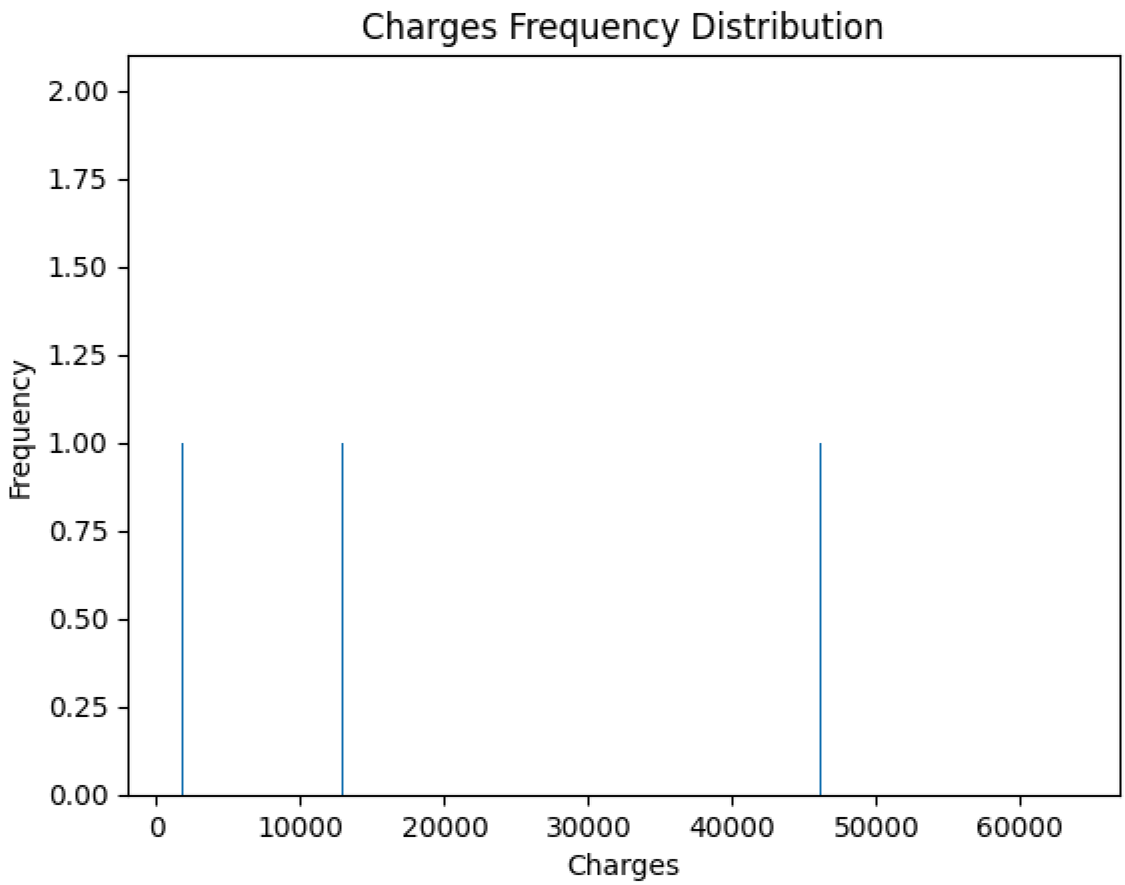
In [ ]:
```
Quantitative_columns = ['calcium','iron','protein','vitamin A','vitamin C','age','b
Qualitative_columns = ['sex','smoker','region']
```

In [ ]:
```
quantitative_data = df[Quantitative_columns]

average_values = quantitative_data.mean()
median_values = quantitative_data.median()
mode_values = quantitative_data.mode().iloc[0]


# Create a DataFrame for better presentation
summary_table = pd.DataFrame({
    'Average': average_values,
    'Median': median_values,
    'Mode': mode_values
})

print("Summary of Quantitative Data:")
print(summary_table)
```

```
Summary of Quantitative Data:
              Average    Median    Mode
calcium    624.338219  549.3800   7.440
iron        11.136673   10.0925   7.136
protein     65.990699   61.4285  73.267
vitamin A  841.556055  525.2750   0.000
vitamin C   78.458196   53.5850   0.000
age         39.593151   40.0000  19.000
bmi         30.963404   30.6900  32.300
children     1.071233    1.0000   0.000
```

- Construct a sales (charges) data frequency distribution:

In [ ]:
```
charges_frequency = df['charges'].value_counts().sort_index()

plt.bar(charges_frequency.index, charges_frequency.values)
plt.xlabel('Charges')
plt.ylabel('Frequency')
plt.title('Charges Frequency Distribution')
plt.show()
```



- Ascertain data spread by calculating range, variance, and standard deviation:

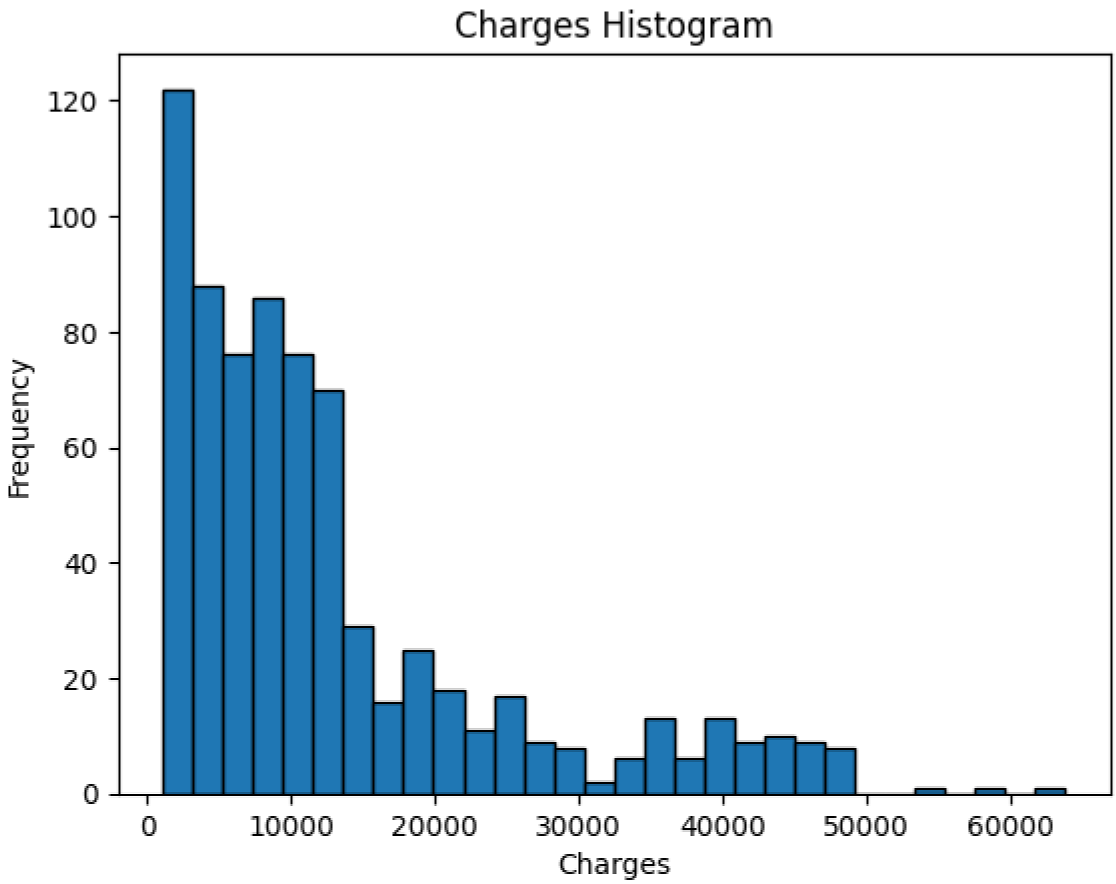
In [ ]:
```
data_spread = pd.DataFrame({
    'Range': quantitative_data.max() - quantitative_data.min(),
    'Variance': quantitative_data.var(),
    'Standard Deviation': quantitative_data.std()
})

print(data_spread)
```

```
                Range      Variance  Standard Deviation
calcium      2859.000  1.565989e+05          395.725745
iron           58.668  3.571731e+01            5.976396
protein       251.012  9.310199e+02           30.512619
vitamin A   34434.270  2.689709e+06         1640.033257
vitamin C     433.339  5.337309e+03           73.056887
age            46.000  2.011799e+02           14.183791
bmi            33.100  3.670461e+01            6.058433
children        5.000  1.383122e+00            1.176062
```

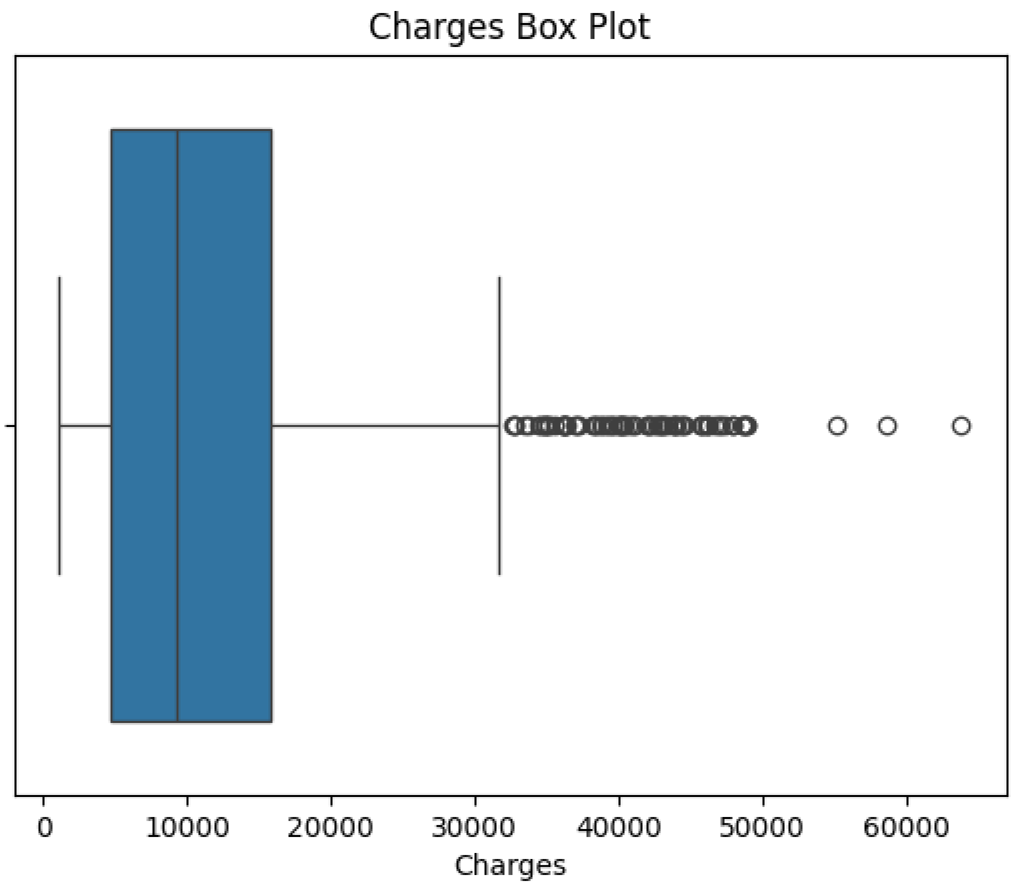
- Develop visual aids like histograms, box plots, or bar graphs to depict sales figures:

In [ ]:
```
# Histogram:
plt.hist(df['charges'], bins=30, edgecolor='black')
plt.xlabel('Charges')
plt.ylabel('Frequency')
```

```
plt.title('Charges Histogram')
plt.show()
```



In [ ]:
```
# Box Plot:
sns.boxplot(x='charges', data=df)
plt.xlabel('Charges')
plt.title('Charges Box Plot')
plt.show()
```



Task 2: Qualita&ve Data Analysis

- Review categorial data.
- Quan3fy and visualize the categorial data with meaningful categories and charts.
- Create dummy variables for region and smoker, and one other categorial data.
- Compile your discoveries into a narra3ve, emphasizing major insights and poten3al links to the sales figures.
- Analyze correla3ons between different attributes, if exists.

- Review categorial data.

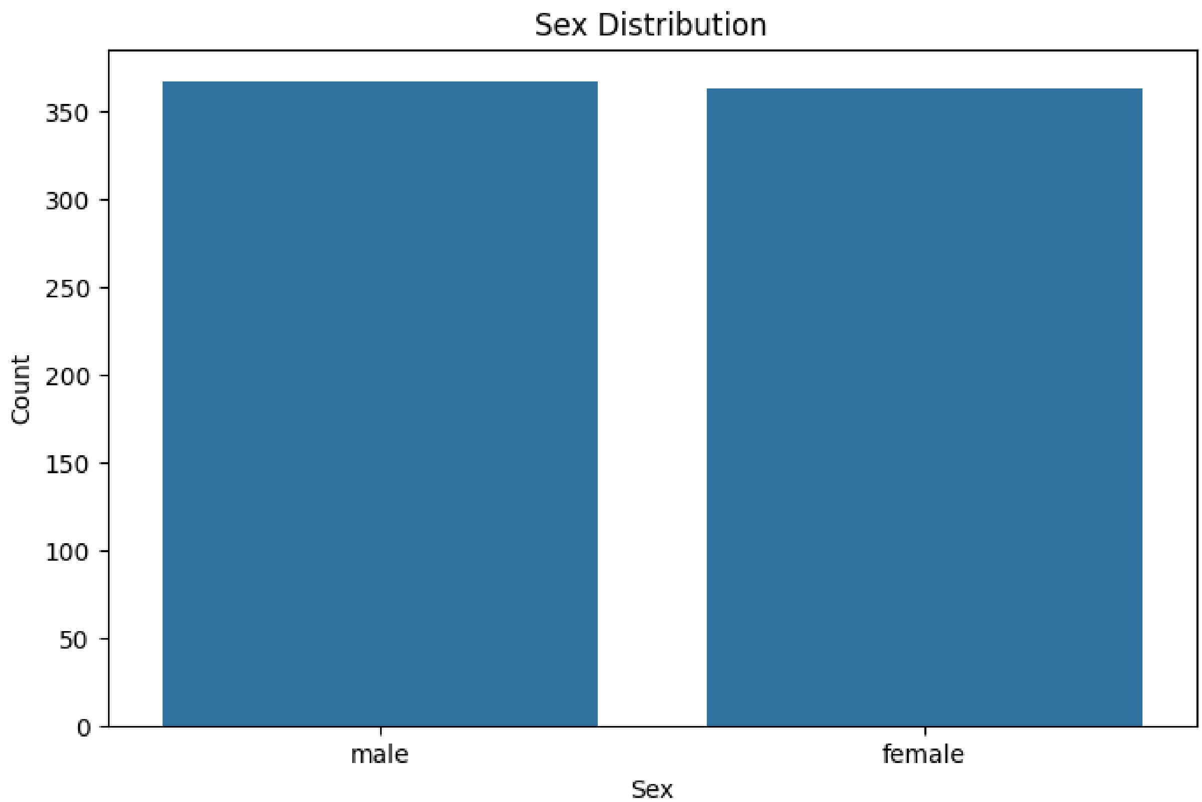
In [ ]:
```
# Extracting categorical data
categorical_data = df[Qualitative_columns]
```

- Quan3fy and visualize the categorial data with meaningful categories and charts.

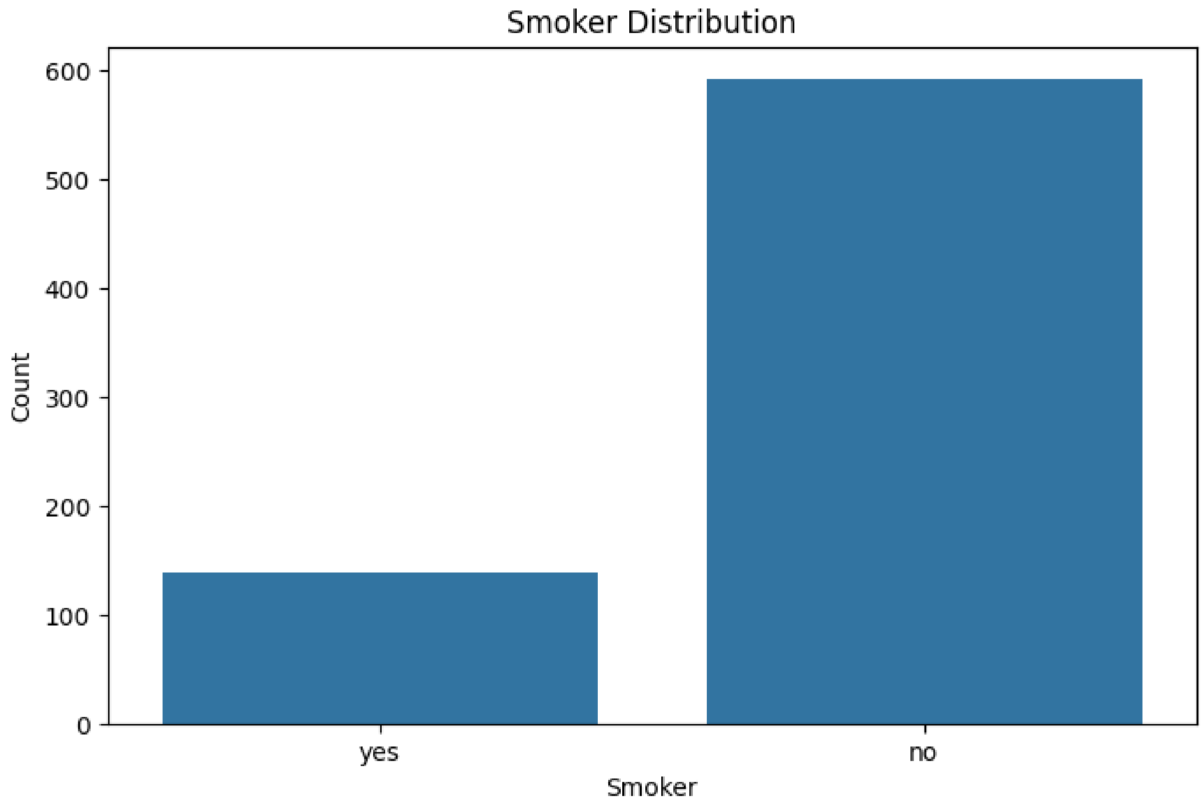
In [ ]:
```
# Quantify and visualize categorical data
for column in categorical_data.columns:
    print(f"\n{column.capitalize()} Data:")
    print(categorical_data[column].value_counts())

    # Visualize using a bar chart
```

```
    plt.figure(figsize=(8, 5))
    sns.countplot(x=column, data=df)
    plt.xlabel(column.capitalize())
    plt.ylabel('Count')
    plt.title(f'{column.capitalize()} Distribution')
    plt.show()
```

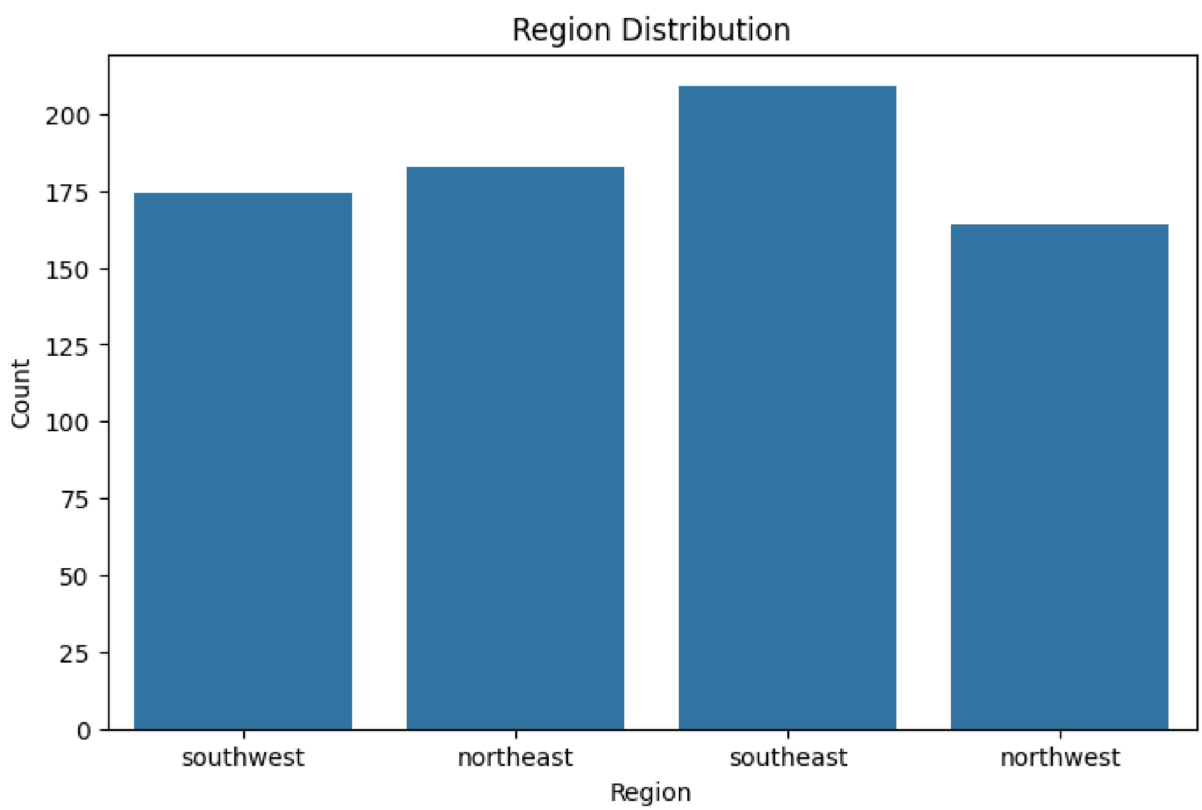
```
Sex Data:
sex
male      367
female    363
Name: count, dtype: int64
```




```
Smoker Data:
smoker
no     592
yes    138
Name: count, dtype: int64
```




```
Region Data:
region
southeast    209
northeast    183
southwest    174
northwest    164
Name: count, dtype: int64
```



- Create dummy variables for region and smoker, and one other categorial data.

In [ ]:
```
# Create dummy variables for 'region', 'smoker', and one other categorical data
df_dummies = pd.get_dummies(df, columns=['region', 'smoker', 'sex'], drop_first=Tru
```

In [ ]:
```
df_dummies.head()
```

Out[ ]:

	calcium	iron	protein	vitamin A	vitamin C	age	bmi	children	charges	region_nc
0	522.29	10.188	42.561	349.13	54.141	38	19.300	0	15820.6990	
1	343.32	4.113	67.793	266.99	24.839	41	31.600	0	6186.1270	
2	858.26	13.741	59.933	667.90	155.455	30	25.460	0	3645.0894	
3	575.98	13.245	42.215	792.23	224.688	18	30.115	0	21344.8467	
4	1927.50	18.919	111.316	740.27	80.961	61	29.920	3	30942.1918	

Narrative Analysis of Categorical Variables and Sales Figures:

1. Sex Distribution: The dataset includes information about the gender distribution of individuals. The bar chart reveals a relatively balanced representation of males and females. This indicates that the dataset is not skewed towards one gender, which is crucial for unbiased analyses.
2. Smoker Status: The 'smoker' category shows a significant disparity, with a notable proportion of smokers compared to non-smokers. The countplot emphasizes the importance of considering the impact of smoking habits on health-related variables and, potentially, on insurance charges.
3. Regional Distribution: The 'region' variable provides insights into the geographic distribution of the dataset. The countplot illustrates that the data is not evenly distributed across regions. For a comprehensive analysis, it's essential to understand how regional differences may influence health-related parameters and, consequently, insurance charges.

- Analyze correla3ons between different attributes, if exists.

In [ ]:
```
# Analyze correlations between different attributes
correlation_matrix = df_dummies.corr()
plt.figure(figsize=(10, 8))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', fmt=".2f", linewidths=
```

```
plt.title('Correlation Matrix')
plt.show()
```