Pima Women Diabetes Prediction

Importing and Examining the Data

Importing required libraries

In [1]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
```

Importing dataset

In [2]:
```
df = pd.read_csv(r"C:\Users\Dr. Harrison\Desktop\DATA\PROJECTS\MeriSkill\Diabetes\Proj
df.head()
```

Out[2]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age
0	6	148	72	35	0	33.6	0.627	50
1	1	85	66	29	0	26.6	0.351	31
2	8	183	64	0	0	23.3	0.672	32
3	1	89	66	23	94	28.1	0.167	21
4	0	137	40	35	168	43.1	2.288	33

In [4]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 768 entries, 0 to 767
Data columns (total 9 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Pregnancies               768 non-null    int64  
 1   Glucose                   768 non-null    int64  
 2   BloodPressure             768 non-null    int64  
 3   SkinThickness             768 non-null    int64  
 4   Insulin                   768 non-null    int64  
 5   BMI                       768 non-null    float64
 6   DiabetesPedigreeFunction  768 non-null    float64
 7   Age                       768 non-null    int64  
 8   Outcome                   768 non-null    int64  
dtypes: float64(2), int64(7)
memory usage: 54.1 KB
```

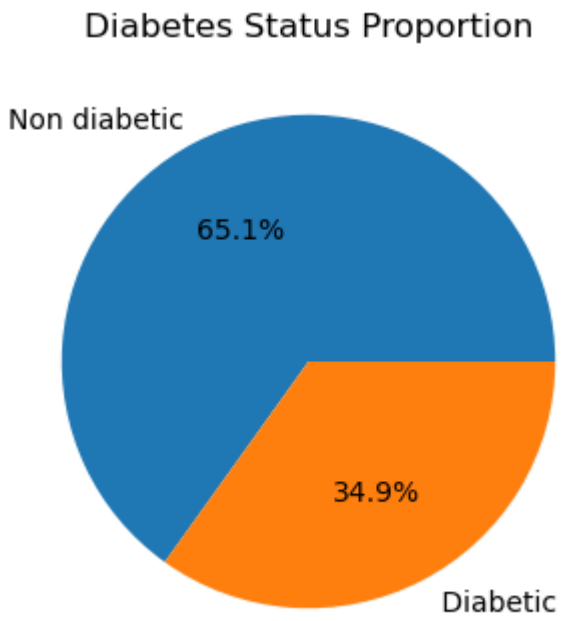
In [9]:
```
df.describe()
```

Out[9]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigr
count	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000	
mean	3.845052	120.894531	69.105469	20.536458	79.799479	31.992578	
std	3.369578	31.972618	19.355807	15.952218	115.244002	7.884160	
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	1.000000	99.000000	62.000000	0.000000	0.000000	27.300000	
50%	3.000000	117.000000	72.000000	23.000000	30.500000	32.000000	
75%	6.000000	140.250000	80.000000	32.000000	127.250000	36.600000	
max	17.000000	199.000000	122.000000	99.000000	846.000000	67.100000	

In [17]:
```
plt.figure(figsize=(6, 4))
plt.pie(df['Outcome'].value_counts(), labels = ['Non diabetic', ' Diabetic'], autopct
plt.title('Diabetes Status Proportion')
```

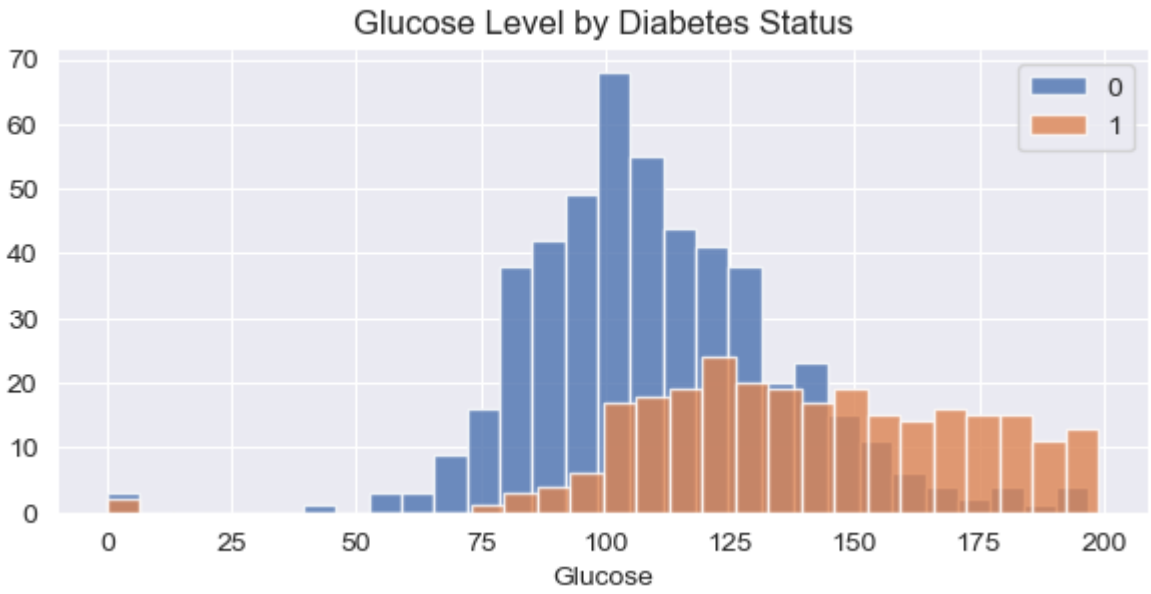
Out[17]:
```
Text(0.5, 1.0, 'Diabetes Status Proportion')
```



Majority of the women do not have diabetes with only approximately 35% having it.

In [53]:
```
r = sns.FacetGrid(df, hue = 'Outcome', height = 3, aspect = 2, palette = 'deep')
r.map(plt.hist, 'Glucose', alpha= 0.8, bins =30)
r.set(title = 'Glucose Level by Diabetes Status')
plt.legend()
```

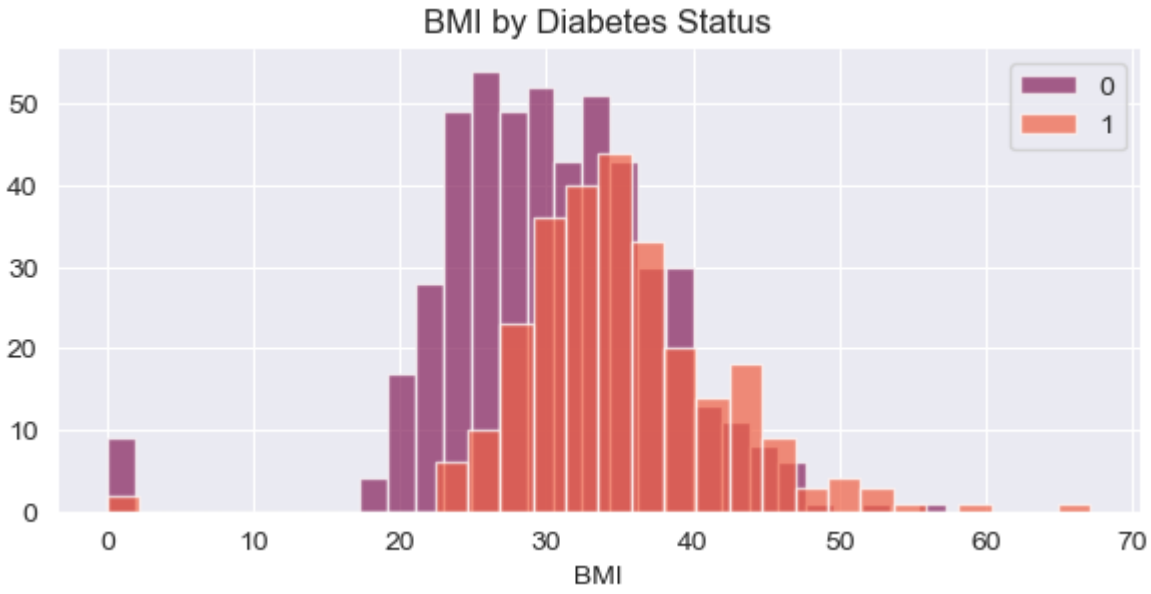
Out[53]:
```
<matplotlib.legend.Legend at 0x2a8b08f9b10>
```



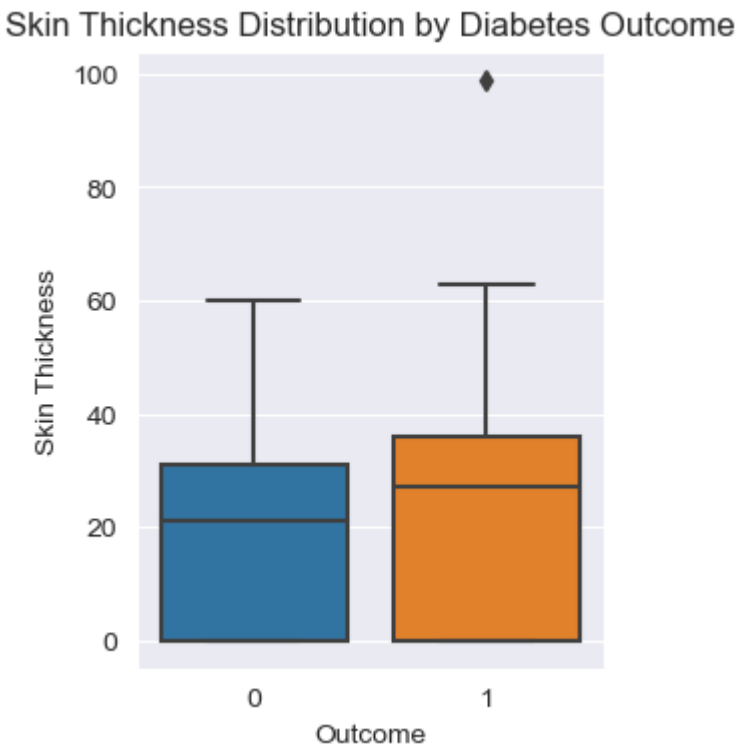
Most women with diabetes have glucose level within the range of 125-200 while those that don't have theirs within the range of 75-150.

In [54]:
```
sns.set_style('darkgrid')
r = sns.FacetGrid(df, hue = 'Outcome', height = 3, aspect = 2, palette = 'rocket')
r.map(plt.hist, 'BMI', alpha= 0.7, bins =30)
r.set(title = 'BMI by Diabetes Status')
plt.legend()
```

Out[54]:
```
<matplotlib.legend.Legend at 0x2a8aeb7ed10>
```

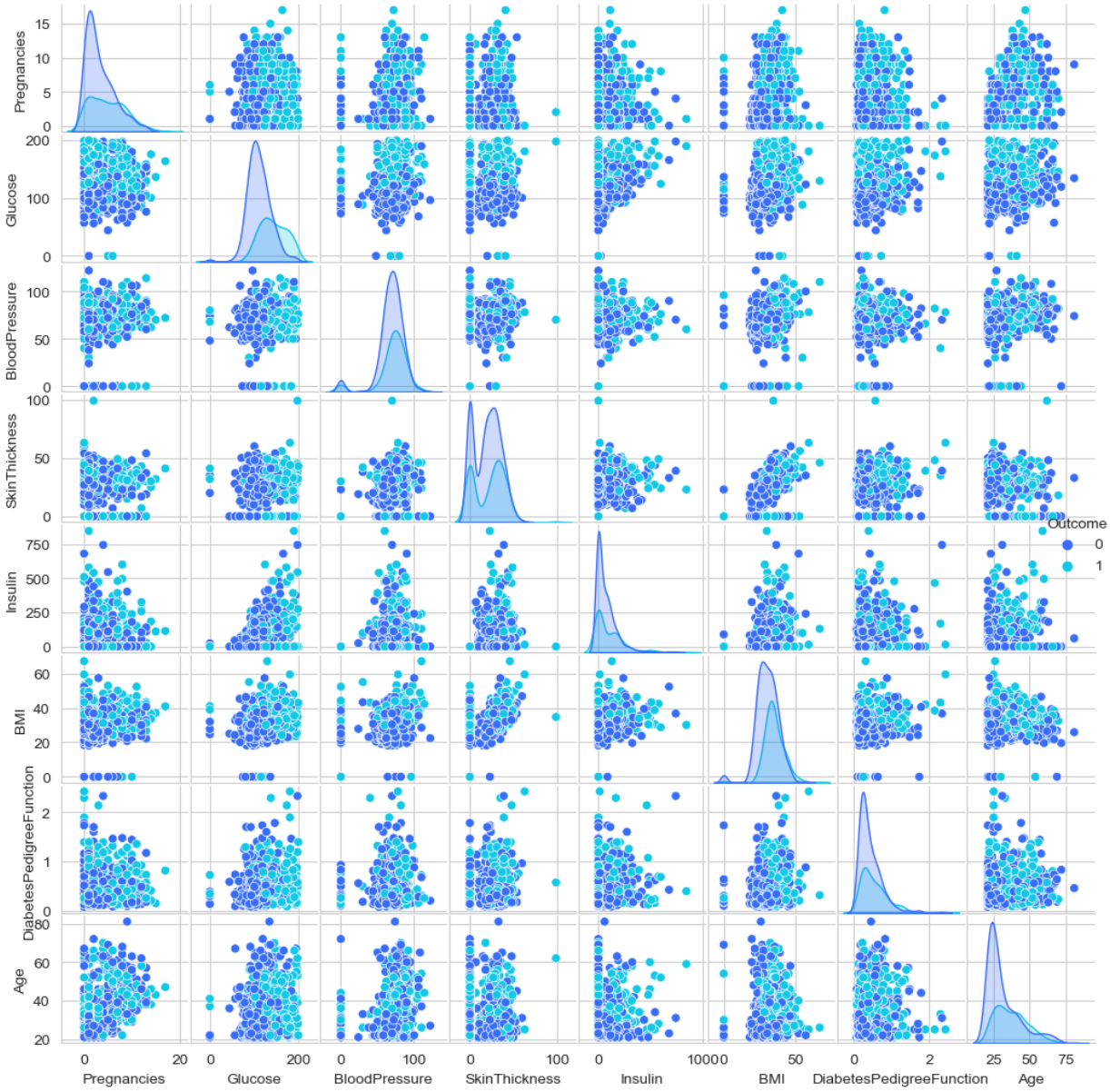


In [52]:
```
plt.figure(figsize=(3, 4))
sns.boxplot(x = 'Outcome', y = 'SkinThickness', data = df)
plt.xlabel('Outcome')
plt.ylabel('Skin Thickness')
plt.title('Skin Thickness Distribution by Diabetes Outcome')
plt.show()
```



Skin thickness is lower in the women without diabetes, higher skin thickness can be an indicator for diabetes

In [57]:
```
sns.set_style('whitegrid')
sns.set_palette('rainbow')
g = sns.pairplot(df, hue = 'Outcome', height = 4, aspect = 2)
g.fig.set_size_inches(10,10)
```



Scaling the Data

In [58]:
```
from sklearn.preprocessing import StandardScaler
```

In [59]:
```
scaler = StandardScaler()
scaler.fit(df)
```

Out[59]:
```
▾ StandardScaler
StandardScaler()
```

In [60]:
```
scaled_data = scaler.transform(df)
scaled_data
```

Out[60]:
```
array([[ 0.63994726,  0.84832379,  0.14964075, ...,  0.46849198,
         1.4259954 ,  1.36589591],
       [-0.84488505, -1.12339636, -0.16054575, ..., -0.36506078,
        -0.19067191, -0.73212021],
       [ 1.23388019,  1.94372388, -0.26394125, ...,  0.60439732,
        -0.10558415,  1.36589591],
       ...,
       [ 0.3429808 ,  0.00330087,  0.14964075, ..., -0.68519336,
        -0.27575966, -0.73212021],
       [-0.84488505,  0.1597866 , -0.47073225, ..., -0.37110101,
         1.17073215,  1.36589591],
       [-0.84488505, -0.8730192 ,  0.04624525, ..., -0.47378505,
        -0.87137393, -0.73212021]])
```

Principal Componenet Analysis

In [61]:
```
from sklearn.decomposition import PCA
```

In [62]:
```
pca = PCA(n_components = 2)
pca.fit(scaled_data)
```

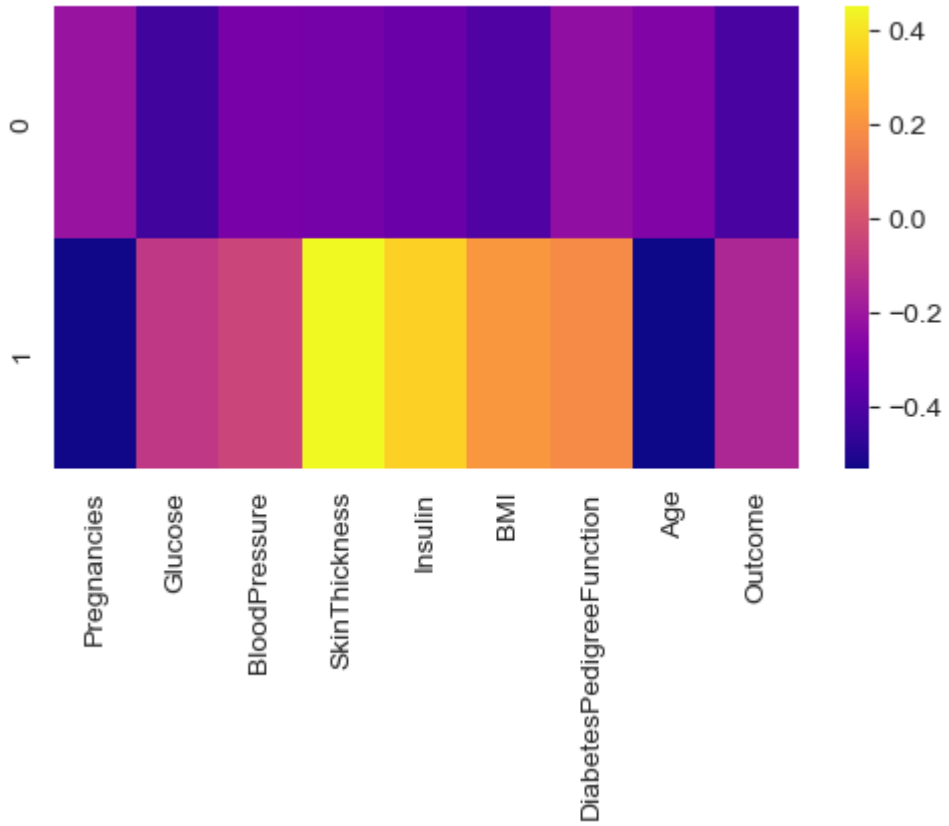
Out[62]:
```
PCA
PCA(n_components=2)
```

In [63]:
```
t_pca = pca.transform(scaled_data)
```

In [65]:
```
df_comp = pd.DataFrame(pca.components_,columns = df.columns)
```

In [84]:
```
plt.figure(figsize=(6,3))
sns.heatmap(df_comp, cmap='plasma',)
```

Out[84]:
```
<Axes: >
```



Building and Training the Model

Importing required libraries

In [69]:
```
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score
```

In [71]:
```
scaled_df = pd.DataFrame(scaled_data, columns = df.columns)
```

In [75]:
```
x = scaled_df.drop("Outcome", axis=1)
y = df['Outcome']
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size = 0.2)
```

Train the Model

In [76]:
```
model = LogisticRegression(solver='lbfgs', max_iter=1000)
model.fit(x_train, y_train)
```

Out[76]:
```
LogisticRegression
LogisticRegression(max_iter=1000)
```

Making Predictions

In [79]:
```
prediction = model.predict(x_test)
```

Model Evaluation

In [81]:
```
from sklearn.metrics import confusion_matrix, classification_report
```

In [82]:
```
print(confusion_matrix(prediction, y_test))
```

```
[[83 21]
 [11 39]]
```

In [83]:
```
print(classification_report(prediction, y_test))
```

```
              precision    recall  f1-score   support

           0       0.88      0.80      0.84       104
           1       0.65      0.78      0.71        50

    accuracy                           0.79       154
   macro avg       0.77      0.79      0.77       154
weighted avg       0.81      0.79      0.80       154
```

In [ ]:
```

```