In [ ]:
```
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
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score,confusion_matrix
import warnings
warnings.filterwarnings('ignore')
```

In [2]:
```
data=pd.read_csv("diabetes.csv")
```

In [3]:
```
data
```

Out[3]:

	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
...	...	...	...	...	...	...	...	...
763	10	101	76	48	180	32.9	0.171	63
764	2	122	70	27	0	36.8	0.340	27
765	5	121	72	23	112	26.2	0.245	30
766	1	126	60	0	0	30.1	0.349	47
767	1	93	70	31	0	30.4	0.315	23

768 rows × 9 columns

In [4]:
```
data.head()
```

Out[4]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	O
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 [6]:
```
data.shape
```

Out[6]:
```
(768, 9)
```

In [8]:
```
data.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 [11]:
```
data.describe()
```

Out[11]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreel
count	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000	76
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	2

In [13]:
```
data.isnull().sum() #checking if data having null values
```

Out[13]:
```
Pregnancies                 0
Glucose                     0
BloodPressure               0
SkinThickness               0
Insulin                     0
BMI                         0
DiabetesPedigreeFunction    0
Age                         0
Outcome                     0
dtype: int64
```

In [18]:
```
data.duplicated().sum()
```

Out[18]:
```
0
```

In [21]:
```
num_duplicates=data.duplicated().sum()
```

In [23]:
```
if num_duplicates>0:
    print("the data contains duplicate values ")
    data=data.drop_duplicates
    print("number of duplicate values after droping",num_duplicates)
else:
    print("the data dosnot contains any duplicates")
```

```
the data dosnot contains any duplicates
```

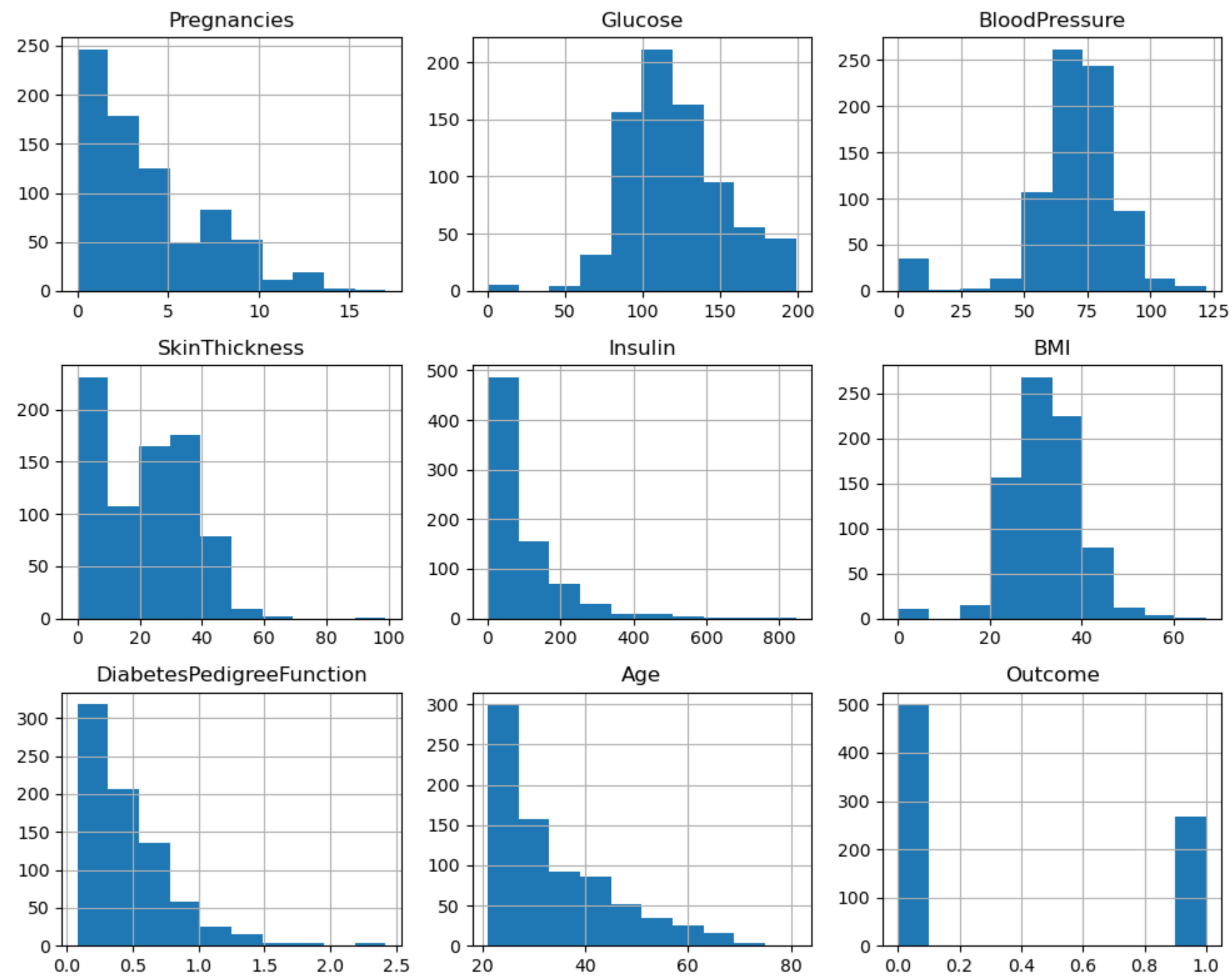
In [24]:
```
data
```

Out[24]:

	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
...	...	...	...	...	...	...	...	...
763	10	101	76	48	180	32.9	0.171	63
764	2	122	70	27	0	36.8	0.340	27
765	5	121	72	23	112	26.2	0.245	30
766	1	126	60	0	0	30.1	0.349	47
767	1	93	70	31	0	30.4	0.315	23

768 rows × 9 columns

In [31]:
```
data.hist(figsize=(10,8))
plt.tight_layout()
plt.show()
```



In [32]:
```
X=data.iloc[:,:-1]
X.head(5)
```

Out[32]:

	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 [34]:
```
Y=data.iloc[:,-1]
Y.head(5)
```

Out[34]:
```
0    1
1    0
2    1
3    0
4    1
Name: Outcome, dtype: int64
```

In [35]:
```
X_train, X_test, Y_train, Y_test=train_test_split(X,Y, test_size=0.30, random_state=5
```

In [37]:
```
print(X_train.shape)
print(X_test.shape)
print(Y_train.shape)
print(Y_test.shape)
```

```
(537, 8)
(231, 8)
(537,)
(231,)
```

Train the model

In [38]:
```
logistic=LogisticRegression()
logistic.fit(X_train,Y_train)
```

Out[38]:
```
LogisticRegression()
```

Evaluate the Model

In [39]:
```
Y_predict=logistic.predict(X_test)
print("Y_predict\n",Y_predict)
```

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

In [40]:
```
print("Y_test\n",Y_test)
```

```
Y_test
 737    0
505    0
296    1
711    0
329    0
      ..
405    0
315    0
131    1
364    0
322    1
Name: Outcome, Length: 231, dtype: int64
```

In [43]:
```
score=accuracy_score(Y_test,Y_predict)
print("Accuracy_score:" ,score*100)
```

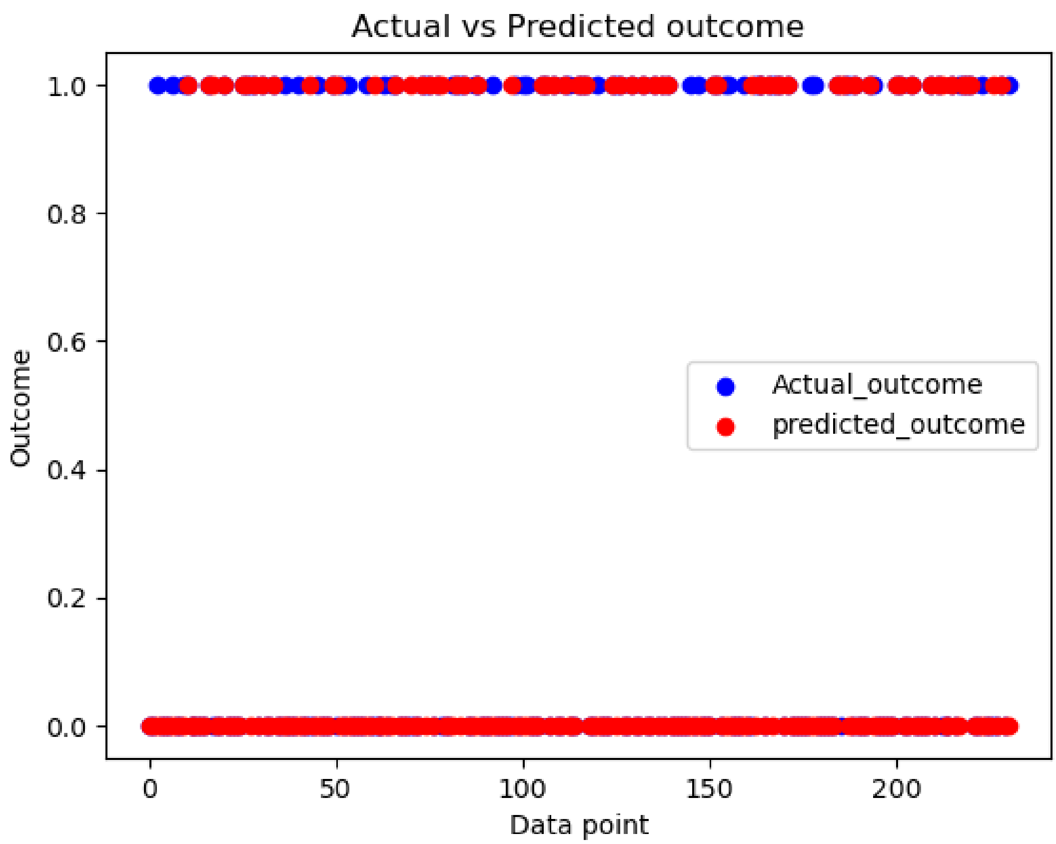
```
Accuracy_score: 79.22077922077922
```

In [48]:
```
import numpy as np
```

Visually understand the performance of the model

In [58]:
```
fig, ax=plt.subplots()
ax.scatter(range(len(Y_test)),Y_test, color="blue", label="Actual_outcome")
ax.scatter(range(len(Y_predict)), Y_predict, color="red", label="predicted_outcome")
ax.set_xlabel("Data point")
ax.set_ylabel("Outcome")
ax.set_title("Actual vs Predicted outcome")

ax.legend()
plt.show()
```



Use the model

once the model is trained and evaluted you can use to predict unseen dataset.