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In [1]: **import** pandas

df **=** pandas.read\_csv('SmokingDataSet.csv')

df.head()

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Out[1]: | | **gender** | **age** | **hypertension** | **heart\_disease** | **ever\_married work\_type** | | **Residence\_type av** |  |
|  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **0** | | Male | 67.0 | 0 | 1 | Yes | Private | Urban |  |
| **1** | | Male | 80.0 | 0 | 1 | Yes | Private | Rural |  |
| **2** | | Female | 49.0 | 0 | 0 | Yes | Private | Urban |  |
| **3** | | Female | 79.0 | 1 | 0 | Yes | Self- | Rural |  |
| employed |  |
|  |  |  |  |  |  |  |  |  |
| **4** | | Male | 81.0 | 0 | 0 | Yes | Private | Urban |  |



In [2]: obj\_list **=** list(df.select\_dtypes(include**=**'object'))

obj\_list

Out[2]: ['gender', 'ever\_married', 'work\_type', 'Residence\_type', 'smoking \_status']



In [3]: **from** sklearn **import** preprocessing

**for** i **in** obj\_list:

Encoder **=** preprocessing.LabelEncoder()

df[i]**=** Encoder.fit\_transform(df[i])



In [4]: x **=** df.drop(columns**=**['stroke'],axis**=**1)

y **=** df['stroke']



In [5]: **from** imblearn.over\_sampling **import** RandomOverSampler

over\_sampler **=** RandomOverSampler(sampling\_strategy**=**'minority')

x,y **=** over\_sampler.fit\_resample(x,y)



In [6]: **from** sklearn.model\_selection **import** train\_test\_split

x\_train,x\_test,y\_train,y\_test **=** train\_test\_split(x,y,test\_size**=**0.25



In [7]: **from** sklearn.linear\_model **import** LogisticRegression

logistic\_model **=** LogisticRegression(max\_iter**=**1000)

logistic\_model.fit(x\_train,y\_train)

logistic\_pred **=** logistic\_model.predict(x\_test)



In [8]: **from** sklearn.tree **import** DecisionTreeClassifier DT\_model **=** DecisionTreeClassifier() DT\_model.fit(x\_train,y\_train)

tree\_pred **=** DT\_model.predict(x\_test)

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In [9]: **from** sklearn **import** svm

model\_svm **=** svm.SVC()

model\_svm.fit(x\_train,y\_train)

svm\_pred **=** model\_svm.predict(x\_test)



In [10]: **from** sklearn.ensemble **import** RandomForestClassifier RF\_model **=** RandomForestClassifier(n\_estimators**=**1000) RF\_model.fit(x\_train,y\_train)

y\_pred **=** RF\_model.predict(x\_test)



In [11]: **from** sklearn.ensemble **import** VotingClassifier final\_model **=** VotingClassifier(

estimators**=**[('lr',logistic\_model), ('dt',DT\_model),('svm',model



In [12]: **from** sklearn.metrics **import** confusion\_matrix

final\_model.fit(x\_train,y\_train)

final\_pred **=** final\_model.predict(x\_test)

cm\_log **=** confusion\_matrix(y\_test,final\_pred)

cm\_log

Out[12]: array([[858, 326],

[200, 983]])

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In [15]: **from** sklearn.metrics **import** precision\_score,recall\_score,roc\_auc\_sc print("Precision Score for Logistic model",precision\_score(y\_test,l print("Precision Score for Decision model",precision\_score(y\_test,t print("Precision Score for SVM model",precision\_score(y\_test,svm\_pr print("Precision Score for Ensemble model",precision\_score(y\_test,f print("Precision Score for RandomForest model",precision\_score(y\_te

print("\nRecall Score for Logistic model",recall\_score(y\_test,logis print("Recall Score for Decision model",recall\_score(y\_test,tree\_pr print("Recall Score for SVM model",recall\_score(y\_test,svm\_pred)) print("Recall Score for Ensemble model",recall\_score(y\_test,final\_p print("Recall Score for RandomForest model",recall\_score(y\_test,y\_p

print("\nROC-AUC Score for logistic model",roc\_auc\_score(y\_test,log print("ROC-AUC Score for Decision model",roc\_auc\_score(y\_test,tree\_ print("ROC-AUC Score for SVM model",roc\_auc\_score(y\_test,svm\_pred)) print("ROC-AUC Score for Ensemble model",roc\_auc\_score(y\_test,final print("ROC-AUC Score for RandomForest model",roc\_auc\_score(y\_test,y

Precision Score for Logistic model 0.7389312977099237

Precision Score for Decision model 0.9403815580286169

Precision Score for SVM model 0.7257448433919023

Precision Score for Ensemble model 0.7509549274255156

Precision Score for RandomForest model 0.9817427385892116

Recall Score for Logistic model 0.8182586644125106

Recall Score for Decision model 1.0

Recall Score for SVM model 0.8030431107354185

Recall Score for Ensemble model 0.830938292476754

Recall Score for RandomForest model 1.0

ROC-AUC Score for logistic model 0.7647036565305797

ROC-AUC Score for Decision model 0.9683277027027026

ROC-AUC Score for SVM model 0.7499168256379796

ROC-AUC Score for Ensemble model 0.7778002273194581

ROC-AUC Score for RandomForest model 0.9907094594594595

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In [16]: **from** prettytable **import** PrettyTable

Comparision\_table **=** PrettyTable(["Model", "Precision Score", "Recal Comparision\_table.add\_row(["Logistic Model","0.73", "0.81", "0.76"] Comparision\_table.add\_row(["Decision Model","0.94", "1.0", "0.96"]) Comparision\_table.add\_row(["SVM Model","0.72", "0.80", "0.74"])

Comparision\_table.add\_row(["Ensemble Model","0.75", "0.83", "0.77"] Comparision\_table.add\_row(["RandomForest Model","0.98", "1.0", "0.9

print(Comparision\_table)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| + | -------------------- | + | ----------------- | + | -------------- | + | ----------- |
| ----+ | |  |  |  |  |  |  |
| | | Model | | Precision Score | Recall Score | | | | | ROC-AUC Sc | |
| ore | | |  |  |  |  |  |  |
| + | -------------------- | + | ----------------- | + | -------------- | + | ----------- |
| ----+ | |  |  |  |  |  |  |
| | | Logistic Model | | | 0.73 | | | 0.81 | | | 0.76 |
| | |  |  |  |  |  |  |  |
| | | Decision Model | | | 0.94 | | | 1.0 | | | 0.96 |
| | |  |  |  |  |  |  |  |
| | | SVM Model | | | 0.72 | | | 0.80 | | | 0.74 |
| | |  |  |  |  |  |  |  |
| | | Ensemble Model | | | 0.75 | | | 0.83 | | | 0.77 |
| | |  |  |  |  |  |  |  |
| | RandomForest Model | | | | 0.98 | | | 1.0 | | | 0.99 |
| | |  |  |  |  |  |  |  |
| + | -------------------- | + | ----------------- | + | -------------- | + | ----------- |
| ----+ | |  |  |  |  |  |  |

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