```
import pandas as pd
import warnings
warnings.filterwarnings('ignore')
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn import svm
from sklearn.neighbors import KNeighborsClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.ensemble import GradientBoostingClassifier
from sklearn.metrics import accuracy_score
import matplotlib.pyplot as plt
import seaborn as sns
```

```
data = pd.read_csv('/content/Placement_Data.csv')
data.head()
#data.columns
```

	sl_no	gender	ssc_p	ssc_b	hsc_p	hsc_b	hsc_s	degree_p	degree_t	workex	etest_p	specialisation	mba_p	status	sa
0	1	M	67.00	Others	91.00	Others	Commerce	58.00	Sci&Tech	No	55.0	Mkt&HR	58.80	Placed	270
1	2	M	79.33	Central	78.33	Others	Science	77.48	Sci&Tech	Yes	86.5	Mkt&Fin	66.28	Placed	200
2	3	M	65.00	Central	68.00	Central	Arts	64.00	Comm&Mgmt	No	75.0	Mkt&Fin	57.80	Placed	250
3	4	M	56.00	Central	52.00	Central	Science	52.00	Sci&Tech	No	66.0	Mkt&HR	59.43	Not Placed	

```
data.info
```

```
<bound method DataFrame.info of      sl_no gender  ssc_p    ssc_b  hsc_p    hsc_b     hsc_s  degree_p  \
0        1      M  67.00   Others  91.00   Others  Commerce     58.00
1        2      M  79.33  Central  78.33   Others   Science     77.48
2        3      M  65.00  Central  68.00  Central      Arts     64.00
3        4      M  56.00  Central  52.00  Central   Science     52.00
4        5      M  85.80  Central  73.60  Central  Commerce     73.30
..     ...    ...    ...      ...    ...      ...       ...       ...
210    211      M  80.60   Others  82.00   Others  Commerce     77.60
211    212      M  58.00   Others  60.00   Others   Science     72.00
212    213      M  67.00   Others  67.00   Others  Commerce     73.00
213    214      F  74.00   Others  66.00   Others  Commerce     58.00
214    215      M  62.00  Central  58.00   Others   Science     53.00

       degree_t workex  etest_p specialisation  mba_p      status    salary
0     Sci&Tech     No     55.0         Mkt&HR  58.80      Placed  270000.0
1     Sci&Tech    Yes     86.5        Mkt&Fin  66.28      Placed  200000.0
2    Comm&Mgmt     No     75.0        Mkt&Fin  57.80      Placed  250000.0
3     Sci&Tech     No     66.0         Mkt&HR  59.43  Not Placed       NaN
4    Comm&Mgmt     No     96.8        Mkt&Fin  55.50      Placed  425000.0
..         ...    ...      ...            ...    ...         ...       ...
210  Comm&Mgmt     No     91.0        Mkt&Fin  74.49      Placed  400000.0
211   Sci&Tech     No     74.0        Mkt&Fin  53.62      Placed  275000.0
212  Comm&Mgmt    Yes     59.0        Mkt&Fin  69.72      Placed  295000.0
213  Comm&Mgmt     No     70.0         Mkt&HR  60.23      Placed  204000.0
214  Comm&Mgmt     No     89.0         Mkt&HR  60.22  Not Placed       NaN

[215 rows x 15 columns]>
```

DATA PREPROCESSING

```
#dropping sl_no and salary
data1 = data.drop(['sl_no','salary'],axis=1)
data1.head()
```

	gender	ssc_p	ssc_b	hsc_p	hsc_b	hsc_s	degree_p	degree_t	workex	etest_p	specialisation	mba_p	status
0	M	67.00	Others	91.00	Others	Commerce	58.00	Sci&Tech	No	55.0	Mkt&HR	58.80	Placed
1	M	79.33	Central	78.33	Others	Science	77.48	Sci&Tech	Yes	86.5	Mkt&Fin	66.28	Placed
2	M	65.00	Central	68.00	Central	Arts	64.00	Comm&Mgmt	No	75.0	Mkt&Fin	57.80	Placed
3	M	56.00	Central	52.00	Central	Science	52.00	Sci&Tech	No	66.0	Mkt&HR	59.43	Not Placed
4	M	85.80	Central	73.60	Central	Commerce	73.30	Comm&Mgmt	No	96.8	Mkt&Fin	55.50	Placed

```
# retrieve the unique values within the 'ssc_b' column
data1['ssc_b'].unique()
```

```
array(['Others', 'Central'], dtype=object)
```

```
# replace values in the 'ssc_b' column with numerical values
#converted categorical data into numerical data
data1['ssc_b']=data1['ssc_b'].map({'Central' : 1,'Others' : 0})
data1.head()
```

	gender	ssc_p	ssc_b	hsc_p	hsc_b	hsc_s	degree_p	degree_t	workex	etest_p	specialisation	mba_p	status
0	M	67.00	0	91.00	Others	Commerce	58.00	Sci&Tech	No	55.0	Mkt&HR	58.80	Placed
1	M	79.33	1	78.33	Others	Science	77.48	Sci&Tech	Yes	86.5	Mkt&Fin	66.28	Placed
2	M	65.00	1	68.00	Central	Arts	64.00	Comm&Mgmt	No	75.0	Mkt&Fin	57.80	Placed
3	M	56.00	1	52.00	Central	Science	52.00	Sci&Tech	No	66.0	Mkt&HR	59.43	Not Placed
4	M	85.80	1	73.60	Central	Commerce	73.30	Comm&Mgmt	No	96.8	Mkt&Fin	55.50	Placed

```
data1['hsc_b']=data1['hsc_b'].map({'Central' : 1,'Others' : 0})
data1.head()
```

	gender	ssc_p	ssc_b	hsc_p	hsc_b	hsc_s	degree_p	degree_t	workex	etest_p	specialisation	mba_p	status
0	M	67.00	0	91.00	0	Commerce	58.00	Sci&Tech	No	55.0	Mkt&HR	58.80	Placed
1	M	79.33	1	78.33	0	Science	77.48	Sci&Tech	Yes	86.5	Mkt&Fin	66.28	Placed
2	M	65.00	1	68.00	1	Arts	64.00	Comm&Mgmt	No	75.0	Mkt&Fin	57.80	Placed
3	M	56.00	1	52.00	1	Science	52.00	Sci&Tech	No	66.0	Mkt&HR	59.43	Not Placed
4	M	85.80	1	73.60	1	Commerce	73.30	Comm&Mgmt	No	96.8	Mkt&Fin	55.50	Placed

```
data1['hsc_s'].unique()
```

```
array(['Commerce', 'Science', 'Arts'], dtype=object)
```

```
data1['hsc_s'] = data1['hsc_s'].map({'Science':2,'Commerce':1,'Arts':0})
data1.head()
```

	gender	ssc_p	ssc_b	hsc_p	hsc_b	hsc_s	degree_p	degree_t	workex	etest_p	specialisation	mba_p	status
0	M	67.00	0	91.00	0	1	58.00	Sci&Tech	No	55.0	Mkt&HR	58.80	Placed
1	M	79.33	1	78.33	0	2	77.48	Sci&Tech	Yes	86.5	Mkt&Fin	66.28	Placed
2	M	65.00	1	68.00	1	0	64.00	Comm&Mgmt	No	75.0	Mkt&Fin	57.80	Placed
3	M	56.00	1	52.00	1	2	52.00	Sci&Tech	No	66.0	Mkt&HR	59.43	Not Placed
4	M	85.80	1	73.60	1	1	73.30	Comm&Mgmt	No	96.8	Mkt&Fin	55.50	Placed

```
data1['degree_t'].unique()
```

```
array(['Sci&Tech', 'Comm&Mgmt', 'Others'], dtype=object)
```

```
data1['degree_t'] = data1['degree_t'].map({'Sci&Tech': 2, 'Comm&Mgmt':1, 'Others':0})
data1.head()
```

	gender	ssc_p	ssc_b	hsc_p	hsc_b	hsc_s	degree_p	degree_t	workex	etest_p	specialisation	mba_p	status
0	M	67.00	0	91.00	0	1	58.00	2	No	55.0	Mkt&HR	58.80	Placed
1	M	79.33	1	78.33	0	2	77.48	2	Yes	86.5	Mkt&Fin	66.28	Placed
2	M	65.00	1	68.00	1	0	64.00	1	No	75.0	Mkt&Fin	57.80	Placed
3	M	56.00	1	52.00	1	2	52.00	2	No	66.0	Mkt&HR	59.43	Not Placed
4	M	85.80	1	73.60	1	1	73.30	1	No	96.8	Mkt&Fin	55.50	Placed

```
data1['specialisation'].unique()
```

```
array(['Mkt&HR', 'Mkt&Fin'], dtype=object)
```

```
data1['specialisation'] = data1['specialisation'].map({'Mkt&HR':1, 'Mkt&Fin':0})
data1.head()
```

	gender	ssc_p	ssc_b	hsc_p	hsc_b	hsc_s	degree_p	degree_t	workex	etest_p	specialisation	mba_p	status
0	M	67.00	0	91.00	0	1	58.00	2	No	55.0	1	58.80	Placed
1	M	79.33	1	78.33	0	2	77.48	2	Yes	86.5	0	66.28	Placed
2	M	65.00	1	68.00	1	0	64.00	1	No	75.0	0	57.80	Placed
3	M	56.00	1	52.00	1	2	52.00	2	No	66.0	1	59.43	Not Placed
4	M	85.80	1	73.60	1	1	73.30	1	No	96.8	0	55.50	Placed

```
data1['workex']=data1['workex'].map({'No':0, 'Yes':1})
data1.head()
```

	gender	ssc_p	ssc_b	hsc_p	hsc_b	hsc_s	degree_p	degree_t	workex	etest_p	specialisation	mba_p	status
0	M	67.00	0	91.00	0	1	58.00	2	0	55.0	1	58.80	Placed
1	M	79.33	1	78.33	0	2	77.48	2	1	86.5	0	66.28	Placed
2	M	65.00	1	68.00	1	0	64.00	1	0	75.0	0	57.80	Placed
3	M	56.00	1	52.00	1	2	52.00	2	0	66.0	1	59.43	Not Placed
4	M	85.80	1	73.60	1	1	73.30	1	0	96.8	0	55.50	Placed

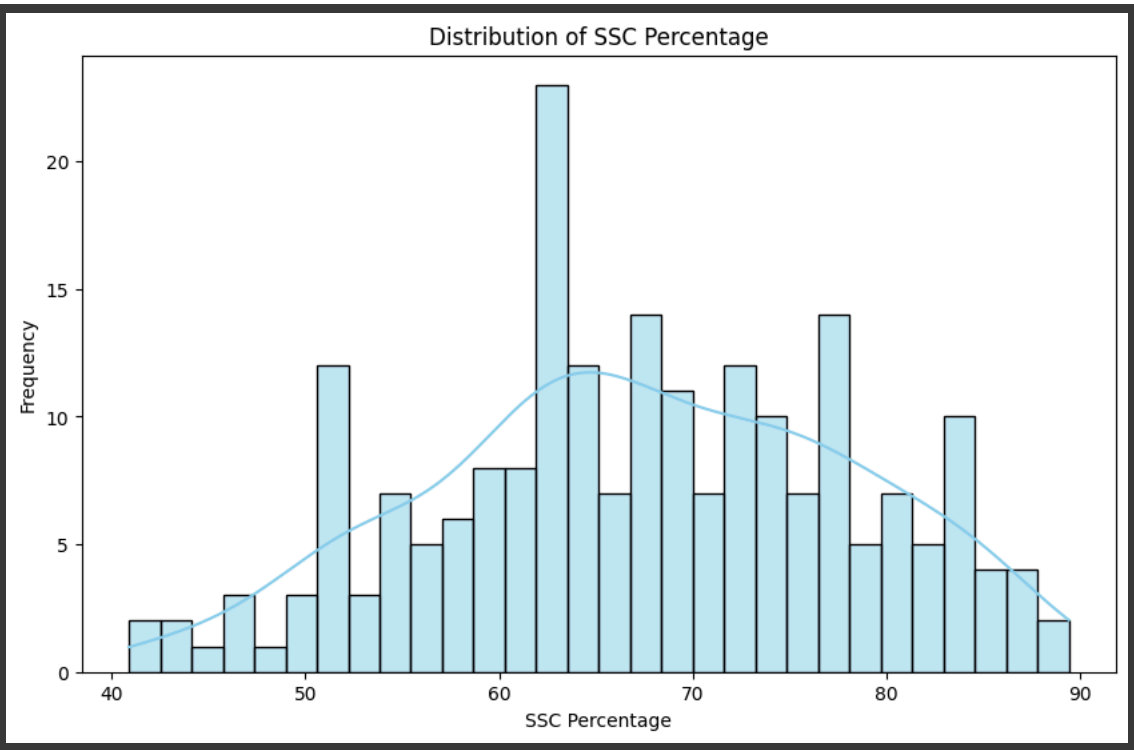
```
data1['status']=data1['status'].map({'Placed':1, 'Not Placed':0})
data1.head()
```

	gender	ssc_p	ssc_b	hsc_p	hsc_b	hsc_s	degree_p	degree_t	workex	etest_p	specialisation	mba_p	status
0	M	67.00	0	91.00	0	1	58.00	2	0	55.0	1	58.80	1
1	M	79.33	1	78.33	0	2	77.48	2	1	86.5	0	66.28	1
2	M	65.00	1	68.00	1	0	64.00	1	0	75.0	0	57.80	1
3	M	56.00	1	52.00	1	2	52.00	2	0	66.0	1	59.43	0
4	M	85.80	1	73.60	1	1	73.30	1	0	96.8	0	55.50	1

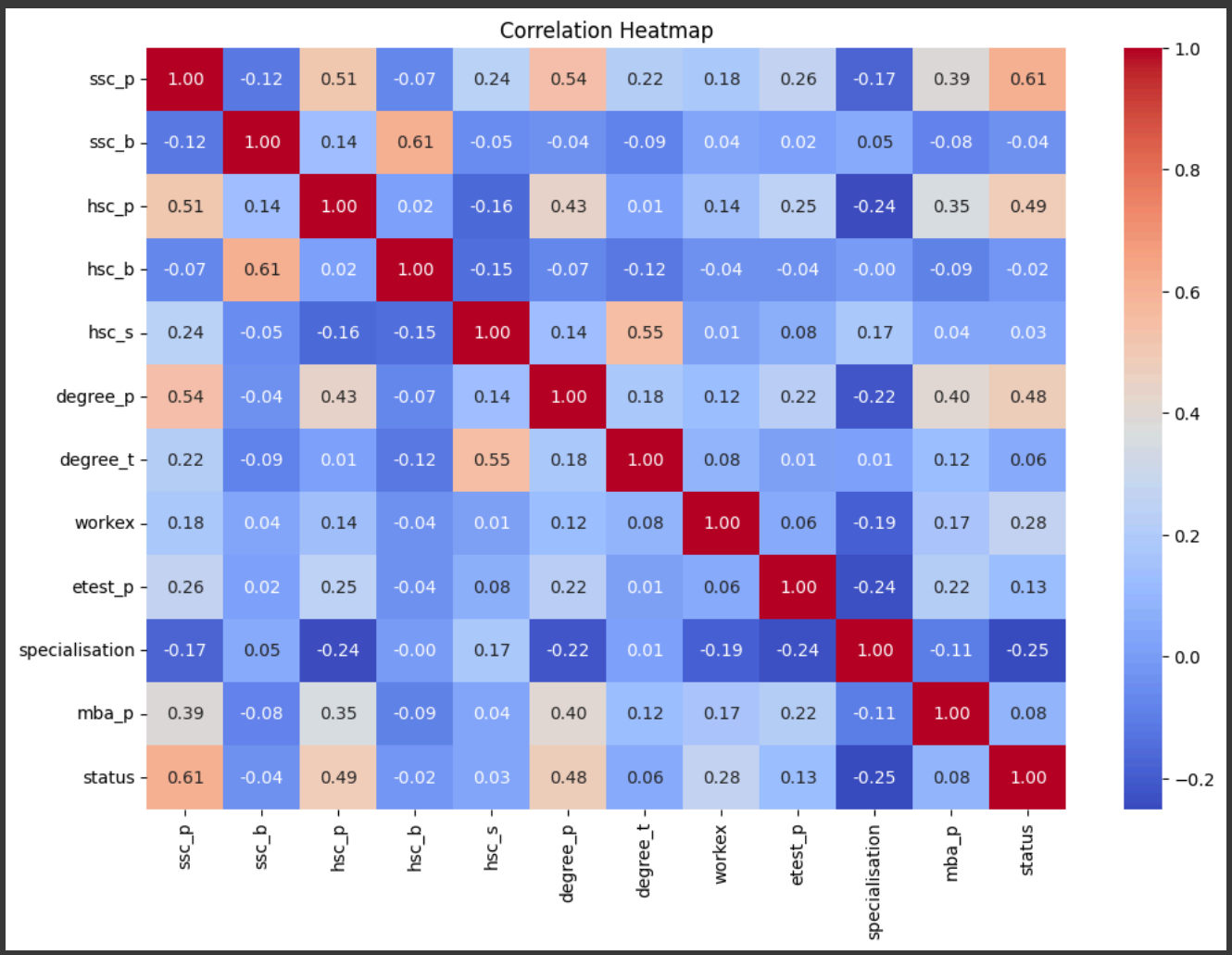
```
X = data.drop('status',axis=1)
y = data['status']
```

*** Data Visualization***

```
plt.figure(figsize=(10, 6))
sns.histplot(data1['ssc_p'], kde=True, bins=30, color='skyblue')
plt.title('Distribution of SSC Percentage')
plt.xlabel('SSC Percentage')
plt.ylabel('Frequency')
plt.show()
```

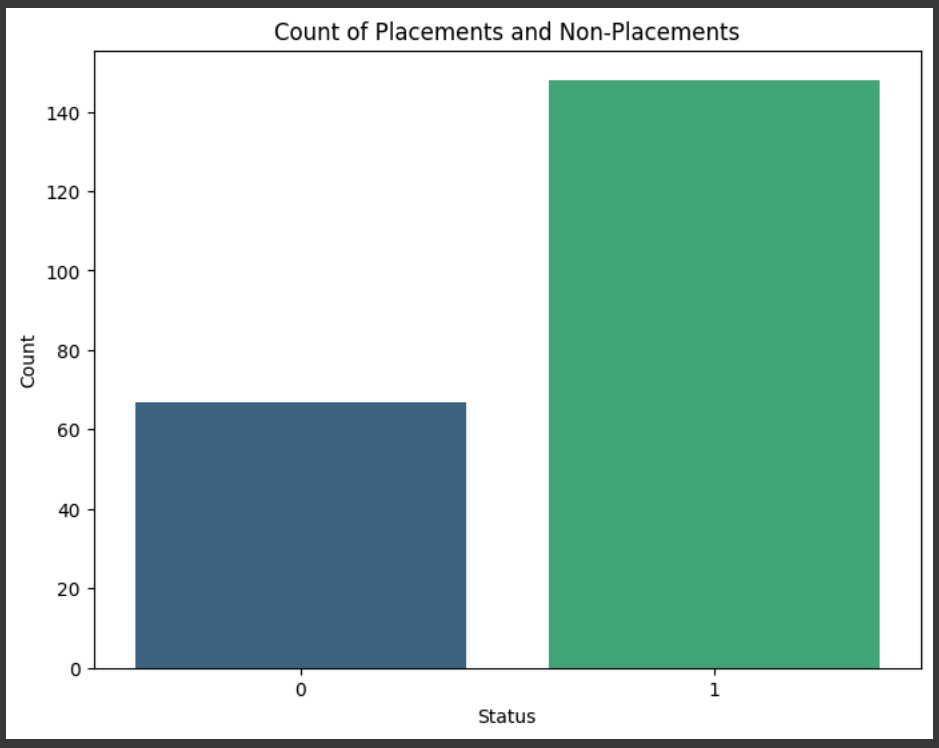



```
# Visualizing the correlation between features
plt.figure(figsize=(12, 8))
sns.heatmap(data1.corr(), annot=True, cmap='coolwarm', fmt='.2f')
plt.title('Correlation Heatmap')
plt.show()
```

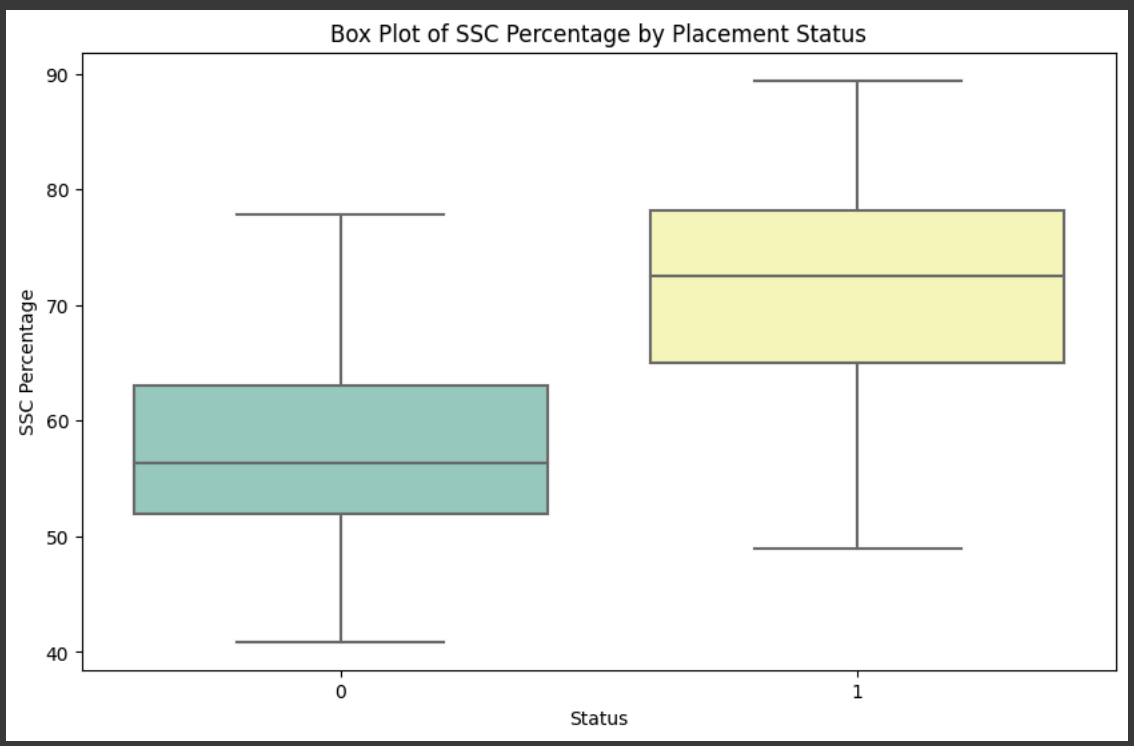



```
# Visualizing the count of placements and non-placements
plt.figure(figsize=(8, 6))
sns.countplot(x='status', data=data1, palette='viridis')
plt.title('Count of Placements and Non-Placements')
```

```
plt.xlabel('Status')
plt.ylabel('Count')
plt.show()
```




```
# Visualizing the distribution of 'ssc_p' with respect to placement status
plt.figure(figsize=(10, 6))
sns.boxplot(x='status', y='ssc_p', data=data1, palette='Set3')
plt.title('Box Plot of SSC Percentage by Placement Status')
plt.xlabel('Status')
plt.ylabel('SSC Percentage')
plt.show()
```



DATA SPLITTING

```
X_train,X_test,y_train,y_test = train_test_split(X,y,test_size=0.20,random_state=42)
```

```
data1.head()
```

	gender	ssc_p	ssc_b	hsc_p	hsc_b	hsc_s	degree_p	degree_t	workex	etest_p	specialisation	mba_p	status
0	M	67.00	0	91.00	0	1	58.00	2	0	55.0	1	58.80	1
1	M	79.33	1	78.33	0	2	77.48	2	1	86.5	0	66.28	1
2	M	65.00	1	68.00	1	0	64.00	1	0	75.0	0	57.80	1
3	M	56.00	1	52.00	1	2	52.00	2	0	66.0	1	59.43	0
4	M	85.80	1	73.60	1	1	73.30	1	0	96.8	0	55.50	1

```
data1['gender']=data1['gender'].map({'M':0, 'F':1})
data1.head()
```

	gender	ssc_p	ssc_b	hsc_p	hsc_b	hsc_s	degree_p	degree_t	workex	etest_p	specialisation	mba_p	status
0	0	67.00	0	91.00	0	1	58.00	2	0	55.0	1	58.80	1
1	0	79.33	1	78.33	0	2	77.48	2	1	86.5	0	66.28	1
2	0	65.00	1	68.00	1	0	64.00	1	0	75.0	0	57.80	1
3	0	56.00	1	52.00	1	2	52.00	2	0	66.0	1	59.43	0
4	0	85.80	1	73.60	1	1	73.30	1	0	96.8	0	55.50	1

```
X1 = data1.drop('status',axis=1)
Y1 = data1['status']
```

```
X1_train,X1_test,Y1_train,Y1_test = train_test_split(X1,Y1,test_size=0.20,random_state=42)
```

```
#Logistic regression
lr  = LogisticRegression()
lr.fit(X1_train,Y1_train)
```

```
▾ LogisticRegression
LogisticRegression()
```

```
#SUPPORT VECTOR MACHINE
s = svm.SVC()
s.fit(X1_train,Y1_train)
```

```
▾ SVC
SVC()
```

```
#K-NEAREST NEIGBOUR
knn = KNeighborsClassifier()
knn.fit(X1_train,Y1_train)
```

```
▾ KNeighborsClassifier
KNeighborsClassifier()
```

```
#DECISION TREE CLASSIFIER
dt = DecisionTreeClassifier()
dt.fit(X1_train,Y1_train)
```

```
▾ DecisionTreeClassifier
DecisionTreeClassifier()
```

```
#READOM FOREST
rf = RandomForestClassifier()
rf.fit(X1_train,Y1_train)
```

```
▾ RandomForestClassifier
RandomForestClassifier()
```

```
#GRADIENT BOOSTING
gd = GradientBoostingClassifier()
gd.fit(X1_train,Y1_train)
```

GradientBoostingClassifier

```
Y_predict1 = lr.predict(X1_test)
Y_predict2 = s.predict(X1_test)
Y_predict3 = knn.predict(X1_test)
Y_predict4 = dt.predict(X1_test)
Y_predict5 = rf.predict(X1_test)
Y_predict6 = gd.predict(X1_test)
```

```
score_lr = accuracy_score(Y1_test,Y_predict1)
score_svm = accuracy_score(Y1_test,Y_predict2)
score_knn = accuracy_score(Y1_test,Y_predict3)
score_dt = accuracy_score(Y1_test,Y_predict4)
score_rf = accuracy_score(Y1_test,Y_predict5)
score_gd = accuracy_score(Y1_test,Y_predict6)
```

```
print("Accuracy of LR = ",score_lr*100)
print("Accuracy of SVM = ",score_svm*100)
print("Accuracy of KNN = ",score_knn*100)
print("Accuracy of DT = ",score_dt*100)
print("Accuracy of RF = ",score_rf*100)
print("Accuracy of GD = ",score_gd*100)
```

```
Accuracy of LR =  88.37209302325581
Accuracy of SVM =  76.74418604651163
Accuracy of KNN =  79.06976744186046
Accuracy of DT =  83.72093023255815
Accuracy of RF =  81.3953488372093
Accuracy of GD =  81.3953488372093
```

```
new_data = pd.DataFrame({
    'gender':0,
    'ssc_p':67.0,
    'ssc_b':0,
    'hsc_p':91.0,
    'hsc_b':0,
    'hsc_s':1,
    'degree_p':58.0,
    'degree_t':2,
    'workex':0,
    'etest_p':55.0,
     'specialisation':1,
    'mba_p':58.8,
},index=[0])
```

```
lr= LogisticRegression()
lr.fit(X1,Y1)
```

LogisticRegression

LogisticRegression()

```
p=lr.predict(new_data)
prob=lr.predict_proba(new_data)
if p==1:
    print('Placed')
    print(f"You will be placed with probability of {prob[0][1]:.2f}")
else:
    print("Not-placed")
```

```
Placed
You will be placed with probability of 0.97
```

```
import joblib
```