```
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.preprocessing import LabelEncoder, StandardScaler
from sklearn.tree import DecisionTreeClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.metrics import accuracy_score, confusion_matrix, classification_report
```

```
from sklearn.cluster import KMeans, AgglomerativeClustering, DBSCAN

from mlxtend.frequent_patterns import apriori, association_rules

from google.colab import files
uploaded = files.upload()
```

Choose Files No file chosen Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.

```
df = pd.read_csv("placement_data.csv")
df.head()
```

| | student_id | gender | degree | stream | internship_score | cgpa | placed |
|---|---|---|---|---|---|---|---|
| **0** | 1 | Male | B.Tech | IT | 80 | 8.5 | Yes |
| **1** | 2 | Female | B.Tech | CS | 70 | 8.0 | Yes |
| **2** | 3 | Male | B.E | EXTC | 50 | 6.5 | No |
| **3** | 4 | Female | B.E | IT | 90 | 9.1 | Yes |
| **4** | 5 | Male | B.Tech | MECH | 40 | 6.0 | No |

```
# Check missing values
print(df.isnull().sum())
```

```
student_id          0
gender              0
degree              0
stream              0
internship_score    0
cgpa                0
placed              0
dtype: int64
```

```
df.fillna(df.mean(numeric_only=True), inplace=True)
```

```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
for col in df.select_dtypes(include=['object']).columns:
    df[col] = le.fit_transform(df[col])
```

```
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
scaled_data = scaler.fit_transform(df)
df_scaled = pd.DataFrame(scaled_data, columns=df.columns)
df_scaled.head()
```

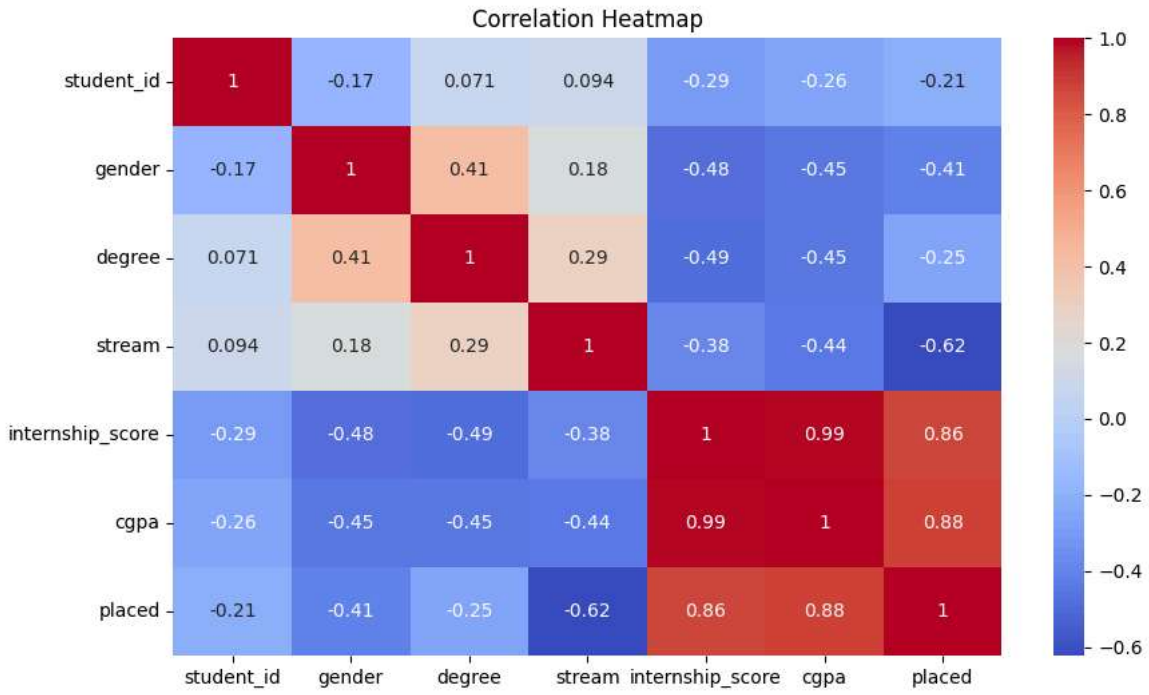
| | student_id | gender | degree | stream | internship_score | cgpa | placed |
|---|---|---|---|---|---|---|---|
| **0** | -1.566699 | 1.0 | 0.816497 | 0.538816 | 0.904534 | 0.831670 | 0.816497 |
| **1** | -1.218544 | -1.0 | 0.816497 | -1.257237 | 0.301511 | 0.359130 | 0.816497 |
| **2** | -0.870388 | 1.0 | -1.224745 | -0.359211 | 0.904534 | -1.058490 | -1.224745 |

```
print(df.describe())   # summary (mean, min, max, etc.)
```

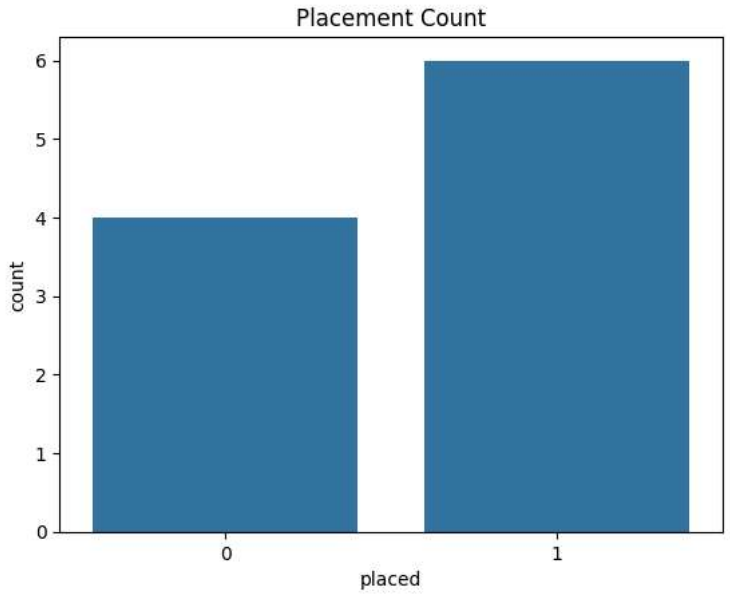
```
       student_id     gender     degree     stream  internship_score  \
count    10.00000  10.000000  10.000000  10.000000         10.000000
mean      5.50000   0.500000   0.600000   1.400000         65.000000
std       3.02765   0.527046   0.516398   1.173788         17.480147
min       1.00000   0.000000   0.000000   0.000000         40.000000
25%       3.25000   0.000000   0.000000   0.250000         51.250000
50%       5.50000   0.500000   1.000000   1.500000         65.000000
75%       7.75000   1.000000   1.000000   2.000000         78.750000
max      10.00000   1.000000   1.000000   3.000000         90.000000

            cgpa     placed
count  10.000000  10.000000
mean    7.620000   0.600000
std     1.115347   0.516398
min     6.000000   0.000000
25%     6.675000   0.000000
50%     7.750000   1.000000
75%     8.475000   1.000000
max     9.100000   1.000000
```

```
plt.figure(figsize=(10,6))
sns.heatmap(df.corr(), annot=True, cmap='coolwarm')
plt.title("Correlation Heatmap")
plt.show()
```




```
sns.countplot(x='placed', data=df)
plt.title("Placement Count")
plt.show()
```




```
X = df.drop('placed', axis=1)
y = df['placed']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

```
dt = DecisionTreeClassifier()
dt.fit(X_train, y_train)
y_pred_dt = dt.predict(X_test)
```

```
nb = GaussianNB()
nb.fit(X_train, y_train)
y_pred_nb = nb.predict(X_test)

print("Naive Bayes Accuracy:", accuracy_score(y_test, y_pred_nb))
print(confusion_matrix(y_test, y_pred_nb))
print(classification_report(y_test, y_pred_nb))
```

```
Naive Bayes Accuracy: 0.5
[[0 0]
 [1 1]]
              precision    recall  f1-score   support

           0       0.00      0.00      0.00         0
           1       1.00      0.50      0.67         2

    accuracy                           0.50         2
   macro avg       0.50      0.25      0.33         2
weighted avg       1.00      0.50      0.67         2
```

```
# K-Means
kmeans = KMeans(n_clusters=3)
df['kmeans_cluster'] = kmeans.fit_predict(df_scaled)

# Agglomerative
agg = AgglomerativeClustering(n_clusters=3)
df['agg_cluster'] = agg.fit_predict(df_scaled)

# DBSCAN
dbscan = DBSCAN(eps=1.5, min_samples=3)
df['dbscan_cluster'] = dbscan.fit_predict(df_scaled)
```

```
print(df.columns)
```

```
Index(['student_id', 'gender', 'degree', 'stream', 'internship_score', 'cgpa',
       'placed', 'kmeans_cluster', 'agg_cluster', 'dbscan_cluster'],
      dtype='object')
```

```
# ✅ Use existing column names
df_apriori = df[['gender', 'degree', 'placed']]   # replace degree_t with actual column name
df_apriori = pd.get_dummies(df_apriori)

# Find frequent itemsets
frequent_itemsets = apriori(df_apriori, min_support=0.2, use_colnames=True)

# Generate rules
rules = association_rules(frequent_itemsets, metric='lift', min_threshold=1)
print(rules[['antecedents', 'consequents', 'support', 'confidence', 'lift']])
```

```
        antecedents       consequents  support  confidence      lift
0          (gender)          (degree)      0.4    0.800000  1.333333
1          (degree)          (gender)      0.4    0.666667  1.333333
2  (gender, placed)          (degree)      0.2    1.000000  1.666667
3  (degree, placed)          (gender)      0.2    0.666667  1.333333
4          (gender)  (degree, placed)      0.2    0.400000  1.333333
5          (degree)  (gender, placed)      0.2    0.333333  1.666667
```

```
df_apriori = df[['gender','degree','placed']]
df_apriori = pd.get_dummies(df_apriori)
```

```
frequent_itemsets = apriori(df_apriori, min_support=0.2, use_colnames=True)
rules = association_rules(frequent_itemsets, metric='lift', min_threshold=1)
print(rules[['antecedents', 'consequents', 'support', 'confidence', 'lift']])
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0          (gender)          (degree)      0.4    0.800000  1.333333
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2  (gender, placed)          (degree)      0.2    1.000000  1.666667
3  (degree, placed)          (gender)      0.2    0.666667  1.333333
4          (gender)  (degree, placed)      0.2    0.400000  1.333333
5          (degree)  (gender, placed)      0.2    0.333333  1.666667
```

```
Start coding or generate with AI.
```