

```
In [1]: import pandas as pd
import matplotlib
df=pd.read_csv("question7.csv")
df
```

```
Out[1]:
```

|   | Course                          | Student |
|---|---------------------------------|---------|
| 0 | Web Development                 | 222     |
| 1 | Android App Development         | 130     |
| 2 | Application Development         | 115     |
| 3 | Windows Application Development | 70      |
| 4 | Utility Software                | 54      |

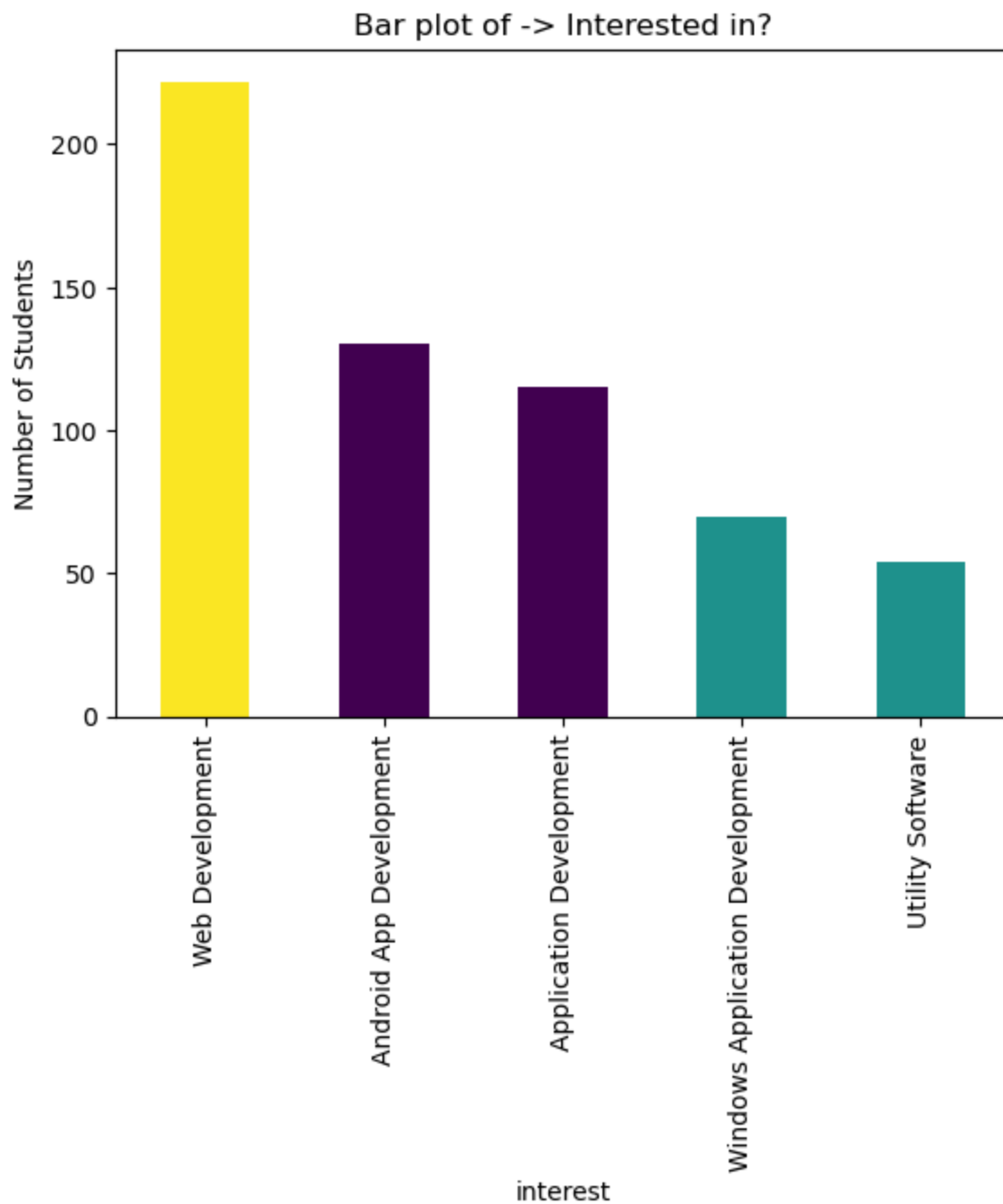
```
In [2]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
import os

# Set OMP_NUM_THREADS environment variable to 1
os.environ["OMP_NUM_THREADS"] = "1"
# Number of clusters
k = 3
# Extract the 'student' column for clustering
X = df.drop('Course',axis=1)
# Apply k-means with explicit n_init
kmeans = KMeans(n_clusters=k, n_init=10, random_state=42)
predict = kmeans.fit_predict(X)
print(predict)
```

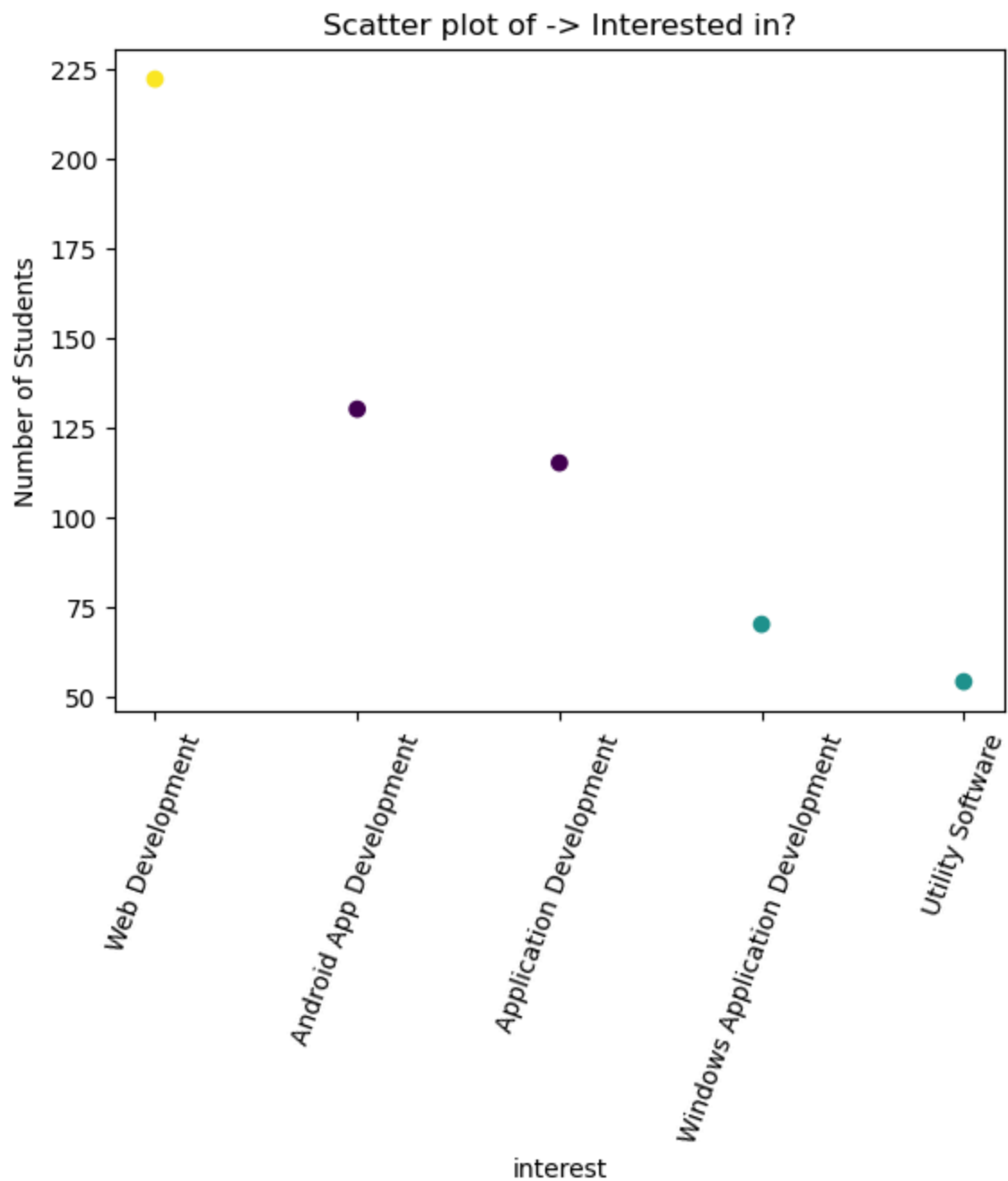
C:\Users\Ritesh\anaconda3\Lib\site-packages\sklearn\cluster\\_kmeans.py:1436: UserWarning: KMeans is known to have a memory leak on Windows with MKL, when there are less c hunks than available threads. You can avoid it by setting the environment variable OMP\_NUM\_THREADS=1.

warnings.warn(  
[2 0 0 1 1]

```
In [3]: # Get unique colors for each cluster using a colormap
colors = plt.cm.viridis(predict/(k - 1))
# Bar plot
df.plot.bar(x='Course', y='Student', color=colors, legend=False)
plt.title('Bar plot of -> Interested in?')
plt.xlabel('interest')
plt.ylabel('Number of Students')
plt.show()
```



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In [4]: # Scatter plot
plt.scatter(range(len(df)), df['Student'], c=colors, marker='o')
plt.title('Scatter plot of -> Interested in?')
plt.xlabel('interest')
plt.ylabel('Number of Students')
plt.xticks(range(len(df)), df['Course'], rotation=70)
plt.show()
# Display cluster information
print("Clusters:")
print(df)
```



Clusters:

|   | Course                          | Student |
|---|---------------------------------|---------|
| 0 | Web Development                 | 222     |
| 1 | Android App Development         | 130     |
| 2 | Application Development         | 115     |
| 3 | Windows Application Development | 70      |
| 4 | Utility Software                | 54      |

In [ ]: