In [2]:
```
# This Python 3 environment comes with many helpful analytics libraries instal
led
# It is defined by the kaggle/python Docker image: https://github.com/kaggle/d
ocker-python
# For example, here's several helpful packages to load
import warnings
warnings.filterwarnings("ignore")
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
import matplotlib.pyplot as plt
# Input data files are available in the read-only "../input/" directory
# For example, running this (by clicking run or pressing Shift+Enter) will lis
t all files under the input directory

import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))

# You can write up to 20GB to the current directory (/kaggle/working/) that ge
ts preserved as output when you create a version using "Save & Run All"
# You can also write temporary files to /kaggle/temp/, but they won't be saved
outside of the current session
```

```
/kaggle/input/students-datta/students_data.csv
```

In [3]:
```
df = pd.read_csv("/kaggle/input/students-datta/students_data.csv")
df.head(3)
```

Out[3]:

	Oliver Thompson	Harvard University	2	Unnamed: 3
0	Emma Johnson	Stanford University	3.82	NaN
1	Liam Smith	Massachusetts Institute of Technology (MIT)	3.6	NaN
2	Olivia Brown	University of Cambridge	2.93	NaN

In [4]:
```
columns_n=['Name', 'University', 'CGPA','none']
df.columns = columns_n
```

In [5]:
```
df
```

Out[5]:

	Name	University	CGPA	none
0	Emma Johnson	Stanford University	3.82	NaN
1	Liam Smith	Massachusetts Institute of Technology (MIT)	3.6	NaN
2	Olivia Brown	University of Cambridge	2.93	NaN
3	Noah Davis	University of Oxford	3.3	NaN
4	Ava Wilson	California Institute of Technology (Caltech)	2.95	NaN
...	...	...	...	...
594	NaN	NaN	NaN	NaN
595	NaN	NaN	NaN	NaN
596	NaN	NaN	NaN	NaN
597	NaN	NaN	NaN	NaN
598	NaN	NaN	NaN	NaN

599 rows × 4 columns

In [6]:
```
df = df.drop('none', axis=1)
```

In [7]:
```
df
```

Out[7]:

	Name	University	CGPA
0	Emma Johnson	Stanford University	3.82
1	Liam Smith	Massachusetts Institute of Technology (MIT)	3.6
2	Olivia Brown	University of Cambridge	2.93
3	Noah Davis	University of Oxford	3.3
4	Ava Wilson	California Institute of Technology (Caltech)	2.95
...	...	...	...
594	NaN	NaN	NaN
595	NaN	NaN	NaN
596	NaN	NaN	NaN
597	NaN	NaN	NaN
598	NaN	NaN	NaN

599 rows × 3 columns

In [8]:
```
df['CGPA'].unique()
```

Out[8]:
```
array(['3.82', '3.6', '2.93', '3.3', '2.95', '2.5', '2.8', '2.45', '2.9',
       '3.01', '3.68', 'Annual ', '3.33', '2.33',
       '3.08(updated after 4 semester).', '2.76', nan, '2', '3.37',
       '2.52', '3.1', '3.4', '3.53', '3.52', '3.2', '2.7', '2.83', '2.86',
       '3.08', '3.47', '3', '3.7', '2.58', '3.51', '3.25', '3.81', '2.97',
       '3.61', '2.94', '3.23', '2.92', '7.5', '2.51', '2.61', '3.28',
       '2.4', '3.26', '3.13', '2.6', '2.2', '3.18', '3.5', '2.96', '3.06',
       '3.58', '3.21 (6th semester completed)', '2.63', '3.12', '3.318',
       '3.45', '2.64', '2.3', '3.54', '2.84', '2.71', '3.78', '2.6/4',
       '3.07', '3.55', '2.48', '3.94', '3.04', '2.73', '3.05', '3.66',
       '3.74', '3.17', '2.78', '2.75', '3.95', '3.64', '3.88', '3.41',
       '3.93', '3.36', '2.89', '3.65', '2.74', '3.09', '3.24', '3.79',
       '4', '3.34', '3.72', '3.49', '2.57', '3.85', '2.87', '3.48',
       '3.43', '3.93/4', '3.44', '3.39', '3.59', '3.69', '3.96', '3.86',
       '3.57', '2.34', '2.41', '2.91', '2.69', '2.55', '3.76', '3.22',
       '2.31', '1.8', '3.84', '3.985', '3.32', '3.15', '2.24', '3.31',
       '3.92', '2.43'], dtype=object)
```

In [9]:
```
df['CGPA'] = df['CGPA'].astype(str)  # Convert all values to strings
df['CGPA'] = df['CGPA'].str.extract(r'(\d+\.\d+)').astype(float)  # Extract an
d convert to float
```

In [10]:
```
df=df.dropna(subset=['CGPA'])
df
```

Out[10]:

	Name	University	CGPA
0	Emma Johnson	Stanford University	3.82
1	Liam Smith	Massachusetts Institute of Technology (MIT)	3.60
2	Olivia Brown	University of Cambridge	2.93
3	Noah Davis	University of Oxford	3.30
4	Ava Wilson	California Institute of Technology (Caltech)	2.95
...	...	...	...
294	Max Turner	University of Amsterdam	3.09
295	Brooklyn Wilson	University of Copenhagen	3.23
296	Colton Carter	University of California, Santa Barbara (UCSB)	2.20
297	Gabriella Lee	King's College London	2.50
298	Jack Green	University of California, Irvine	2.43

274 rows × 3 columns

In [11]:
```
df = df.loc[df['CGPA'] <= 4]
top_uni = df.groupby('University')['CGPA'].mean().sort_values(ascending=Fals
e).head(5)
top_uni
```

Out[11]:
```
University
University of Toronto                                  3.525
Massachusetts Institute of Technology (MIT)            3.474
University of Southern California (USC)                3.455
University of Bristol                                  3.440
Swiss Federal Institute of Technology Zurich (ETH Zurich)    3.410
Name: CGPA, dtype: float64
```

In [12]:
```
df['Name_Length'] = df['Name'].str.len()

# Calculate the correlation between 'CGPA' and 'Name_Length'
correlation = df['CGPA'].corr(df['Name_Length'])

# Print the correlation value
print("Correlation between CGPA and Name Length:", correlation)
```

```
Correlation between CGPA and Name Length: 0.021044223047317186
```

In [13]:
```
c_uni = df.groupby('University')['CGPA'].describe()
c_uni
```

Out[13]:

University	count	mean	std	min	25%	50%	75%	max
California Institute of Technology (Caltech)	3.0	2.996667	0.411987	2.61	2.7800	2.950	3.1900	3.43
Columbia University	6.0	3.006667	0.344654	2.70	2.8075	2.845	3.1600	3.59
Cornell University	6.0	3.141667	0.549014	2.24	2.8675	3.400	3.4450	3.66
Harvard University	4.0	2.965000	0.450074	2.40	2.8125	2.980	3.1325	3.50
Imperial College London	6.0	3.138333	0.381650	2.70	2.9275	3.055	3.2725	3.79
...	...	...	...	...	...	...	...	...
University of Washington	6.0	3.038333	0.352387	2.50	2.9225	3.090	3.1000	3.58
University of Western Australia	3.0	3.110000	0.359305	2.70	2.9800	3.260	3.3150	3.37
University of Wisconsin-Madison	6.0	2.951667	0.373117	2.40	2.7700	2.925	3.2375	3.40
University of Zurich	3.0	2.766667	0.215484	2.60	2.6450	2.690	2.8500	3.01
Yale University	3.0	3.070000	0.170000	2.90	2.9850	3.070	3.1550	3.24

63 rows × 8 columns

In [15]:
```
from sklearn.model_selection import train_test_split
# Assuming you have already loaded the data into the 'df' DataFrame

# Filter out non-string values from the 'Name' column
df = df[df['Name'].apply(lambda x: isinstance(x, str))]

x = df['Name'].apply(len).values.reshape(-1, 1)
y = df['CGPA'].values

x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.35, rand
om_state=42)
```

In [18]:
```
from sklearn.linear_model import LinearRegression
mod=LinearRegression()
mod.fit(x_train,y_train)
```

Out[18]:
```
▾ LinearRegression

LinearRegression()
```

In [25]:
```
import statsmodels.api as sm
from sklearn.metrics import mean_squared_error
y_pred = mod.predict(x_test)
```

In [27]:
```
mse=mean_squared_error(y_test,y_pred)
mse
```

Out[27]:
```
0.18228806353414384
```

In [ ]:
```

```

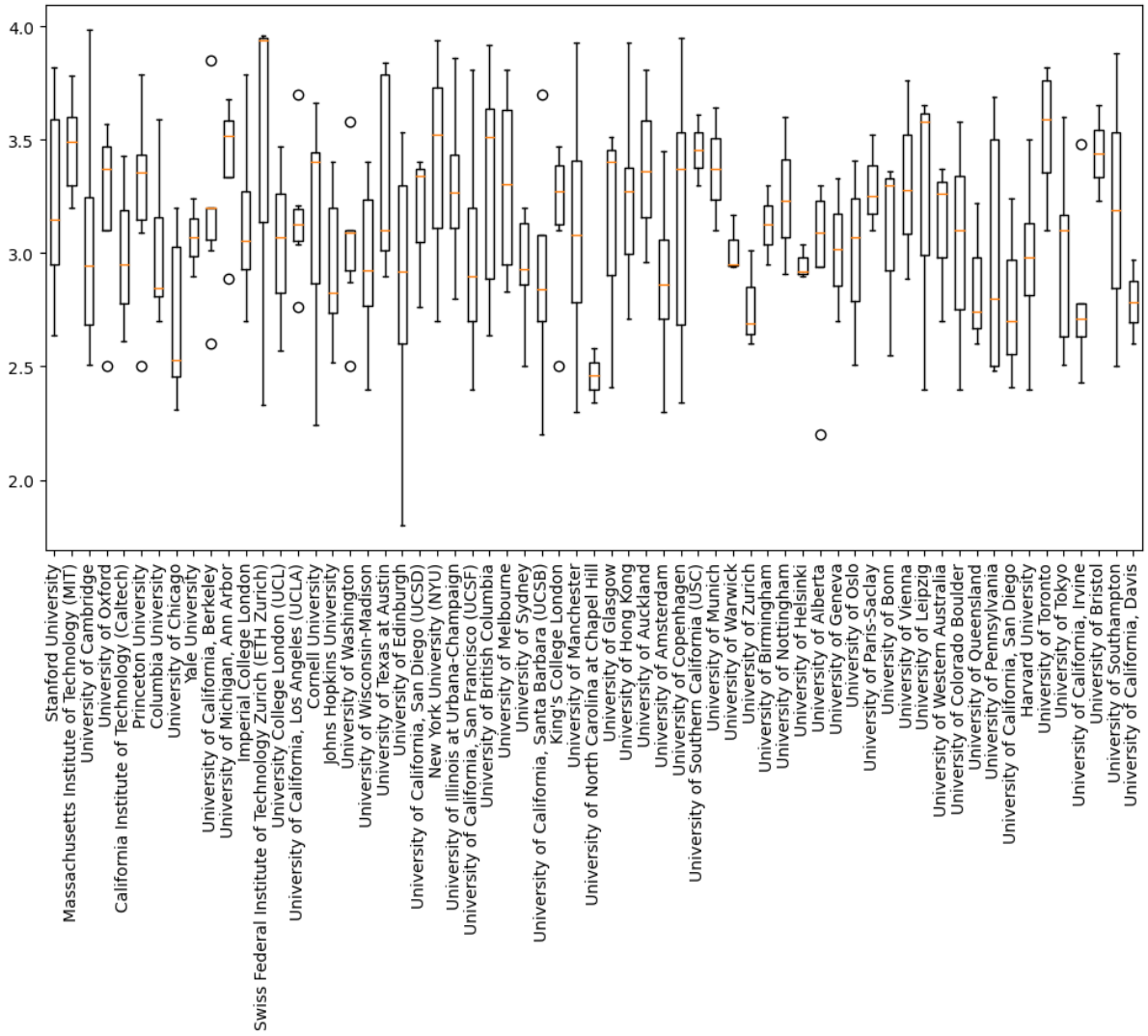
In [41]:
```
t=3.5
uni=df[df['CGPA']>t]['University'].value_counts().idxmax()
uni
```

Out[41]:
```
'University of British Columbia'
```

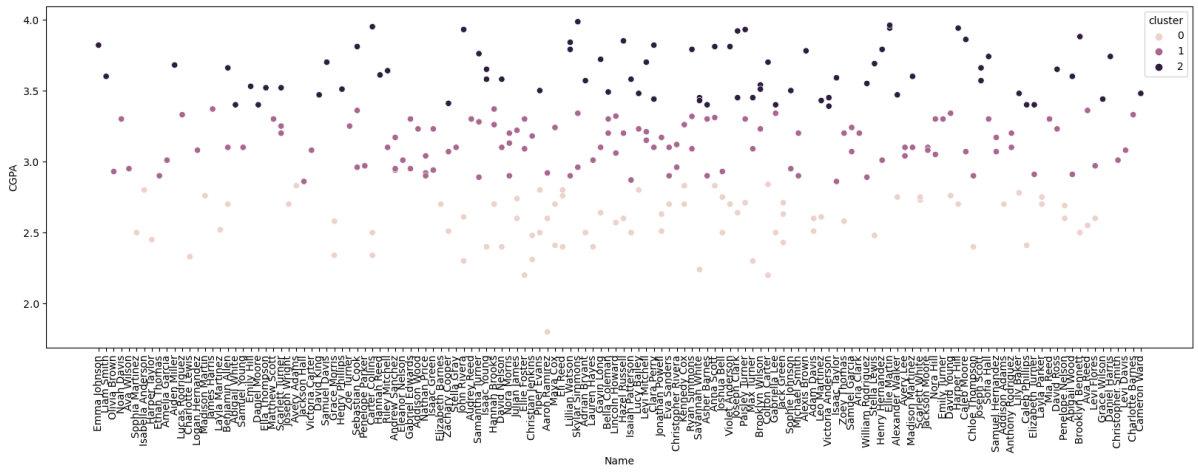
In [42]:
```
outliers=df.groupby('University')['CGPA'].apply(lambda x: x[x.between(*x.quant
ile([0.25,0.75]).values)])
outliers
```

Out[42]:
```
University
California Institute of Technology (Caltech)  4      2.95
Columbia University                           106    2.86
                                              185    2.83
Cornell University                            18     3.37
                                              187    3.43
                                                     ...
University of Western Australia               59     3.26
University of Wisconsin-Madison               121    3.05
                                              268    2.80
University of Zurich                          245    2.69
Yale University                               108    3.07
Name: CGPA, Length: 105, dtype: float64
```

In [43]:
```
# box plot for cgpa stats
data_plot = [df[df.University == uni]['CGPA'] for uni in df.University.unique
()]
plt.figure(figsize=(12, 6))
plt.boxplot(data_plot, labels=df.University.unique())
plt.xticks(rotation=90)
plt.show()
```



In [44]:
```
from sklearn.cluster import KMeans
import matplotlib.pyplot as plt
import seaborn as sns
k=df[['CGPA']]
kmean=KMeans(n_clusters=3,random_state=42)
df['cluster']=kmean.fit_predict(k)
plt.figure(figsize=(20,6))
sns.scatterplot(x='Name',y='CGPA',hue='cluster',data=df)
plt.xticks(rotation=90)
plt.show()
```



In [45]:
```
avg=df.groupby('cluster')['CGPA'].mean()
avg
```

Out[45]:
```
cluster
0    2.575062
1    3.119293
2    3.632434
Name: CGPA, dtype: float64
```

In [47]:
```
from sklearn.tree import DecisionTreeClassifier
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
import pandas as pd

# Assuming you have already loaded the data into the 'df' DataFrame

# Filter out non-string values from the 'Name' column
df = df[df['Name'].apply(lambda x: isinstance(x, str))]

# Select the features (independent variables)
features = df[['CGPA']]

# Select the target variable (dependent variable)
target = df['University']  # Replace 'University' with the actual target colum
n name

# Split the data into training and testing sets for both features and target
x_train, x_test, y_train, y_test = train_test_split(features, target, test_siz
e=0.35, random_state=42)

# Create a DecisionTreeClassifier model
model = DecisionTreeClassifier(random_state=42)

# Fit the model to the training data
model.fit(x_train, y_train)

# Predict the target values using the model
y_pred = model.predict(x_test)

# Calculate the accuracy score
accuracy = accuracy_score(y_test, y_pred)
print("Accuracy:", accuracy)
```

```
Accuracy: 0.010416666666666666
```

In [48]:
```
avg2=df['CGPA'].mean()
avg2
```

Out[48]:
```
3.1006703296703293
```

In [50]:
```
from sklearn.preprocessing import LabelEncoder

# Encode the 'University' column using label encoding
encoder = LabelEncoder()
df['University_encoded'] = encoder.fit_transform(df['University'])

# Task 1: Build a Regression Model for CGPA Prediction
x_regression = df[['University_encoded']]
y_regression = df['CGPA']
x_train_reg, x_test_reg, y_train_reg, y_test_reg = train_test_split(x_regressi
on, y_regression, test_size=0.2, random_state=42)
regression_model = LinearRegression()
regression_model.fit(x_train_reg, y_train_reg)
y_pred_reg = regression_model.predict(x_test_reg)
mse = mean_squared_error(y_test_reg, y_pred_reg)
print("Regression Model MSE:", mse)
```

```
Regression Model MSE: 0.18061559865339447
```

In [51]:
```
# Task 3: Check for Missing or Erroneous CGPA Values
missing_cgpa = df['CGPA'].isna().sum()
print("Missing CGPA Values:", missing_cgpa)
```

```
Missing CGPA Values: 0
```

In [54]:
```
from sklearn.cluster import AgglomerativeClustering

x_clustering = df[['CGPA']]
clustering_model = AgglomerativeClustering(n_clusters=3)
df['cluster'] = clustering_model.fit_predict(x_clustering)
```

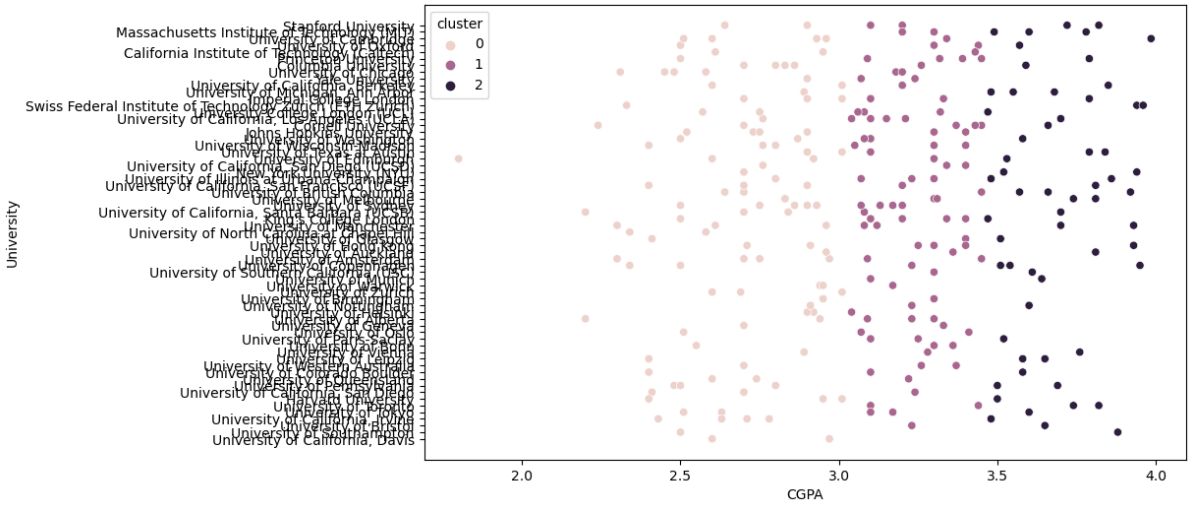
In [55]:
```
# Task 7: Build a Classification Model for University Prediction
x_classification = df[['CGPA', 'Name_Length']]
y_classification = df['University']
x_train_class, x_test_class, y_train_class, y_test_class = train_test_split(x_
classification, y_classification, test_size=0.2, random_state=42)
classification_model = DecisionTreeClassifier(random_state=42)
classification_model.fit(x_train_class, y_train_class)
y_pred_class = classification_model.predict(x_test_class)
accuracy = accuracy_score(y_test_class, y_pred_class)
print("Classification Model Accuracy:", accuracy)
```

```
Classification Model Accuracy: 0.03636363636363636
```

In [56]:
```
correlations = df.groupby('University')[['Name_Length', 'CGPA']].corr().loc[:, 'Name_Length']
print("Correlation between Name Length and CGPA within Each University:\n", correlations)
```

```
Correlation between Name Length and CGPA within Each University:
 University
California Institute of Technology (Caltech)  Name_Length    1.000000
                                               CGPA           0.098097
Columbia University                            Name_Length    1.000000
                                               CGPA          -0.199380
Cornell University                             Name_Length    1.000000
                                                               ...
University of Wisconsin-Madison                CGPA           0.742487
University of Zurich                           Name_Length    1.000000
                                               CGPA          -0.977951
Yale University                                Name_Length    1.000000
                                               CGPA           0.866025
Name: Name_Length, Length: 126, dtype: float64
```

In [57]:
```
# Visualizations
plt.figure(figsize=(10, 6))
sns.scatterplot(x='CGPA', y='University', hue='cluster', data=df)
plt.show()
```



In [ ]:
```
```