```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

```
data = pd.read_csv('/content/mission5.csv')
```

```
data.head()
```

	GPA	Test Score	Extracurricular Activities	Volunteer Hours	Recommendation Letters	Essay Score	Accepted
0	2.75	1374	5	16	2	9	No
1	3.90	1542	7	27	3	3	Yes
2	3.46	1040	4	29	1	9	No
3	3.20	1363	3	28	2	1	No
4	2.31	895	1	5	1	1	No

```
data['Accepted'] = data['Accepted'].map({"No":0, "Yes":1})
```

```
data.head()
```

	GPA	Test Score	Extracurricular Activities	Volunteer Hours	Recommendation Letters	Essay Score	Accepted
0	2.75	1374	5	16	2	9	0
1	3.90	1542	7	27	3	3	1
2	3.46	1040	4	29	1	9	0
3	3.20	1363	3	28	2	1	0
4	2.31	895	1	5	1	1	0

```
data.isna().sum()
```

	0
GPA	0
Test Score	0
Extracurricular Activities	0
Volunteer Hours	0
Recommendation Letters	0
Essay Score	0
Accepted	0

dtype: int64

```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
data['Accepted'] = le.fit_transform(data['Accepted'])
```

```
data.head()
```

	GPA	Test Score	Extracurricular Activities	Volunteer Hours	Recommendation Letters	Essay Score	Accepted
0	2.75	1374	5	16	2	9	0
1	3.90	1542	7	27	3	3	1
2	3.46	1040	4	29	1	9	0
3	3.20	1363	3	28	2	1	0
4	2.31	895	1	5	1	1	0

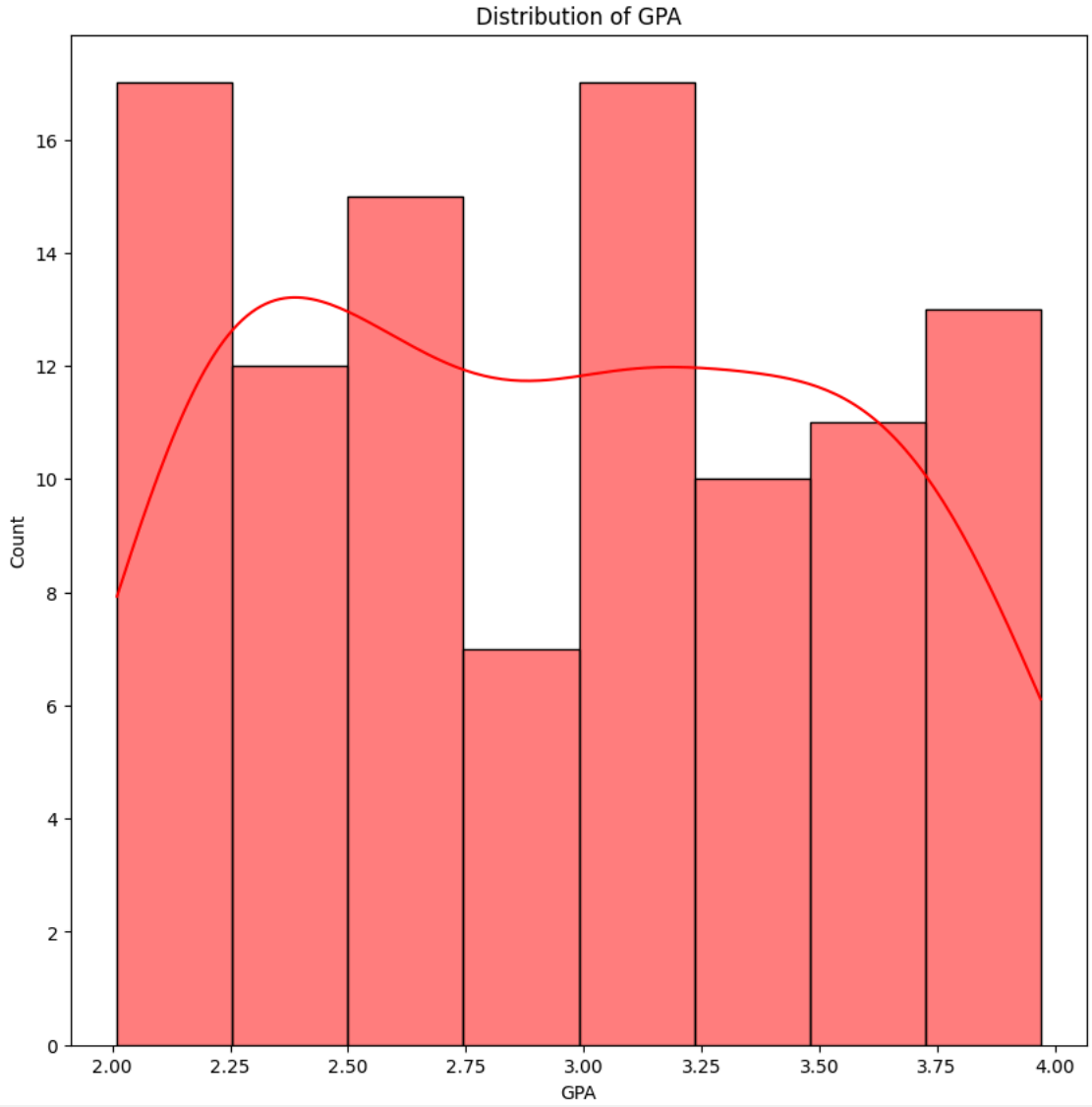
```
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
x = data.drop('Accepted', axis=1)
x = scaler.fit_transform(x)
```

```
[[-0.32857578  0.57268455  0.41764096 -0.40939893  0.19576351  1.15296752]
 [ 1.63284605  1.33301014  1.15849971  0.54162715  1.44375591 -0.94084887]
 [ 0.882389   -0.93891514  0.04721159  0.71454099 -1.05222889  1.15296752]
 [ 0.43893711  0.52290132 -0.32321779  0.62808407  0.19576351 -1.63878766]
 [-1.07903283 -1.59514854 -1.06407654 -1.36042501 -1.05222889 -1.63878766]
 [-1.07903283  1.29227841  0.41764096  1.14682557 -1.05222889 -0.59187947]
 [-1.40309382  0.16536727  0.41764096  1.3197394   0.19576351  1.15296752]
 [ 1.34289674 -0.18764104 -1.43450591  0.19579949 -1.05222889  0.10605933]
 [ 0.43893711 -0.98417262  1.52892908  0.62808407  1.44375591 -0.94084887]
 [ 0.81416563  1.36016462  0.41764096  0.8009979  -1.05222889 -1.63878766]
 [-1.53954056  0.93474435 -0.69364716  1.14682557  0.19576351 -0.59187947]
 [ 1.70106942 -1.25571747 -0.32321779  0.97391174  0.19576351  1.15296752]
 [ 1.22350584  0.41880913 -0.32321779 -0.06357126  0.19576351 -0.94084887]
 [-0.89141857 -1.86669339 -0.69364716  0.88745482 -1.05222889  1.15296752]
 [-0.99375362  0.34639717  1.89935846  0.10934257  0.19576351  0.45502872]
 [-0.97669778 -1.30550069 -0.69364716  0.97391174  0.19576351 -0.59187947]
 [-0.56735757  1.13387725 -0.69364716 -1.61979576 -1.05222889 -0.94084887]
 [ 0.18309948 -0.92986365 -0.32321779 -0.32294201  1.44375591  1.50193692]
 [-0.14096152 -1.64040601  0.78807033  0.2822564  -1.05222889 -0.24291007]
 [-0.61852509  1.57287476 -0.32321779  0.8009979   0.19576351 -0.24291007]
 [ 0.47304879  0.58626179  1.52892908 -1.61979576  0.19576351 -0.94084887]
 [-1.13020035  1.05693954 -1.43450591  1.57911015 -1.05222889  1.15296752]
 [-0.61852509  0.49122109  1.15849971  0.19579949  1.44375591 -0.59187947]
 [-0.36268746  0.5681588   0.78807033  0.88745482  0.19576351 -0.24291007]
 [-0.05568231  0.89401263 -1.06407654  0.02288565  0.19576351 -0.59187947]
 [ 1.07000326  1.57287476  1.15849971  0.10934257  0.19576351 -0.24291007]
 [-0.92553025 -1.90289937 -1.43450591 -1.70625268 -1.05222889  0.45502872]
 [ 0.1489878   0.77634319  1.52892908  0.45517024  0.19576351  1.15296752]
 [ 0.40482543  0.48669534  1.52892908 -1.70625268  1.44375591  0.45502872]
 [-1.45426135 -0.49086613 -1.06407654  0.36871332  0.19576351 -0.24291007]
 [ 0.47304879  1.58192626  0.78807033 -0.40939893  0.19576351  1.50193692]
 [-1.0278653  -0.53159786  1.89935846  1.57911015  1.44375591  1.50193692]
 [-1.38603798  0.86685814 -0.69364716  0.97391174  0.19576351  0.45502872]
 [ 1.63284605  0.26040797  0.78807033 -1.10105426 -1.05222889  1.50193692]
 [ 1.68401358 -0.45466015  1.89935846  1.49265324 -1.05222889 -0.24291007]
 [ 1.15528247  0.1110583   1.52892908  0.62808407 -1.05222889 -0.94084887]
 [-0.56735757 -0.98417262 -0.32321779  0.36871332  1.44375591  0.45502872]
 [-1.26664709 -1.16972827 -1.43450591  1.14682557  0.19576351 -1.28981826]
 [ 0.72888642 -1.0113271  -1.06407654  0.2822564  -1.05222889  1.15296752]
 [-0.10684983 -0.28720749 -1.43450591  0.19579949  1.44375591  1.50193692]
 [-1.19842372 -0.32341347  0.04721159 -0.75522659  0.19576351  1.50193692]
 [ 0.08076443 -0.74883374  0.04721159 -1.27396809  1.44375591 -1.63878766]
 [-1.48837303  0.83517791  0.78807033  1.23328249 -1.05222889  0.10605933]
 [ 1.49639931  0.81254917  1.52892908 -0.15002818 -1.05222889  0.45502872]
 [-0.72086015  1.34206163  1.52892908 -1.79270959 -1.05222889  0.80399812]
 [ 0.66066306 -0.85745168 -0.69364716 -1.18751118  1.44375591  1.50193692]
 [-0.55030173 -0.40487693 -0.69364716 -0.49585584  1.44375591  1.15296752]
 [ 0.16604364  1.18366047 -0.69364716 -0.66876968 -1.05222889 -1.28981826]
 [ 0.25132285  0.03412059 -0.32321779 -0.84168351  1.44375591  1.50193692]
 [-0.97669778 -0.16953805  1.15849971  0.10934257 -1.05222889 -1.28981826]
 [ 1.70106942  0.90758987  0.41764096 -0.58231276 -1.05222889 -0.24291007]
 [ 1.03589158 -0.59043258  1.15849971  0.54162715  0.19576351 -0.24291007]
 [ 1.59873437  1.0343108  -1.43450591  1.06036865  1.44375591  0.10605933]
 [ 1.44523179 -1.0113271   1.15849971 -1.70625268 -1.05222889 -0.94084887]
 [ 0.43893711 -0.97059537 -0.32321779  0.88745482 -1.05222889  0.80399812]
 [ 1.530511    1.06599103 -1.43450591  0.10934257  1.44375591 -1.63878766]
 [-1.30075877  0.97547608  1.15849971  0.02288565  0.19576351  0.10605933]
 [-0.94258609 -0.33699071 -0.32321779  0.2822564   0.19576351 -0.59187947]
```

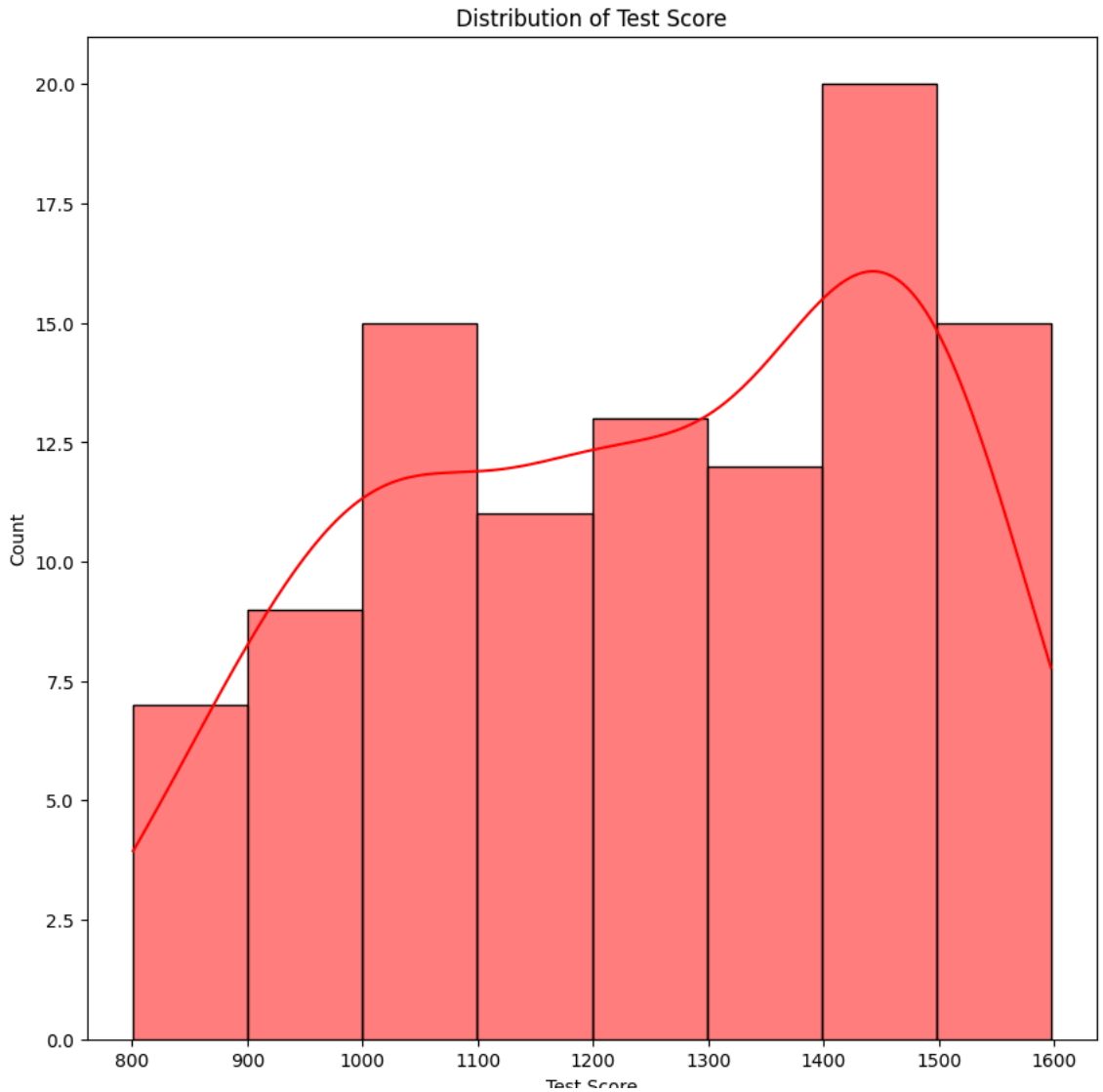
```
data.describe()
```

	GPA	Test Score	Extracurricular Activities	Volunteer Hours	Recommendation Letters	Essay Score	Accepted
count	102.000000	102.000000	102.000000	102.000000	102.000000	102.000000	102.000000
mean	2.942647	1247.460784	3.872549	20.735294	1.843137	5.696078	0.500000
std	0.589205	222.049128	2.712901	11.623573	0.805244	2.879732	0.502469
min	2.010000	801.000000	0.000000	0.000000	1.000000	1.000000	0.000000
25%	2.392500	1040.500000	2.000000	12.000000	1.000000	3.000000	0.000000
50%	2.965000	1263.000000	3.000000	22.000000	2.000000	5.500000	0.500000
75%	3.460000	1444.000000	6.000000	30.750000	2.750000	9.000000	1.000000
max	3.970000	1597.000000	9.000000	39.000000	3.000000	10.000000	1.000000

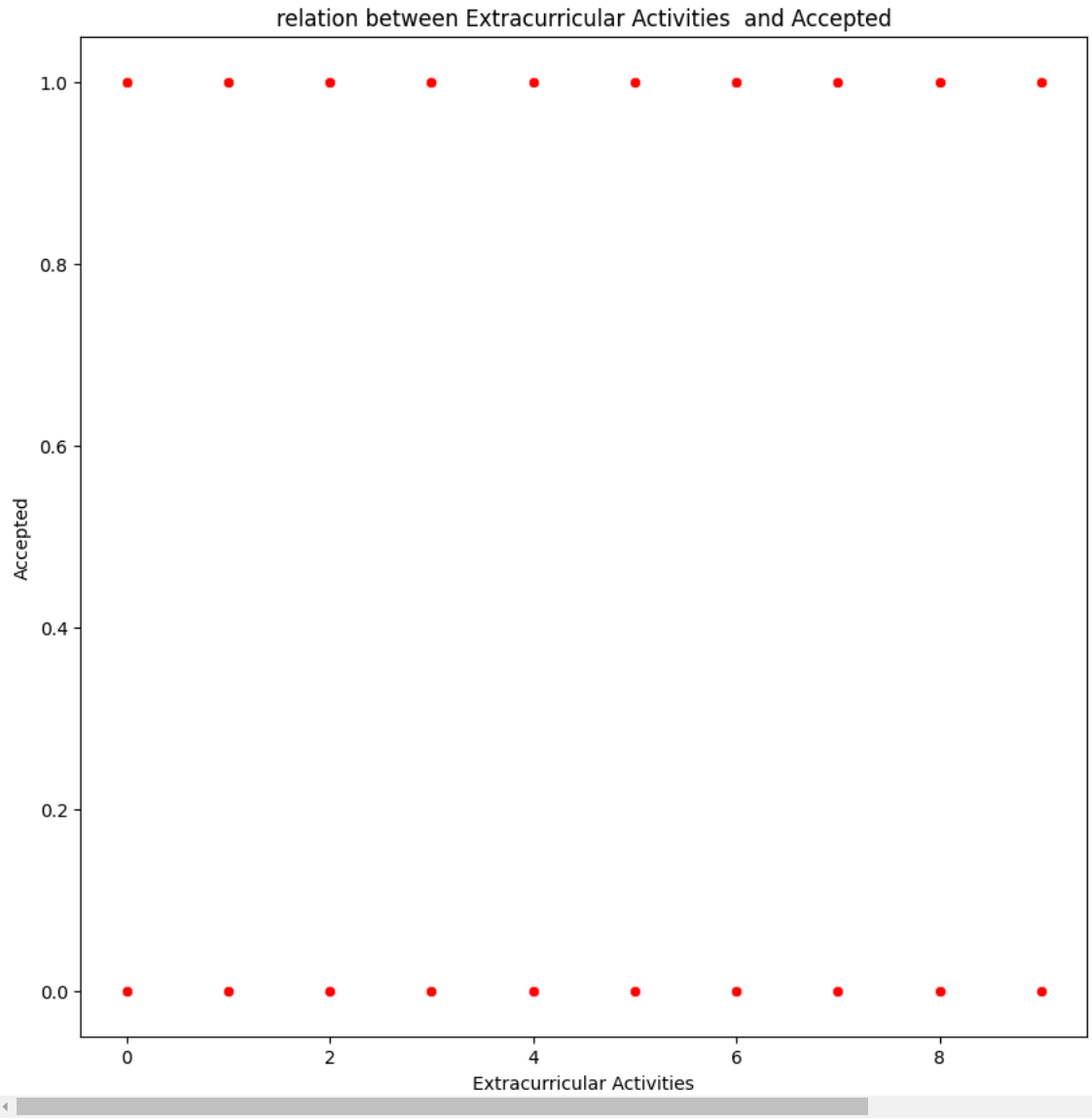
```
plt.figure(figsize=(10,10))
sns.histplot(x=data['GPA'], color="red", kde=True)
plt.xlabel('GPA')
plt.ylabel('Count')
plt.title('Distribution of GPA')
plt.show()
```



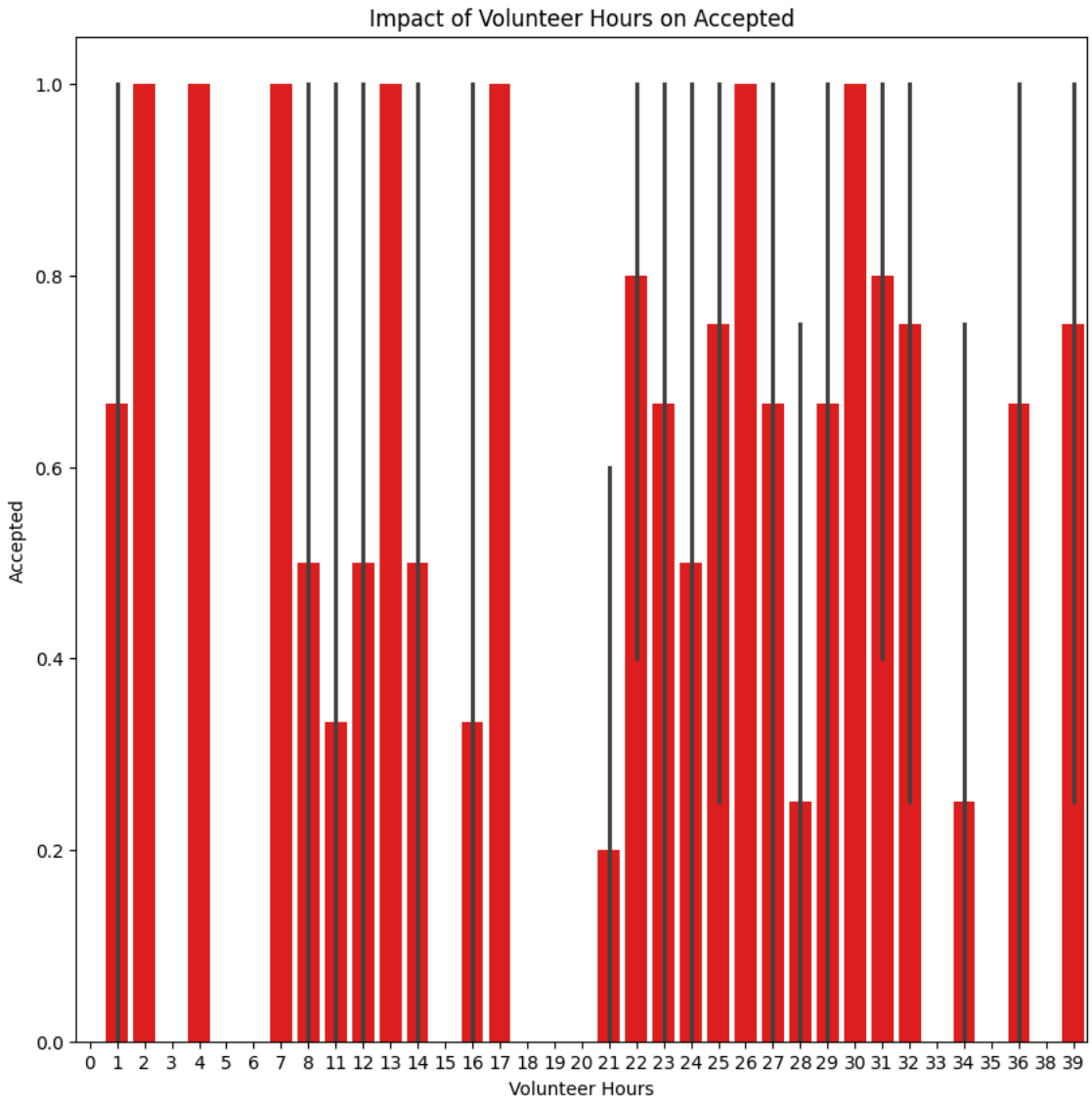

```
plt.figure(figsize=(10,10))
sns.histplot(x=data['Test Score'], color="red", kde=True)
plt.xlabel('Test Score')
plt.ylabel('Count')
plt.title('Distribution of Test Score')
plt.show()
```



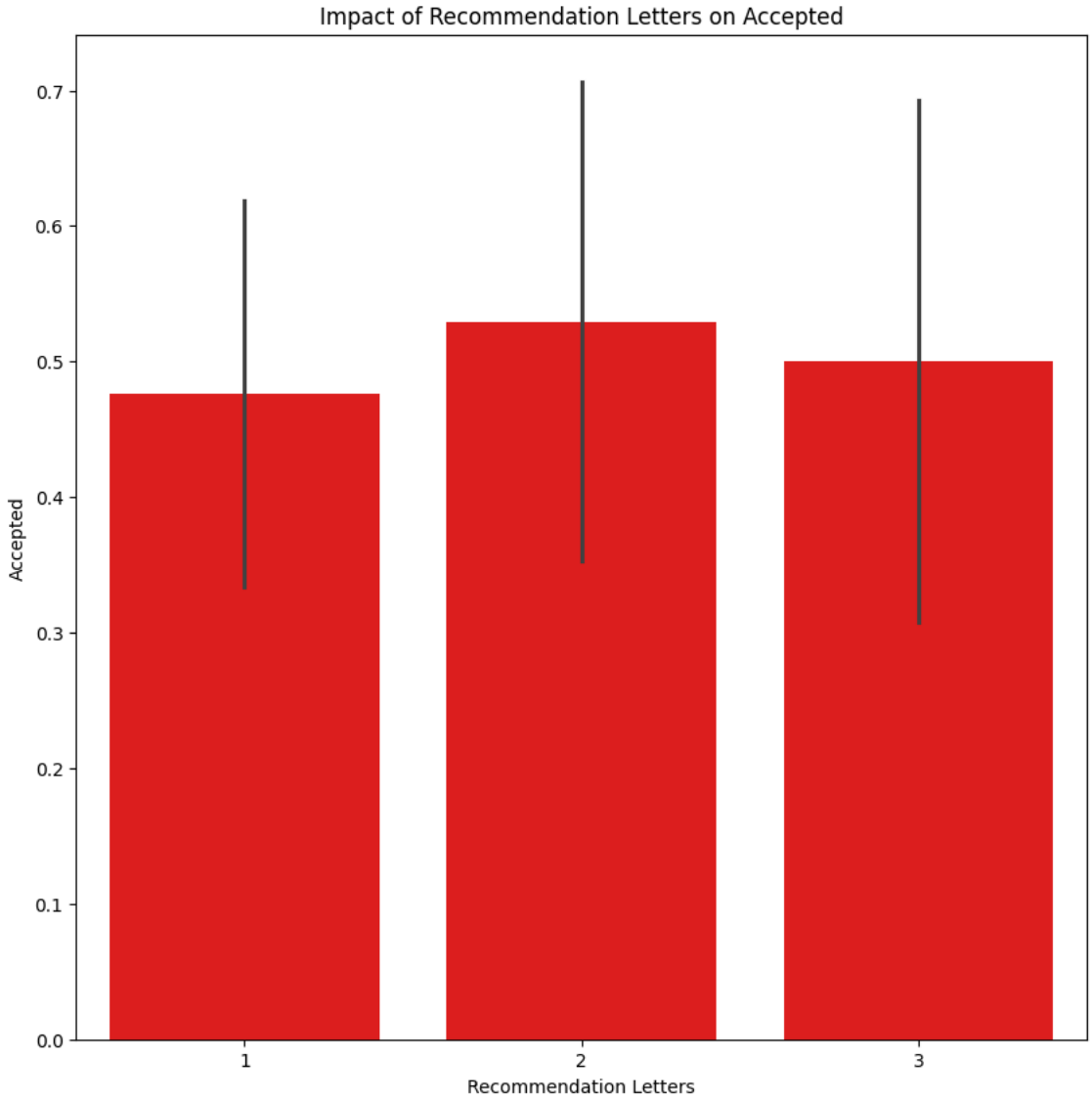

```
plt.figure(figsize=(10,10))
sns.scatterplot(x=data['Extracurricular Activities'], y=data['Accepted'], color="red")
plt.xlabel('Extracurricular Activities')
plt.ylabel('Accepted')
plt.title('relation between Extracurricular Activities  and Accepted')
plt.show()
```




```
plt.figure(figsize=(10,10))
sns.barplot(x=data['Volunteer Hours'], y=data['Accepted'], color="red")
plt.xlabel('Volunteer Hours')
plt.ylabel('Accepted')
plt.title('Impact of Volunteer Hours on Accepted')
plt.show()
```




```
plt.figure(figsize=(10,10))
sns.barplot(x=data['Recommendation Letters'], y=data['Accepted'], color="red")
plt.xlabel('Recommendation Letters')
plt.ylabel('Accepted')
plt.title('Impact of Recommendation Letters on Accepted')
plt.show()
```



x

```
array([[-0.32857578,  0.57268455,  0.41764096, -0.40939893,  0.19576351,
         1.15296752],
       [ 1.63284605,  1.33301014,  1.15849971,  0.54162715,  1.44375591,
        -0.94084887],
       [ 0.882389  , -0.93891514,  0.04721159,  0.71454099, -1.05222889,
         1.15296752],
       [ 0.43893711,  0.52290132, -0.32321779,  0.62808407,  0.19576351,
        -1.63878766],
       [-1.07903283, -1.59514854, -1.06407654, -1.36042501, -1.05222889,
        -1.63878766],
       [-1.07903283,  1.29227841,  0.41764096,  1.14682557, -1.05222889,
        -0.59187947],
       [-1.40309382,  0.16536727,  0.41764096,  1.3197394 ,  0.19576351,
         1.15296752],
       [ 1.34289674, -0.18764104, -1.43450591,  0.19579949, -1.05222889,
         0.10605933],
       [ 0.43893711, -0.98417262,  1.52892908,  0.62808407,  1.44375591,
        -0.94084887],
       [ 0.81416563,  1.36016462,  0.41764096,  0.8009979 , -1.05222889,
        -1.63878766],
       [-1.53954056,  0.93474435, -0.69364716,  1.14682557,  0.19576351,
        -0.59187947],
       [ 1.70106942, -1.25571747, -0.32321779,  0.97391174,  0.19576351,
         1.15296752],
       [ 1.22350584,  0.41880913, -0.32321779, -0.06357126,  0.19576351,
        -0.94084887],
       [-0.89141857, -1.86669339, -0.69364716,  0.88745482, -1.05222889,
         1.15296752],
       [-0.99375362,  0.34639717,  1.89935846,  0.10934257,  0.19576351,
         0.45502872],
       [-0.97669778, -1.30550069, -0.69364716,  0.97391174,  0.19576351,
        -0.59187947],
```

```
[-0.56735757,  1.13387725, -0.69364716, -1.61979576, -1.05222889,
 -0.94084887],
[ 0.18309948, -0.92986365, -0.32321779, -0.32294201,  1.44375591,
  1.50193692],
[-0.14096152, -1.64040601,  0.78807033,  0.2822564 , -1.05222889,
 -0.24291007],
[-0.61852509,  1.57287476, -0.32321779,  0.8009979 ,  0.19576351,
 -0.24291007],
[ 0.47304879,  0.58626179,  1.52892908, -1.61979576,  0.19576351,
 -0.94084887],
[-1.13020035,  1.05693954, -1.43450591,  1.57911015, -1.05222889,
  1.15296752],
[-0.61852509,  0.49122109,  1.15849971,  0.19579949,  1.44375591,
 -0.59187947],
[-0.36268746,  0.5681588 ,  0.78807033,  0.88745482,  0.19576351,
 -0.24291007],
[-0.05568231,  0.89401263, -1.06407654,  0.02288565,  0.19576351,
 -0.59187947],
[ 1.07000326,  1.57287476,  1.15849971,  0.10934257,  0.19576351,
 -0.24291007],
[-0.92553025, -1.90289937, -1.43450591, -1.70625268, -1.05222889,
  0.45502872],
[ 0.1489878 ,  0.77634319,  1.52892908,  0.45517024,  0.19576351,
  1.15296752],
[ 0.40482543,  0.48669534,  1.52892908, -1.70625268,  1.44375591,
```

```
y = data['Accepted']
```

```
y
```

	Accepted
0	0
1	1
2	0
3	0
4	0
...	...
97	1
98	1
99	0
100	1
101	1

102 rows × 1 columns

dtype: int64

```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.2, random_state=42)
```

```
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix
```

```
lr = LogisticRegression()
lr.fit(x_train, y_train)
dt  = DecisionTreeClassifier()
dt.fit(x_train, y_train)
y_pred_lr = lr.predict(x_test)
y_pred_dt = dt.predict(x_test)
```

```
print("Accuracy score for lr:", accuracy_score(y_test, y_pred_lr))
print("Accuracy score for dt:", accuracy_score(y_test, y_pred_dt))
```

```
Accuracy score for lr: 0.38095238095238093
Accuracy score for dt: 0.6190476190476191
```

```
print("classification report for lr:", classification_report(y_test, y_pred_lr))
print("classification report for dt:", classification_report(y_test, y_pred_dt))
```

```
classification report for lr:               precision    recall  f1-score   support

           0       0.40      0.36      0.38        11
           1       0.36      0.40      0.38        10

    accuracy                           0.38        21
   macro avg       0.38      0.38      0.38        21
weighted avg       0.38      0.38      0.38        21

classification report for dt:               precision    recall  f1-score   support

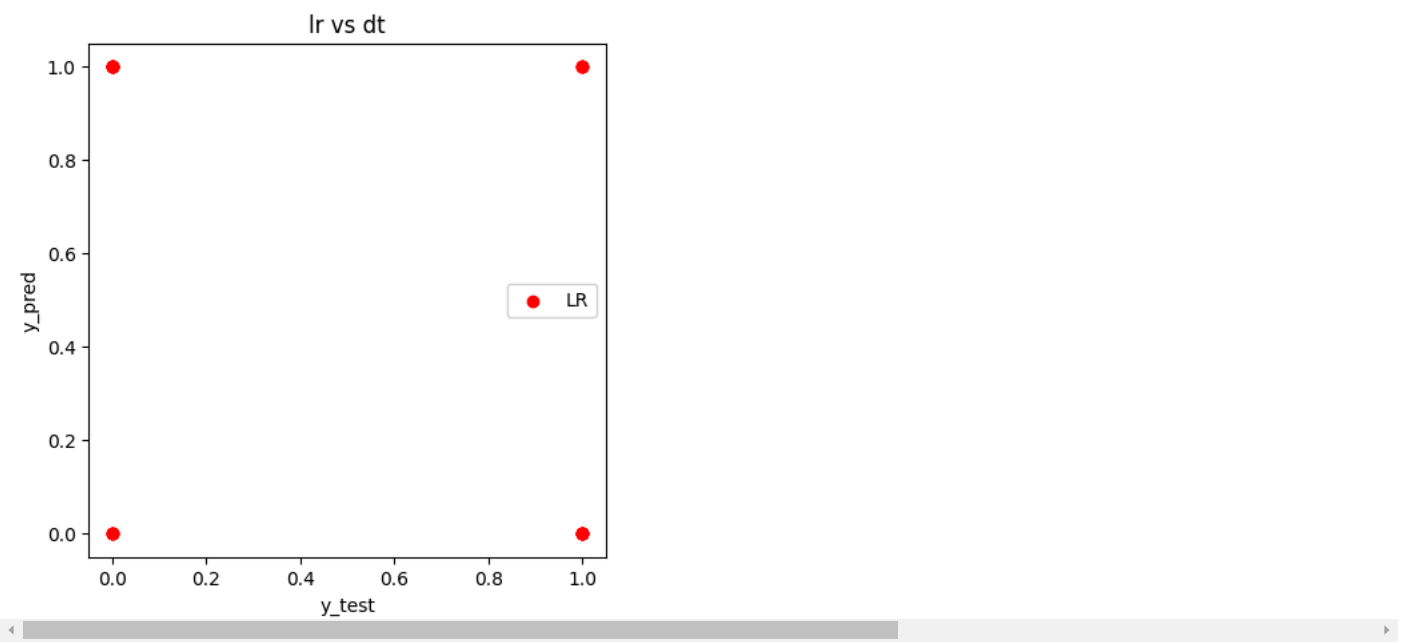
           0       0.62      0.73      0.67        11
           1       0.62      0.50      0.56        10

    accuracy                           0.62        21
   macro avg       0.62      0.61      0.61        21
weighted avg       0.62      0.62      0.61        21
```

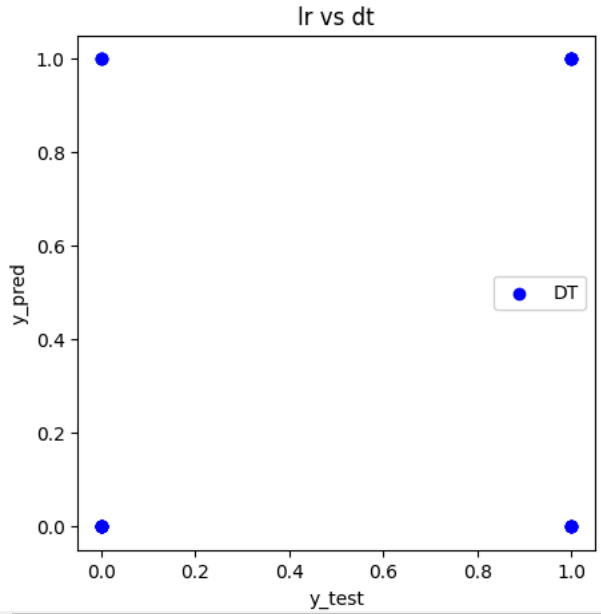
```
print("confusion matrix for lr:", confusion_matrix(y_test, y_pred_lr))
print("confusion matrix for dt:", confusion_matrix(y_test, y_pred_dt))
```

```
confusion matrix for lr: [[4 7]
 [6 4]]
confusion matrix for dt: [[8 3]
 [5 5]]
```

```
plt.figure(figsize=(5,5))
plt.scatter(x=y_test,y=y_pred_lr, color="red", label="LR")
plt.xlabel('y_test')
plt.ylabel('y_pred')
plt.title('lr vs dt')
plt.legend()
plt.show()
# use threshold <=0.5 ==> No else if >0.5 ==> yes
```




```
plt.figure(figsize=(5,5))
plt.scatter(x=y_test,y=y_pred_dt, color="blue", label="DT")
plt.xlabel('y_test')
plt.ylabel('y_pred')
plt.title('lr vs dt')
plt.legend()
plt.show()
# use threshold <=0.5 ==> No else if >0.5 ==> yes
```




```
from sklearn.model_selection import GridSearchCV, RandomizedSearchCV
```

```
grid_params = {"max_iter": [1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000]}
grid_search = GridSearchCV(lr, grid_params, cv=5)
grid_search.fit(x_train, y_train)
print("Best parameters:", grid_search.best_params_)
print("Best score:", grid_search.best_score_)
```

```
Best parameters: {'max_iter': 1000}
Best score: 0.5566176470588236
```

```
random_params = {"max_depth": [10, 15, 20, 30, 35, 40, 45], "min_samples_split": [2, 5, 10, 15, 20]}
random_search = RandomizedSearchCV(dt, random_params, cv=5)
random_search.fit(x_train, y_train)
print("Best parameters:", random_search.best_params_)
print("Best score:", random_search.best_score_)
```

```
Best parameters: {'min_samples_split': 2, 'max_depth': 10}
Best score: 0.5801470588235295
```

```
pip install gradio
```

```
Collecting gradio
  Downloading gradio-5.12.0-py3-none-any.whl.metadata (16 kB)
Collecting aiofiles<24.0,>=22.0 (from gradio)
  Downloading aiofiles-23.2.1-py3-none-any.whl.metadata (9.7 kB)
Requirement already satisfied: anyio<5.0,>=3.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (3.7.1)
Collecting fastapi<1.0,>=0.115.2 (from gradio)
  Downloading fastapi-0.115.6-py3-none-any.whl.metadata (27 kB)
Collecting ffmpy (from gradio)
  Downloading ffmpy-0.5.0-py3-none-any.whl.metadata (3.0 kB)
Collecting gradio-client==1.5.4 (from gradio)
  Downloading gradio_client-1.5.4-py3-none-any.whl.metadata (7.1 kB)
Requirement already satisfied: httpx>=0.24.1 in /usr/local/lib/python3.10/dist-packages (from gradio) (0.28.1)
Requirement already satisfied: huggingface-hub>=0.25.1 in /usr/local/lib/python3.10/dist-packages (from gradio) (0.27.0)
Requirement already satisfied: jinja2<4.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (3.1.4)
Collecting markupsafe~=2.0 (from gradio)
  Downloading MarkupSafe-2.1.5-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (3.0 kB)
Requirement already satisfied: numpy<3.0,>=1.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (1.26.4)
Requirement already satisfied: orjson~=3.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (3.10.12)
Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-packages (from gradio) (24.2)
Requirement already satisfied: pandas<3.0,>=1.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (2.2.2)
Requirement already satisfied: pillow<12.0,>=8.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (11.0.0)
Requirement already satisfied: pydantic>=2.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (2.10.3)
Collecting pydub (from gradio)
  Downloading pydub-0.25.1-py2.py3-none-any.whl.metadata (1.4 kB)
Collecting python-multipart>=0.0.18 (from gradio)
  Downloading python_multipart-0.0.20-py3-none-any.whl.metadata (1.8 kB)
Requirement already satisfied: pyyaml<7.0,>=5.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (6.0.2)
Collecting ruff>=0.2.2 (from gradio)
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  Downloading ruff-0.9.1-py3-none-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (25 kB)
Collecting safehttpx<0.2.0,>=0.1.6 (from gradio)
  Downloading safehttpx-0.1.6-py3-none-any.whl.metadata (4.2 kB)
Collecting semantic-version~=2.0 (from gradio)
  Downloading semantic_version-2.10.0-py2.py3-none-any.whl.metadata (9.7 kB)
Collecting starlette<1.0,>=0.40.0 (from gradio)
  Downloading starlette-0.45.2-py3-none-any.whl.metadata (6.3 kB)
Collecting tomlkit<0.14.0,>=0.12.0 (from gradio)
  Downloading tomlkit-0.13.2-py3-none-any.whl.metadata (2.7 kB)
Requirement already satisfied: typer<1.0,>=0.12 in /usr/local/lib/python3.10/dist-packages (from gradio) (0.15.1)
Requirement already satisfied: typing-extensions~=4.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (4.12.2)
Collecting uvicorn>=0.14.0 (from gradio)
  Downloading uvicorn-0.34.0-py3-none-any.whl.metadata (6.5 kB)
Requirement already satisfied: fsspec in /usr/local/lib/python3.10/dist-packages (from gradio-client==1.5.4->gradio) (2024.10.0)
Requirement already satisfied: websockets<15.0,>=10.0 in /usr/local/lib/python3.10/dist-packages (from gradio-client==1.5.4->gradio) (
Requirement already satisfied: idna>=2.8 in /usr/local/lib/python3.10/dist-packages (from anyio<5.0,>=3.0->gradio) (3.10)
Requirement already satisfied: sniffio>=1.1 in /usr/local/lib/python3.10/dist-packages (from anyio<5.0,>=3.0->gradio) (1.3.1)
Requirement already satisfied: exceptiongroup in /usr/local/lib/python3.10/dist-packages (from anyio<5.0,>=3.0->gradio) (1.2.2)
Collecting starlette<1.0,>=0.40.0 (from gradio)
  Downloading starlette-0.41.3-py3-none-any.whl.metadata (6.0 kB)
Requirement already satisfied: certifi in /usr/local/lib/python3.10/dist-packages (from httpx>=0.24.1->gradio) (2024.12.14)
Requirement already satisfied: httpcore==1.* in /usr/local/lib/python3.10/dist-packages (from httpx>=0.24.1->gradio) (1.0.7)
Requirement already satisfied: h11<0.15,>=0.13 in /usr/local/lib/python3.10/dist-packages (from httpcore==1.*->httpx>=0.24.1->gradio)
Requirement already satisfied: filelock in /usr/local/lib/python3.10/dist-packages (from huggingface-hub>=0.25.1->gradio) (3.16.1)
Requirement already satisfied: requests in /usr/local/lib/python3.10/dist-packages (from huggingface-hub>=0.25.1->gradio) (2.32.3)
Requirement already satisfied: tqdm>=4.42.1 in /usr/local/lib/python3.10/dist-packages (from huggingface-hub>=0.25.1->gradio) (4.67.1)
Requirement already satisfied: python-dateutil>=2.8.2 in /usr/local/lib/python3.10/dist-packages (from pandas<3.0,>=1.0->gradio) (2.8
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas<3.0,>=1.0->gradio) (2024.2)
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.10/dist-packages (from pandas<3.0,>=1.0->gradio) (2024.2)
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import gradio as gr
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