



```
In [35]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from scipy.special import gamma # gamma function

from sklearn.tree import DecisionTreeClassifier, plot_tree
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
```

```
In [36]: df = pd.read_csv("/content/student_exam_data.csv")
df.head()
```

```
Out[36]:
```

	Study Hours	Previous Exam Score	Pass/Fail
0	4.370861	81.889703	0
1	9.556429	72.165782	1
2	7.587945	58.571657	0
3	6.387926	88.827701	1
4	2.404168	81.083870	0

```
In [37]: df['Pass/Fail'] = np.where(df['Study Hours'] < 2, 0, df['Pass/Fail'])
```

```
In [38]: # Transform features using gamma function
df['StudyHours_Gamma'] = df['Study Hours'].apply(lambda x: gamma(x+1)) # gamma
df['PrevScore_Gamma'] = df['Previous Exam Score'].apply(lambda x: gamma(x/10 + 1))

# Features and target
X = df[['StudyHours_Gamma', 'PrevScore_Gamma']]
y = df['Pass/Fail']
```

```
In [39]: X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.2, random_state=42
)
```

```
In [40]: DT = DecisionTreeClassifier(
    criterion='entropy',
    max_depth=4,
    random_state=42
)
DT.fit(X_train, y_train)
```

```
Out[40]:
```

▼ DecisionTreeClassifier ⓘ ?

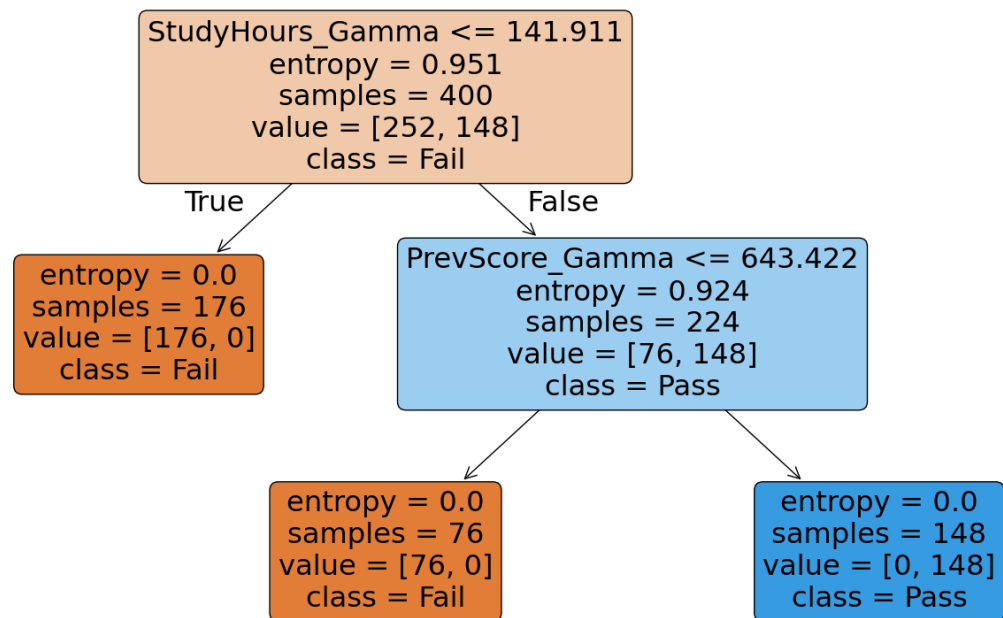
DecisionTreeClassifier(criterion='entropy', max_depth=4, random_state=42)

```
In [41]: y_pred = DT.predict(X_test)
```

```
accuracy = accuracy_score(y_test, y_pred)
print("Model Accuracy:", accuracy)
```

Model Accuracy: 0.99

```
In [42]: plt.figure(figsize=(18, 10))
plot_tree(
    DT,
    feature_names=['StudyHours_Gamma', 'PrevScore_Gamma'],
    class_names=['Fail', 'Pass'],
    filled=True,
    rounded=True
)
plt.show()
```



```
In [44]: import pickle
with open("Decision Tree.pkl", "wb") as f:
    pickle.dump(DT, f)
from google.colab import files
files.download('Decision Tree.pkl')
```