

## ✓ import Libraries

```
import pandas as pd
from sklearn.preprocessing import LabelEncoder
from sklearn.naive_bayes import CategoricalNB
from sklearn.metrics import accuracy_score
```

## ✓ Load Play Tennis dataset manually

```
# Play Tennis dataset
data = {
    'Outlook': ['Sunny', 'Sunny', 'Overcast', 'Rain', 'Rain', 'Rain',
               'Overcast', 'Sunny', 'Sunny', 'Rain', 'Sunny', 'Overcast',
               'Overcast', 'Rain'],
    'Temperature': ['Hot', 'Hot', 'Hot', 'Mild', 'Cool', 'Cool',
                   'Cool', 'Mild', 'Cool', 'Mild', 'Mild', 'Mild',
                   'Hot', 'Mild'],
    'Humidity': ['High', 'High', 'High', 'High', 'Normal', 'Normal',
                'Normal', 'High', 'Normal', 'Normal', 'Normal', 'High',
                'Normal', 'High'],
    'Wind': ['Weak', 'Strong', 'Weak', 'Weak', 'Weak', 'Strong',
            'Strong', 'Weak', 'Weak', 'Weak', 'Strong', 'Strong',
            'Weak', 'Strong'],
    'PlayTennis': ['No', 'No', 'Yes', 'Yes', 'Yes', 'No',
                  'Yes', 'No', 'Yes', 'Yes', 'Yes', 'Yes',
                  'Yes', 'No']
}

df = pd.DataFrame(data)
df
```



	Outlook	Temperature	Humidity	Wind	PlayTennis
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0	Sunny	Hot	High	Weak	No
1	Sunny	Hot	High	Strong	No
2	Overcast	Hot	High	Weak	Yes
3	Rain	Mild	High	Weak	Yes
4	Rain	Cool	Normal	Weak	Yes
5	Rain	Cool	Normal	Strong	No
6	Overcast	Cool	Normal	Strong	Yes
7	Sunny	Mild	High	Weak	No
8	Sunny	Cool	Normal	Weak	Yes
9	Rain	Mild	Normal	Weak	Yes
10	Sunny	Mild	Normal	Strong	Yes
11	Overcast	Mild	High	Strong	Yes
12	Overcast	Hot	Normal	Weak	Yes
13	Rain	Mild	High	Strong	No



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## ✓ Encode Categorical Features

```
# Encode features using LabelEncoder
encoders = {} # Dictionary to store encoder for each column

for col in df.columns:
    le = LabelEncoder()
```

```
df[col] = le.fit_transform(df[col])
encoders[col] = le # Save encoder for later use
```

```
df # Show encoded dataframe
```

	Outlook	Temperature	Humidity	Wind	PlayTennis	
0	2	1	0	1	0	
1	2	1	0	0	0	
2	0	1	0	1	1	
3	1	2	0	1	1	
4	1	0	1	1	1	
5	1	0	1	0	0	
6	0	0	1	0	1	
7	2	2	0	1	0	
8	2	0	1	1	1	
9	1	2	1	1	1	
10	2	2	1	0	1	
11	0	2	0	0	1	
12	0	1	1	1	1	
13	1	2	0	0	0	

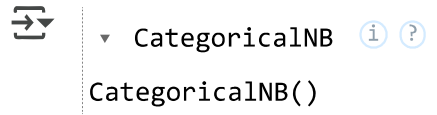
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## ✓ Train Naive Bayes Model

```
# Split into features and target
X = df.drop('PlayTennis', axis=1)
y = df['PlayTennis']
```

```
# Train Naive Bayes classifier
model = CategoricalNB()
model.fit(X, y)
```





## ✓ Make Predictions & Evaluate

```
# Predict on training data
y_pred = model.predict(X)

# Accuracy
accuracy = accuracy_score(y, y_pred)
print(f"Accuracy on training data: {accuracy * 100:.2f}%")

# Show predictions
pd.DataFrame({'Actual': y, 'Predicted': y_pred})
```

⇒ Accuracy on training data: 92.86%

	Actual	Predicted	
0	0	0	
1	0	0	
2	1	1	
3	1	1	
4	1	1	
5	0	1	
6	1	1	
7	0	0	
8	1	1	
9	1	1	
10	1	1	
11	1	1	
12	1	1	
13	0	0	

## ✓ Predict a New Sample

```
# New sample: Outlook=Sunny, Temperature=Cool, Humidity=High, Wind=Strong
sample = pd.DataFrame([['Sunny', 'Cool', 'High', 'Strong']],
                      columns=['Outlook', 'Temperature', 'Humidity', 'Wind'])
```

```
# Encode the sample using saved encoders
for col in sample.columns:
    sample[col] = encoders[col].transform(sample[col].astype(str))
```

```
# Predict the encoded sample
pred_encoded = model.predict(sample)[0]

# Decode prediction back to original label
pred_label = encoders['PlayTennis'].inverse_transform([pred_encoded])[0]

print("Predicted Class:", pred_label)
```

 Predicted Class: No

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