INCOME DATASET

```
import pandas as pd
df=pd.read_csv("/content/income.csv")
df.head()
```

	age	fnlwgt	education_num	capital_gain	capital_loss	hours_per_week	income_level
0	39	77516	13	2174	0	40	0
1	50	83311	13	0	0	13	0
2	38	215646	9	0	0	40	0
3	53	234721	7	0	0	40	0
4	28	338409	13	0	0	40	0

```
from sklearn.model_selection import train_test_split
from sklearn.ensemble import AdaBoostClassifier
from sklearn.metrics import accuracy_score, confusion_matrix
import seaborn as sns
import matplotlib.pyplot as plt
```

```
X = df.drop('income_level', axis=1)
y = df['income_level']

# Split the dataset into training and testing sets (70% training, 30% testing)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)

# 1. Build AdaBoost Classifier with default n_estimators (10)
ada_default = AdaBoostClassifier(n_estimators=10, random_state=42)
ada_default.fit(X_train, y_train)
```

```
AdaBoostClassifier
AdaBoostClassifier(n_estimators=10, random_state=42)
```

```
y_pred_default = ada_default.predict(X_test)
accuracy_default = accuracy_score(y_test, y_pred_default)

print(f"Accuracy with default n_estimators (10): {accuracy_default:.4f}")
```

```
Accuracy with default n_estimators (10): 0.8277
```

```
best_accuracy = 0
best_n_estimators = 10

for n in range(10, 201, 10):
    ada_tuned = AdaBoostClassifier(n_estimators=n, random_state=42)
    ada_tuned.fit(X_train, y_train)

    # Predict and calculate accuracy
    y_pred_tuned = ada_tuned.predict(X_test)
    accuracy_tuned = accuracy_score(y_test, y_pred_tuned)

    # Track the best accuracy and corresponding n_estimators
    if accuracy_tuned > best_accuracy:
        best_accuracy = accuracy_tuned
        best_n_estimators = n

print(f"Best accuracy: {best_accuracy:.4f} with n_estimators = {best_n_estimators}")
```

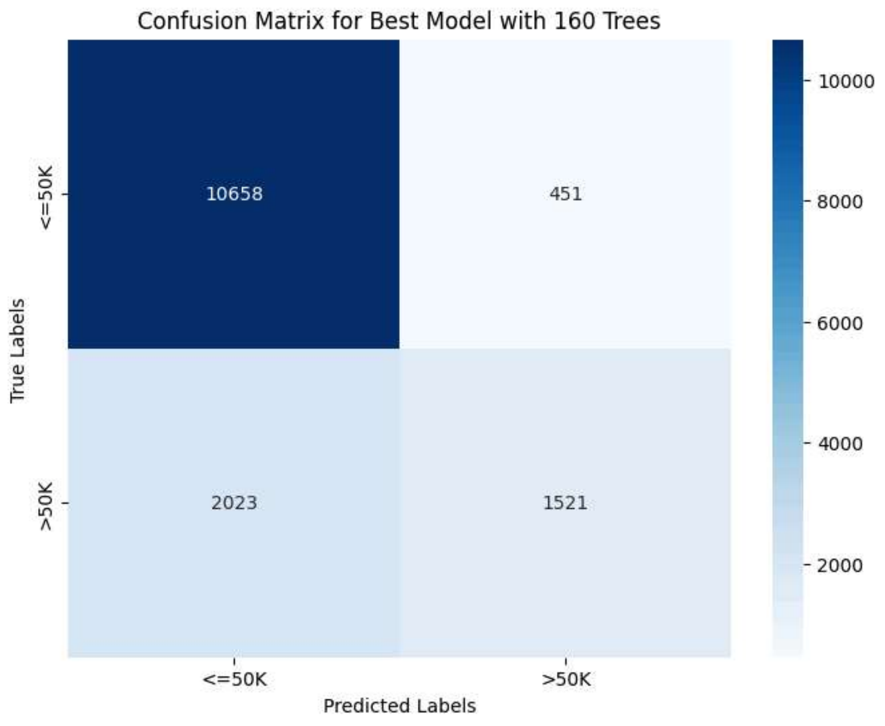
```
Best accuracy: 0.8312 with n_estimators = 160
```

```
ada_best = AdaBoostClassifier(n_estimators=best_n_estimators, random_state=42)
ada_best.fit(X_train, y_train)

y_pred_best = ada_best.predict(X_test)

cm = confusion_matrix(y_test, y_pred_best)
```

```
# Plot confusion matrix
plt.figure(figsize=(8, 6))
sns.heatmap(cm, annot=True, fmt='d', cmap='Blues', xticklabels=['<=50K', '>50K'],
            yticklabels=['<=50K', '>50K'])
plt.title(f"Confusion Matrix for Best Model with {best_n_estimators} Trees")
plt.xlabel('Predicted Labels')
plt.ylabel('True Labels')
plt.show()
```



Start coding or generate with AI.