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import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from \ sklearn.tree \ import \ Decision Tree Classifier
from sklearn.ensemble import RandomForestClassifier
# Step 1: Load the dataset
url = "https://raw.githubusercontent.com/jbrownlee/Datasets/master/pima-indians-diabetes.data.csv"
columns = ["Pregnancies", "Glucose", "BloodPressure", "SkinThickness", "Insulin",
            "BMI", "DiabetesPedigreeFunction", "Age", "Outcome"]
df = pd.read_csv(url, names=columns)
# Step 2: Features and Target
X = df.drop("Outcome", axis=1)
y = df["Outcome"]
# Step 3: Train/Test split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
# Step 4: Train Decision Tree
dt_clf = DecisionTreeClassifier(criterion='entropy', max_depth=3, random_state=42)
{\tt dt\_clf.fit(X\_train,\ y\_train)}
# Step 5: Train Random Forest
rf_clf = RandomForestClassifier(n_estimators=100, random_state=42)
rf_clf.fit(X_train, y_train)
# Step 6: Compare Accuracy
\label{lem:print}  \text{print}(\texttt{"Decision Tree - Training Accuracy:", dt\_clf.score}(X\_train, y\_train)) \\
print("Decision Tree - Testing Accuracy:", dt_clf.score(X_test, y_test))
\verb|print("Random Forest - Training Accuracy:", rf_clf.score(X_train, y_train))| \\
print("Random Forest - Testing Accuracy:", rf_clf.score(X_test, y_test))
# Step 7: Feature Importance from Random Forest
importances = rf_clf.feature_importances_
feat_importance = pd.Series(importances, index=X.columns).sort_values(ascending=False)
# Step 8: Plot Feature Importance
plt.figure(figsize=(8, 5))
feat_importance.plot(kind='bar', color="skyblue")
plt.title("Feature Importance - Random Forest")
plt.ylabel("Importance Score")
plt.tight_layout()
plt.show()
→ Decision Tree - Training Accuracy: 0.7752442996742671
     Decision Tree - Testing Accuracy: 0.7662337662337663
Random Forest - Training Accuracy: 1.0
     Random Forest - Testing Accuracy: 0.7207792207792207
                                           Feature Importance - Random Forest
         0.25
```

