classifying-irises

February 13, 2025

[1]:
```
from sklearn.datasets import load_iris
```

[2]:
```
X, y = load_iris(as_frame=True, return_X_y=True)
```

Scale the features as we did with the hierarchical clustering demo

[3]:
```
from sklearn.preprocessing import StandardScaler
```

[4]:
```
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)
X_scaled
```

[4]:
```
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```

Build our decision tree model for the purposes of extracting the feature importances which we can use to update the feature weighting in the hierarchical clustering demo

[5]:
```
from sklearn.model_selection import train_test_split
```

[6]:
```
X_train, X_test, y_train, y_test = train_test_split(
    X_scaled,
    y,
```

```
    test_size=0.3,
    random_state=42)
```

[7]:
```
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
```

Tree-based classifiers like DecisionTreeClassifier and RandomForestClassifier give us weights indicating how important each feature is using feature_importances_

[8]:
```
#clf = DecisionTreeClassifier()
clf = RandomForestClassifier()

clf = clf.fit(X_train, y_train)
```

[9]:
```
y_pred = clf.predict(X_test)
y_pred
```

[9]:
```
array([1, 0, 2, 1, 1, 0, 1, 2, 1, 1, 2, 0, 0, 0, 0, 1, 2, 1, 1, 2, 0, 2,
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       0])
```

[10]:
```
from sklearn.metrics import accuracy_score
```

Test that our model is actually working

[11]:
```
accuracy_score(y_test, y_pred)
```

[11]:
```
1.0
```

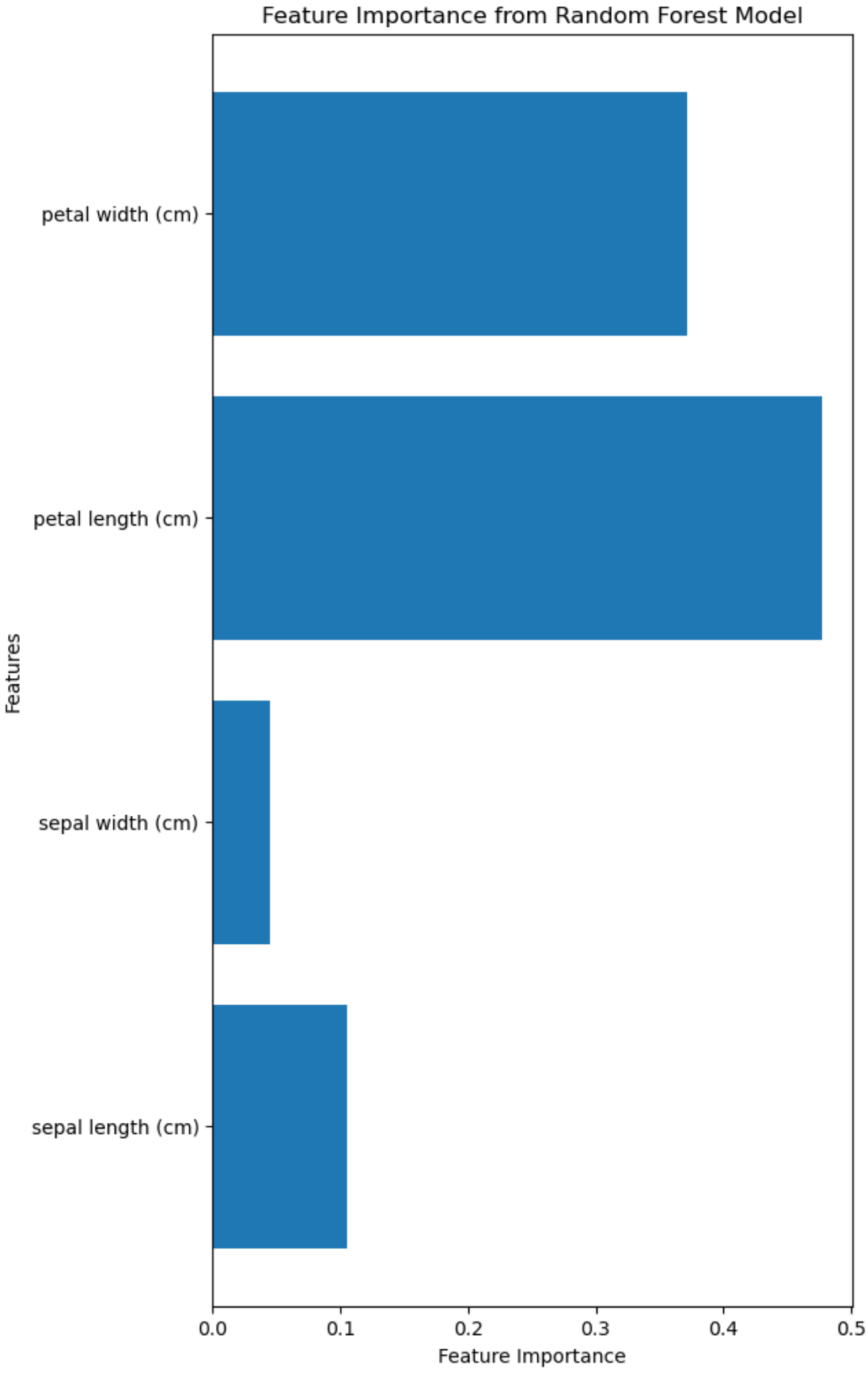
Get our feature importances and graph them for comparison

[12]:
```
clf.feature_importances_
```

[12]:
```
array([0.10587484, 0.04496103, 0.47740956, 0.37175456])
```

[13]:
```
import matplotlib.pyplot as plt
```

[14]:
```
plt.figure(figsize=(6, 12))
plt.barh(X.columns, clf.feature_importances_)
plt.xlabel('Feature Importance')
plt.ylabel('Features')
plt.title('Feature Importance from Random Forest Model')
plt.show()
```


Feature Importance from Random Forest Model
petal width (cm)
petal length (cm)
sepal width (cm)
sepal length (cm)
Features
0.0
0.1
0.2
0.3
0.4
0.5
Feature Importance

We can scale these so that the maximum value is 1, making it easier to compare their relative importance

[15]:
```
clf.feature_importances_ / max(clf.feature_importances_)
```

[15]:
```
array([0.22176942, 0.09417707, 1.        , 0.77869107])
```