Logistic Regression

In [19]:

```
from sklearn.datasets import load_iris
from sklearn.linear_model import LogisticRegression
X, y = load_iris(return_X_y=True)
clf = LogisticRegression(random_state=0).fit(X, y)
clf.predict(X[:2, :])

clf.predict_proba(X[:2, :])


clf.score(X, y)
```

```
C:\Users\ASUS\anaconda3\lib\site-packages\sklearn\linear_model\_logisti
c.py:940: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown
in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-
regression
  extra_warning_msg=_LOGISTIC_SOLVER_CONVERGENCE_MSG)
```

Out[19]:

```
0.9733333333333334
```

In [23]:

```
from sklearn.datasets import load_iris
from sklearn.svm import LinearSVC
from sklearn.linear_model import LogisticRegression
from sklearn.preprocessing import StandardScaler
from sklearn.pipeline import make_pipeline
from sklearn.ensemble import StackingClassifier
from sklearn.model_selection import train_test_split
```

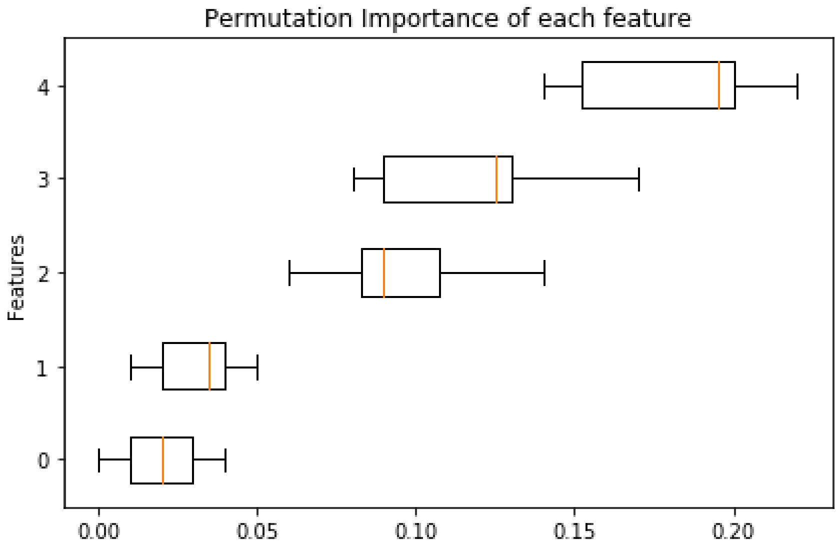
```
X, y = load_iris(return_X_y=True)
estimators = [
    ('rf', RandomForestClassifier(n_estimators=10, random_state=42)),
    ('svr', make_pipeline(StandardScaler(),
                          LinearSVC(random_state=42)))
]
clf = StackingClassifier(
    estimators=estimators, final_estimator=LogisticRegression()
)
X_train, X_test, y_train, y_test = train_test_split(
    X, y, stratify=y, random_state=42
)
clf.fit(X_train, y_train).score(X_test, y_test)
```

Out[23]:

```
0.9473684210526315
```

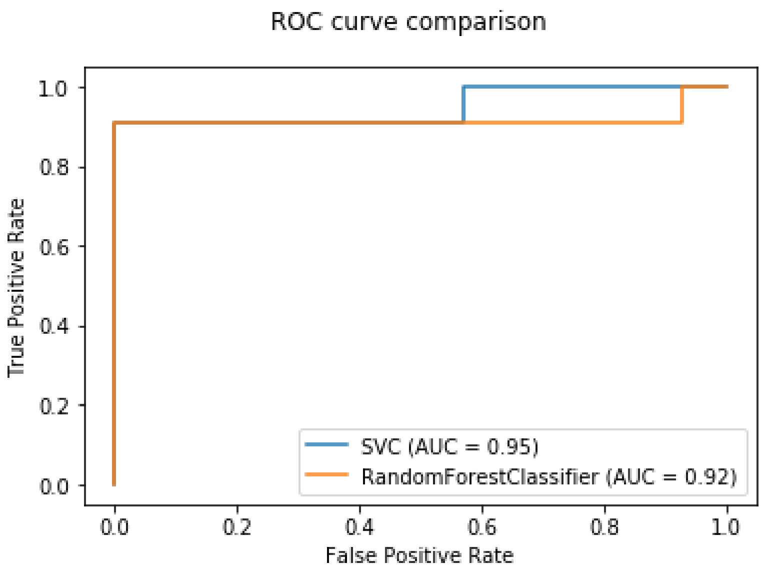
In [24]:

```
from sklearn.ensemble import RandomForestClassifier
from sklearn.inspection import permutation_importance

X, y = make_classification(random_state=0, n_features=5, n_informative=
3)
rf = RandomForestClassifier(random_state=0).fit(X, y)
result = permutation_importance(rf, X, y, n_repeats=10, random_state=0,
                                n_jobs=-1)

fig, ax = plt.subplots()
sorted_idx = result.importances_mean.argsort()
ax.boxplot(result.importances[sorted_idx].T,
           vert=False, labels=range(X.shape[1]))
ax.set_title("Permutation Importance of each feature")
ax.set_ylabel("Features")
fig.tight_layout()
plt.show()
```



In [18]:

```
from sklearn.svm import SVC
from sklearn.metrics import plot_roc_curve
from sklearn.ensemble import RandomForestClassifier
from sklearn.datasets import make_classification
import matplotlib.pyplot as plt

X, y = make_classification(random_state=0)
X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=
42)

svc = SVC(random_state=42)
svc.fit(X_train, y_train)
rfc = RandomForestClassifier(random_state=42)
rfc.fit(X_train, y_train)

svc_disp = plot_roc_curve(svc, X_test, y_test)
rfc_disp = plot_roc_curve(rfc, X_test, y_test, ax=svc_disp.ax_)
rfc_disp.figure_.suptitle("ROC curve comparison")

plt.show()
```



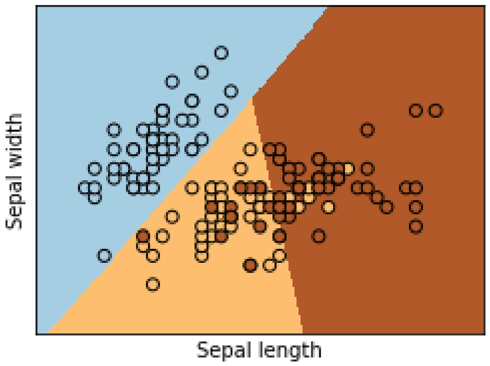
Logistic Regression 3-class Classifier

In [4]:

```
print(__doc__)

# Code source: Gaël Varoquaux
# Modified for documentation by Jaques Grobler
# License: BSD 3 clause

import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import LogisticRegression
from sklearn import datasets

# import some data to play with
iris = datasets.load_iris()
X = iris.data[:, :2]  # we only take the first two features.
Y = iris.target

logreg = LogisticRegression(C=1e5)
```

```
# Create an instance of Logistic Regression Classifier and fit the dat
a.
logreg.fit(X, Y)

# Plot the decision boundary. For that, we will assign a color to each
# point in the mesh [x_min, x_max]x[y_min, y_max].
x_min, x_max = X[:, 0].min() - .5, X[:, 0].max() + .5
y_min, y_max = X[:, 1].min() - .5, X[:, 1].max() + .5
h = .02  # step size in the mesh
xx, yy = np.meshgrid(np.arange(x_min, x_max, h), np.arange(y_min, y_max
, h))
Z = logreg.predict(np.c_[xx.ravel(), yy.ravel()])

# Put the result into a color plot
Z = Z.reshape(xx.shape)
plt.figure(1, figsize=(4, 3))
plt.pcolormesh(xx, yy, Z, cmap=plt.cm.Paired)

# Plot also the training points
plt.scatter(X[:, 0], X[:, 1], c=Y, edgecolors='k', cmap=plt.cm.Paired)
plt.xlabel('Sepal length')
plt.ylabel('Sepal width')

plt.xlim(xx.min(), xx.max())
plt.ylim(yy.min(), yy.max())
plt.xticks(())
plt.yticks(())

plt.show()
```

```
Automatically created module for IPython interactive environment
```


Sepal width
Sepal length