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ECHOCARDIOGRAM:

An echocardiogram is a non-invasive medical test that uses sound waves to produce detailed images of the heart. It is commonly used to evaluate the structure and function of the heart and its valves. The procedure is also known as an echo test or cardiac ultrasound.

During an echocardiogram, a technician or a doctor called a cardiologist will apply a gel to the patient's chest and use a device called a transducer to capture sound waves as they bounce off different parts of the heart. The transducer emits high-frequency sound waves and receives the echoes that return after bouncing off the heart's structures.

The echoes are then processed by a computer to create real-time images of the heart, which can be viewed on a monitor. The test can provide information about the size, shape, and movement of the heart chambers, the thickness and function of the heart muscles, the condition of the heart valves, and the blood flow through the heart.

There are different types of echocardiograms, including:

1. Transthoracic echocardiogram (TTE): This is the most common type of echocardiogram. It is performed by placing the transducer on the chest wall to obtain images of the heart through the chest.
2. Transesophageal echocardiogram (TEE): In this test, a specialized transducer is passed through the mouth and into the esophagus to get closer and more detailed images of the heart. It is often used when clearer images are needed, such as when evaluating the heart valves or detecting blood clots.
3. Stress echocardiogram: This test combines an echocardiogram with exercise or medications that stimulate the heart to beat faster. It is used to evaluate how the heart responds to stress and can help diagnose coronary artery disease or assess the effectiveness of heart treatments.
4. Doppler echocardiogram: This type of echocardiogram measures the speed and direction of blood flow within the heart. It can detect abnormal blood flow patterns, such as those caused by valve problems or congenital heart defects.

Echocardiograms are safe and painless procedures that typically take around 30 minutes to complete. They are widely used in diagnosing various heart conditions, including heart valve disorders, heart failure, congenital heart defects, and cardiomyopathies. The test provides valuable information for doctors to make accurate diagnoses, monitor treatment progress, and guide further management of heart conditions.

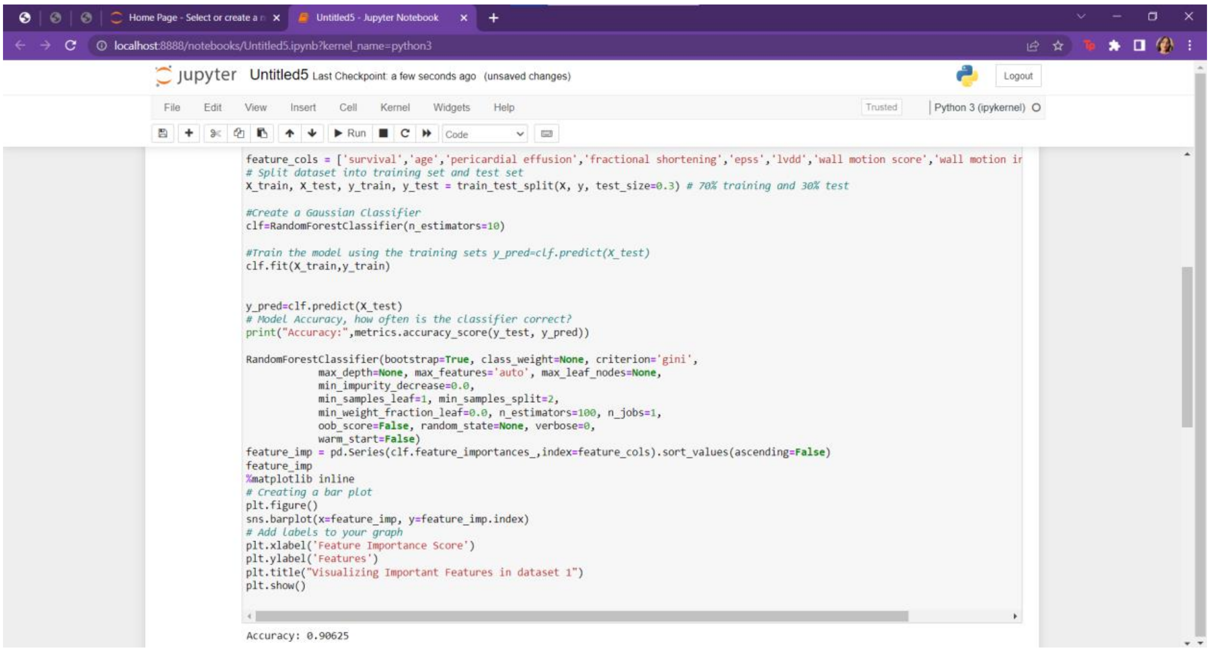
CODE:

```
# Load libraries

import pandas as pd

from sklearn.model_selection import train_test_split

from pandas.plotting import scatter_matrix

import matplotlib.pyplot as plt
```

```
from sklearn import model_selection

from sklearn import metrics

from sklearn.metrics import classification_report

from sklearn.metrics import confusion_matrix

from sklearn.metrics import accuracy_score

from sklearn.ensemble import RandomForestClassifier

from sklearn.tree import DecisionTreeClassifier

import matplotlib.pyplot as plt

import seaborn as sns


heart = pd.read_csv('C:/Users/hp/Desktop/echocardiogram.csv')

# Split-out validation dataset

array = heart.values

X = array[:,0:8]

y = array[:,8]

feature_cols = ['survival','age','pericardial effusion','fractional shortening','epss','lvdd','wall motion
score','wall motion index','still alive']

# Split dataset into training set and test set

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3) # 70% training and 30% test


#Create a Gaussian Classifier

clf=RandomForestClassifier(n_estimators=10)


#Train the model using the training sets y_pred=clf.predict(X_test)

clf.fit(X_train,y_train)

y_pred=clf.predict(X_test)

# Model Accuracy, how often is the classifier correct?

print("Accuracy:",metrics.accuracy_score(y_test, y_pred))


RandomForestClassifier(bootstrap=True, class_weight=None, criterion='gini',

            max_depth=None, max_features='auto', max_leaf_nodes=None,
```

```
        min_impurity_decrease=0.0, min_impurity_split=None,
        min_samples_leaf=1, min_samples_split=2,
        min_weight_fraction_leaf=0.0, n_estimators=100, n_jobs=1,
        oob_score=False, random_state=None, verbose=0,
        warm_start=False)
feature_imp = pd.Series(clf.feature_importances_,index=feature_cols).sort_values(ascending=False)
feature_imp
%matplotlib inline
# Creating a bar plot
plt.figure()
sns.barplot(x=feature_imp, y=feature_imp.index)
# Add labels to your graph
plt.xlabel('Feature Importance Score')
plt.ylabel('Features')
plt.title("Visualizing Important Features in dataset 1")
plt.show()
```

OUTPUT:



Attribute Information:

1. survival -- the number of months patient survived (has survived, if patient is still alive). Because all the patients had their heart attacks at different times, it is possible that some patients have survived less than one year but they are still alive. Check the second variable to confirm this. Such patients cannot be used for the prediction task mentioned above.

2. still-alive -- a binary variable. 0=dead at end of survival period, 1 means still alive

3. age-at-heart-attack -- age in years when heart attack occurred

4. pericardial-effusion -- binary. Pericardial effusion is fluid around the heart. 0=no fluid, 1=fluid

5. fractional-shortening -- a measure of contracility around the heart lower numbers are increasingly abnormal

6. epss -- E-point septal separation, another measure of contractility. Larger numbers are increasingly abnormal.

7. lvdd -- left ventricular end-diastolic dimension. This is a measure of the size of the heart at end-diastole. Large hearts tend to be sick hearts.

8. wall-motion-score -- a measure of how the segments of the left ventricle are moving

9. wall-motion-index -- equals wall-motion-score divided by number of segments seen. Usually 12-13 segments are seen in an echocardiogram. Use this variable INSTEAD of the wall motion score.

10. mult -- a derivate var which can be ignored

11. name -- the name of the patient (I have replaced them with "name")

12. group -- meaningless, ignore it

13. alive-at-1 -- Boolean-valued. Derived from the first two attributes. 0 means patient was either dead after 1 year or had been followed for less than 1 year. 1 means patient was alive at 1 year.

Accuracy gained is 90.6%

Data used is echocardiogram: This dataset is used for classifying if patients will survive for at least one year after a heart attack

Reference: https://archive.ics.uci.edu/ml/datasets/echocardiogram

THE END