VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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ML Lab Report

Submitted by

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In

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Date :

Lab1

COMPLETE UPLOAD OF READING OF CSV FILE.

```
import pandas as pd
url = "https://archive.ics.uci.edu/ml/
      machine-learning-databases/iris/iris.data"
col_names = ["sepal_length_in_cm",
  "sepal_width_in_cm", "petal_length_in_cm",
  "petal_width_in_cm", "class"]
iris_data = pd.read_csv(url, names =
                        col_names)
print (iris_data.head())
```

OUTPUT-

sepal_length_in_cm	sepal_width_in_cm	...	petal_width_in_cm	class
5.1	3.5		0.2	Iris_setosa

21/3/24

Date :

Lab-2

Housing Dataset

End End Machine Learning Project

1) We frame the problem, use median & RMSE regression model.

2) Getting the data-
Download-Root holds URL of housing data
Housing-Path is used to join "data" & "01" directories.
Housing-URL has it combined.
OS mandirs for creating a directory.
Extract the files using tarfile.open()
.extractall()

3) imports required-
os for joining paths
tarfile for opening tarfiles
urllib for downloading data
matplotlib.pyplot for plotting data

4) load-dataframe-
pd.read-csv(data-path) to create a dataframe.

Date : _____

5) Create Test-data:

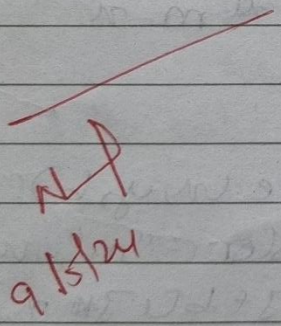
np.random.permutations() ⇒ generates random numbers.

test_size ⇒ store the % of data in test_size

indices[: test_set_size] ⇒ first set.

indices[test_set_size:] ⇒ second set

use a seed to get the same data always or store in a file.



9/5/24

Date :

Python Implementation of Linear Regression

```
import numpy as np
import matplotlib.pyplot as plt

def estimate_coeff(x, y):
    n = np.size(x)
    m_x = np.mean(x)
    m_y = np.mean(y)
    SS_xy = np.sum(y*x) - n*m_y*m_x
    SS_xx = np.sum(x*x) - n*m_x*m_x
    b_1 = SS_xy / SS_xx
    b_0 = m_y - b_1*m_x
    return (b_0, b_1)

def plot_regression_line(x, y, b):
    plt.scatter(x, y, color = "m", marker = "o",
                y_pred = b[0] + b[1]*x, s = 30)
    plt.plot(x, y_pred, color = "g")
    plt.xlabel('x')
    plt.ylabel('y')

def main():
    x = np.array([0,1,2,...,9])
    y = np.array([1,3,2,...12])
```

Date :

```
b = estimate_coef(x,y)
print(b)
plot_regression_line(x,y,b)
```

output:

(b_0, b_1) = (1.2363..., 1.16969...)

→ Multiple Linear Regression:

```
from sklearn.model_selection import
    train_test_split
    import matplotlib.pyplot
    import numpy as np
from sklearn import datasets, linear_model,
        metrics
data_url = "http://lib.stat.cmu.edu/datasets
                    /boston"
raw_dt = pd.read_csv(data_url, sep="\s+",
                skiprows=22, header=none)
x = np.hstack([raw_df.values[::2, :],
        raw_df.values[1::2, :2]])
y = rawdf.values[1::2, 2]
x_train, x_test, y_train, y_test = train_test_
        split(x, y, test_size=0.4, random_state=1)
reg = linear_model.LinearRegression()
reg.fit(x_train, y_train)
```

Date :

```
print ("coefficient:", reg.coeff)
print ("variance score: {}".format
        (reg.score(x_test, y_test)))
plt.style.use('fivethirtyeight')
plt.scatter (reg.predict(x_train),
  reg.predict(x_train)-y_train,
   color="green", s=10, label="Train Data")
plt.scatter (reg.predict(x_test),
   reg.predict(x_test)- y_test,
   color="blue", s=10, label="Test data")
plt.hlines (y=0, xmin=0, xmax=50,
            linewidth=2)
plt.legend (loc="upper right")
plt.title ("residual errors")
plt.show()
```

Date :

Decision Trees (ID3)

```
import numpy as np
import pandas as pd
df = pd.read_csv('url')
df.head()
df.info()
df.describe()
def find_entropy(df):
    target = df.keys()[-1]
    entropy = 0
    values = df[target].unique()
    for value in values:
        fraction = df[target].value_counts()
                   [value] / len(df[target])
        entropy += fraction * np.log2(fraction)
    return entropy
def BuildTree(df, tree=None):
    target = df.keys()[-1]
    node = find_winner(df)
    att = np.unique(df[node])
if tree is None:
    tree = {}
    tree[node] = {}
for value in att:
    sub = get_subtable(df, node, value)
    dValue, counts = np.unique(subtable
                     [target], return_counts=True)
```

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```
        if len(counts) == 1:
            tree[node][value] = value[0]
        else:
            tree[node][value] = buildTree(subtable)
    return tree
tree = buildTree(df)
import pprint
pprint.print(tree)
```

Decision tree (sklearn):-

```
import pandas as pd
import numpy as np
import sklearn.model_selection import
                                DecisionTree
from sklearn.tree import plot_tree.
df = pd.read_csv('url')
df.head()
df.info()
df.isnull().sum()
cols = df.columns[0:-1]
for i in cols:
    sns.boxplot(y=df[i])
    plt.show()
x = df.drop('species', axis=1)
y = df['species']
```

Date : _____

```
x_train, x_test, y_train =
        train_test_split(x, y, test_size=0.3)
dt = DecisionTreeClassifier(max_depth=3)
dt.fit(x,y)
y_pred_train = dt.predict(x_train)
y_pred = dt.predict(x_test)
accuracy = score(y_pred, y_test)
```

NL
9/5/24

Date :

Logistic Regression

```
import pandas as pd
from matplotlib import pyplot as plt

file = "insurance.csv"
df = pd.read_csv(file)
from sklearn.linear_model import
Logistic Regression
model = Logistic Regression()
model.fit(x_train, y_train)
print(x_test)

y_predicted = model.predict(x_test)
print(y_predicted)
```

o/p: Age: 22
probability: 0.1059

Date :

KNN

```
import pandas as pd
from sklearn.datasets import load_iris
iris = load_iris()

df = pd.DataFrame(iris.data, columns=
                  iris.feature_names)
df['target'] = iris.target
df['flower_name'] = df.target.apply
        (lamda x: iris.target_name
                  (x))

from sklearn.model_selection import
                  train_test_split
x = df.drop(['target', 'flower_name'],
        axis = 'columns')
y = df.target

x_train, x_test, y_train, y_test =
        train_test_split(x, y, test_size=0.2)
from sklearn.neighbours import
        KNeighboursClassifier(
        KNN = KNNeighbors_Classifier(
                n_neighbours=10)
        knn.fit(x_train, y_train)
```

Date :

```
knn.score(x_test, y_test)
0.966

knn.predict([[4.8, 3.0, 1.5, 0.3]])
```

5

o/p: 0 (setosa)

10

15

20

25

Date :

K-means Implementation

```
import pandas as pd
data = pd.read_csv("iris.csv")
data.head()

import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.datasets import load_iris
from sklearn.cluster import KMeans

x, y = load_iris(return_x_y = True)

kmeans = KMeans(n_clusters = 3,
                random_state = 2)
kmeans.fit(x)

pred = kMeans.fit_predict(x)
pred
```

Date :

SVM

```
from sklearn.datasets import
                    load_breast_cancer
import matplotlib.pyplot as plt
from sklearn.inspection import
                    DecisionBoundaryDisplay
from sklearn.svm import SVC

cancer = load_breast_cancer()
X = cancer.data[:, :2]
y = cancer.target

svm = SVC(kernel="rbf", gamma=0.5, C=1.0)
svm.fit(X, y)

DecisionBoundaryDisplay.from_estimator(
        svm,
        X,
        response_method="predict",
        cmap= plt.cm.Spectral,
        alpha=0.8,
        xlabel = cancer.feature_names[0],
        ylabel = cancer.feature_names[1])
plt.scatter(X[:,0], X[:, 1], c=y, s=20,
                    edgecolors = 'k')
plt.show()
```

Date : _____

PCA

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
from sklearn.decomposition import PCA
from sklearn.preprocessing import
                                standardScaler
from sklearn.datasets import
                        load_breast_cancer
data = load_breast_cancer()
data.keys()
print(data['feature_names'])
df1 = pd.DataFrame(data['data'],
columns = data['feature_names'])
scaling = standardScaler()
scaling.fit(df1)
scaled_data = scaling.transform(df1)
principal = PCA(n_components = 3)
principal.fit(scaled_data)
x = principal.transform(scaled_data)
plt.figure(figsize=(10,10))
plt.scatter(x[:,0], x[:,1], c=['target'],
                                cmap='plasma')
plt.xlabel('pc1')
plt.ylabel('pc2')
```

Date :

Random Forest Ensemble & Ada Boost

```
from sklearn.datasets import make_moons
                              ada boost
from sklearn.metrics import accuracy_
                              score
from sklearn.model_selection import
                              train_test_split
from sklearn.tree import DecisionTree
                              classifier
from sklearn.ensemble import RandomForest
                              Classifier,
                              AdaBoostClassifier

X,y = make_moons(n_examples=10000,
      noise=0.5, random_state=0)
x_train, x_test, y_train, y_test =
        train_test_split
    (X,y, test_size=0.2, random_state=42)
clf = RandomForestClassifier(n_estimators=100,
    max_features="auto", random_state=0)
clf.fit(x_train, y_train)
y_pred = clf.predict(x_test)
accuracy_score(y_test, y_pred)
```

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O/P: 0.7965

Date : _____

AdaBoost:

```
clf = AdaboostClassifier(n_estimators=100)
clf.fit(x_train, y_train)
y_pred = clf.predict(x_test)
accuracy_score(y_test, y_pred)
```

o/p: 0.8393