Perceptron2

September 27, 2023

Deep Learning Fundamentals

Trimester 3, 2023

Assignment - 1

Predict diabetes using Perceptron

Loading Libraries

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import accuracy_score, classification_report,␣
 ↪confusion_matrix
```

Loading Dataset

[2]:
```
DataFrame_DLF = pd.read_csv('diabetes.csv')
DataFrame_DLF.head()
```

[2]:

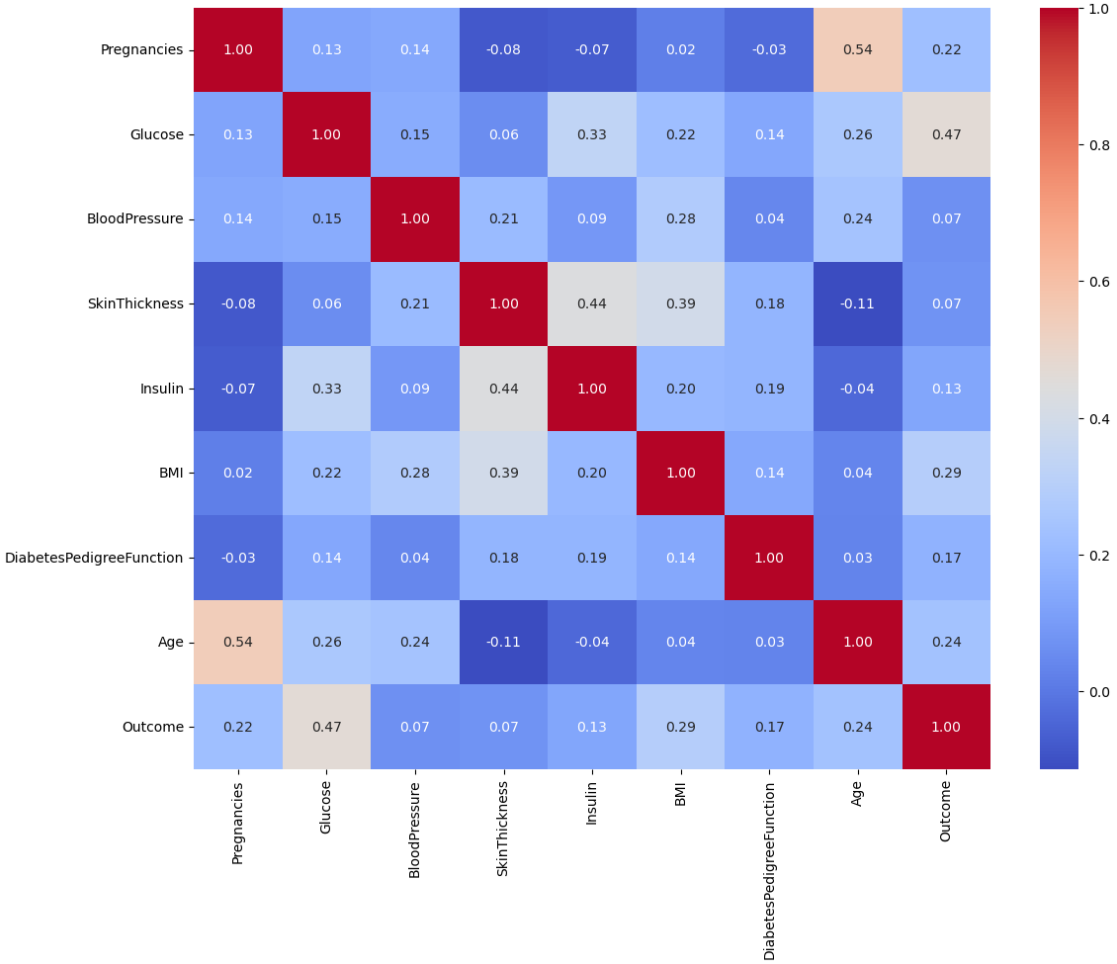
	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	\
0	6	148	72	35	0	33.6	
1	1	85	66	29	0	26.6	
2	8	183	64	0	0	23.3	
3	1	89	66	23	94	28.1	
4	0	137	40	35	168	43.1	

	DiabetesPedigreeFunction	Age	Outcome
0	0.627	50	1
1	0.351	31	0
2	0.672	32	1
3	0.167	21	0
4	2.288	33	1

Choosing Important Features

[3]:
```
plt.figure(figsize=(13,10))
sns.heatmap(DataFrame_DLF.corr(),annot=True, fmt = ".2f", cmap = "coolwarm")
```

[3]: <Axes: >



Checking For Any Missing Value

[4]:
```
DataFrame_DLF.isnull().sum()
```

[4]:
```
Pregnancies                 0
Glucose                     0
BloodPressure               0
SkinThickness               0
Insulin                     0
BMI                         0
DiabetesPedigreeFunction    0
Age                         0
```

```
Outcome                       0
dtype: int64
```

Data Splitting and Pre-processing

[5]:
```
Important_DLF = DataFrame_DLF.loc[:, ['Pregnancies', 'Glucose', 'BMI', 'Age']].
 ↪values
Outcomes_DLF = DataFrame_DLF.iloc[:, -1].values

Important_DLF_train, Important_DLF_test, Outcomes_DLF_train, Outcomes_DLF_test␣
 ↪= train_test_split(Important_DLF, Outcomes_DLF, test_size=0.25,␣
 ↪random_state=104)
sc = StandardScaler()
Important_DLF_train = sc.fit_transform(Important_DLF_train)
Important_DLF_test = sc.transform(Important_DLF_test)
```

Defining Perceptron Algorithm

[6]:
```
class PerceptronAlgorithm:
    def __init__(self, learning_rate_dlf, num_epochs_dlf, num_features_dlf):
        self.learning_rate_dlf = learning_rate_dlf
        self.num_epochs_dlf = num_epochs_dlf
        self.num_features_dlf = num_features_dlf

    def fit(self, Important_DLF, Outcomes_DLF):
        self.weights_dlf = np.zeros(self.num_features_dlf)
        self.bias_dlf = 0

        for epoch_dlf in range(self.num_epochs_dlf):
            for i in range(Important_DLF.shape[0]):
                Outcomes_DLF_pred = np.dot(Important_DLF[i], self.weights_dlf)␣
 ↪+ self.bias_dlf

                if Outcomes_DLF_pred >= 0:
                    update = self.learning_rate_dlf * (Outcomes_DLF[i] - 1)
                else:
                    update = self.learning_rate_dlf * Outcomes_DLF[i]

                self.weights_dlf += update * Important_DLF[i]
                self.bias_dlf += update

    def predict(self, Important_DLF):
        Outcomes_DLF_pred = np.dot(Important_DLF, self.weights_dlf) + self.
 ↪bias_dlf
        return np.where(Outcomes_DLF_pred >= 0, 1, 0)
```

Evaluating Model

[31]:
```
DLF_obj = PerceptronAlgorithm(learning_rate_dlf=0.01, num_epochs_dlf=50,␣
↪num_features_dlf=Important_DLF_train.shape[1])

DLF_obj.fit(Important_DLF_train, Outcomes_DLF_train)

Outcomes_DLF_pred = DLF_obj.predict(Important_DLF_test)
```

Accuracy

[32]:
```
accuracy_score(Outcomes_DLF_test, Outcomes_DLF_pred)
```

[32]:
```
0.796875
```

Confusion Matrix

[33]:
```
print(confusion_matrix(Outcomes_DLF_test, Outcomes_DLF_pred))
```

```
[[107  21]
 [ 18  46]]
```

Report

[34]:
```
print(classification_report(Outcomes_DLF_test, Outcomes_DLF_pred))
```

```
              precision    recall  f1-score   support

           0       0.86      0.84      0.85       128
           1       0.69      0.72      0.70        64

    accuracy                           0.80       192
   macro avg       0.77      0.78      0.77       192
weighted avg       0.80      0.80      0.80       192
```