

PRACTICAL 6

Aim: To implement Neural Network.

Code:

```
import pandas as pd
from sklearn.preprocessing import StandardScaler
from sklearn.neural_network import MLPClassifier
from sklearn.preprocessing import LabelEncoder
from sklearn.feature_extraction import DictVectorizer

data=pd.read_csv('data.csv')
cols_to_retain=['Alt','Bar','Fri','Hun','Pat','Price','Rain','Res','Type','Est
']

X_feature=data[cols_to_retain]
X_dict=X_feature.T.to_dict().values()

vect=DictVectorizer(sparse=False)
X_vector=vect.fit_transform(X_dict)
print(X_vector)

X_Train=X_vector[:-1]
X_Test=X_vector[-1:]
print('Train Set')
print(X_Train)
print('test set')
print(X_Test)

le=LabelEncoder()
y_Train=le.fit_transform(data['Goal'][:-1])

scaler=StandardScaler()
scaler.fit(X_Train)
X_Train=scaler.transform(X_Train)
X_Test=scaler.transform(X_Test)
mlp=MLPClassifier(hidden_layer_sizes=(10,10,10),max_iter=1000)
mlp.fit(X_Train,y_Train)
print(le.inverse_transform(mlp.predict(X_Test)))

print("Weight between input and first hidden layer:")
print(mlp.coefs_[0])
print("\nWeights between first hidden and second hidden layer:")
print(mlp.coefs_[1])
```

Output:

```
[Running] python -u "c:\Users\athar\Documents\Practicals\AI Practical\p6\NeuralNetwork.py"
[[ 0. 1. 1. 0. 1. 0. 0. 1. 0. 0. 1. 0. 1. 100.
  1. 0. 0. 1. 0. 1. 0. 0. ]
 [ 0. 1. 1. 0. 0. 1. 0. 1. 0. 0. 1. 1. 0. 10.
  1. 0. 1. 0. 0. 0. 0. 1. ]
 [ 1. 0. 0. 1. 1. 0. 0. 1. 0. 1. 0. 0. 1. 10.
  1. 0. 1. 0. 1. 0. 0. 0. ]
 [ 0. 1. 1. 0. 0. 0. 1. 0. 1. 1. 0. 1. 0. 100.
  1. 0. 0. 1. 0. 1. 0. 0. ]
 [ 1. 0. 0. 1. 1. 0. 0. 1. 0. 0. 1. 0. 1. 75.
  0. 1. 0. 1. 0. 0. 1. 0. ]
 [ 1. 0. 0. 1. 1. 0. 0. 1. 0. 1. 0. 0. 1. 10.
  0. 1. 1. 0. 1. 0. 0. 0. ]
 [ 1. 0. 1. 0. 1. 0. 0. 1. 0. 0. 1. 0. 1. 75.
  0. 1. 0. 1. 0. 0. 0. 1. ]]
Train Set
[[ 0. 1. 1. 0. 1. 0. 0. 1. 0. 0. 1. 0. 1. 100.
  1. 0. 0. 1. 0. 1. 0. 0. ]
 [ 0. 1. 1. 0. 0. 1. 0. 1. 0. 0. 1. 1. 0. 10.
  1. 0. 1. 0. 0. 0. 0. 1. ]
 [ 1. 0. 0. 1. 1. 0. 0. 1. 0. 1. 0. 0. 1. 10.
  1. 0. 1. 0. 1. 0. 0. 0. ]
 [ 0. 1. 1. 0. 0. 0. 1. 0. 1. 1. 0. 1. 0. 100.
  1. 0. 0. 1. 0. 1. 0. 0. ]
 [ 1. 0. 0. 1. 1. 0. 0. 1. 0. 0. 1. 0. 1. 75.
  0. 1. 0. 1. 0. 0. 1. 0. ]
 [ 1. 0. 0. 1. 1. 0. 0. 1. 0. 1. 0. 0. 1. 10.
  0. 1. 1. 0. 1. 0. 0. 0. ]]
test set
[[ 1. 0. 1. 0. 1. 0. 0. 1. 0. 0. 1. 0. 1. 75. 0. 1. 0. 1.
  0. 0. 0. 1. ]]
['Yes']
```

```
Weight between input and first hidden layer:
[[ 0.11178816 -0.08322613 0.28819008 0.1417432 -0.07993836 -0.0234439
 -0.32556609 0.2819107 0.34339153 -0.40061132]
 [-0.3555404 0.12518344 0.12143512 0.25656193 -0.16413123 0.28674061
 0.17096668 0.25408383 -0.3327317 0.2427141 ]
 [ 0.25488486 0.23107169 0.10752882 0.24763077 0.09664829 0.31029122
 -0.1798146 0.20790604 0.16673253 0.21929341]
 [-0.36145313 0.31957001 -0.19917225 0.09499458 -0.06700765 -0.2369795
 0.44441914 -0.20593882 0.06020186 -0.17436259]
 [ 0.47262435 0.24287057 0.11397288 0.34398837 0.23817038 -0.00990518
 -0.28464283 0.42542445 -0.42238516 0.11592984]
 [ 0.06862971 -0.1320448 0.32857233 0.27728722 -0.26347349 -0.35706107
 0.20996266 0.11227537 -0.05740675 0.43769183]
 [ 0.05790966 -0.31878301 -0.47585111 -0.19224325 -0.5487939 0.20110746
 -0.20504898 0.32409408 -0.05182557 0.14117212]
 [ 0.18219024 -0.05795462 -0.13162177 0.43445393 0.57028113 0.11284978
 -0.18042364 0.42120609 0.18417756 -0.0251814 ]
 [-0.25850931 -0.27554338 -0.20504532 -0.33234993 -0.30456811 -0.23195754
 -0.24659273 0.3186362 -0.15160804 -0.34278952]
 [ 0.3786525 -0.32341217 -0.16425815 -0.32304122 -0.11932209 0.17820534
 -0.06509465 0.27680467 -0.33882998 -0.09694202]
 [-0.20842225 0.4091564 -0.3136371 0.22570437 -0.24666855 0.14634263
 -0.11748381 0.50277656 0.12450666 -0.44163125]
 [-0.52696319 -0.45356768 0.02601842 0.07186043 -0.22640355 0.43346279
 -0.42781123 -0.36449917 -0.14465499 0.3717832 ]
 [ 0.08686792 0.51652037 0.25263898 0.25411412 0.01241726 -0.05498963
 -0.0354399 0.50294557 -0.31783063 0.42515159]
 [-0.12480558 -0.35444069 -0.05641649 0.06778264 0.01210776 0.3342814
 -0.24594327 -0.00171656 -0.08671145 -0.52953332]
 [ 0.52961717 0.05319496 -0.40424679 0.22649532 -0.10587124 -0.08672585
 0.17521501 0.06863734 -0.33245559 -0.13875005]
 [-0.35497062 -0.49527194 0.3252034 0.02430188 -0.28621631 -0.09670283
 -0.26648716 0.3410439 0.052883 0.5100022 ]
 [ 0.18113315 -0.46709385 0.47110445 -0.20855347 -0.21335479 0.21325842
 0.21729427 -0.42293249 0.27178686 0.56820103]
 [ 0.34105338 -0.10885561 -0.09213774 0.22313047 -0.32963595 0.34423157
 0.03786795 0.3570717 0.4933163 -0.55856806]
 [-0.02384597 0.27688704 0.11071959 -0.36010116 0.18234859 0.44671762
 0.01347743 0.18019942 -0.13009692 0.01477087]
 [-0.16371246 -0.14980791 0.3089557 0.14286038 0.13203864 0.3355725
 -0.13855417 0.3239168 0.21313655 -0.16337983]
 [-0.49887211 0.24957755 -0.4518225 0.05226248 0.21201648 0.06538036
 -0.01739201 0.09047277 0.32522681 -0.07713293]
 [ 0.2152787 -0.0758852 -0.44456277 0.22009412 -0.57473256 -0.09489588
 -0.2508197 0.32796434 -0.19563507 0.10380452]]
```

```
Weights between first hidden and second hidden layer:
[[-6.23390241e-01  2.98780838e-01  1.44249247e-01  4.03033887e-06
  -2.28815841e-01  6.53395829e-01  -2.76381947e-02  -9.01459550e-02
   6.04638302e-01  7.27296344e-02]
 [ 3.54896242e-01  2.24014493e-01  -4.26019701e-01  1.12158600e-04
  -1.65691116e-01  1.89679119e-02  -3.20415547e-01  -6.04206794e-01
   6.57327149e-01  -9.13935559e-02]
 [ 1.34840739e-01  -1.79928943e-01  3.34592151e-01  5.58322708e-05
  -1.64212023e-01  -2.70550080e-01  -3.67251908e-03  -1.25273154e-07
  -9.11883553e-02  -5.10742288e-02]
 [ 1.39847298e-01  6.67985038e-02  1.06944421e-01  -3.03797026e-01
  -1.86862742e-01  -5.88406665e-01  -1.74630162e-02  5.03311214e-01
   1.25375881e-03  1.46594022e-01]
 [ 6.96381797e-02  2.88197876e-01  1.09545911e-01  -1.12328287e-01
  -3.66064479e-03  -2.78729559e-02  5.14497397e-02  -5.43130713e-01
   5.20297902e-01  5.40158617e-02]
 [ 1.21489928e-01  -1.72299052e-01  4.14349200e-01  -7.62728430e-03
  -4.01811574e-02  3.03543801e-01  4.80869284e-01  -3.42479016e-01
  -2.83448832e-01  -2.85910922e-01]
 [ 3.31708020e-01  -2.33310579e-01  -3.40040453e-01  -9.79030439e-02
  -1.03096814e-01  -2.59337933e-01  5.57139259e-02  3.89408814e-01
   3.83403334e-01  -9.47348958e-02]
 [-4.99123555e-01  6.53463083e-01  -5.67330099e-01  -1.85149081e-01
   2.31505503e-01  -9.06788395e-03  -1.93054683e-01  2.25025733e-01
   2.41038468e-01  -2.35182810e-01]
 [-3.64917754e-01  -2.89690400e-01  1.67710212e-01  -6.37632551e-02
  -6.48039234e-02  1.75741951e-01  -2.16152042e-01  6.90859309e-02
   4.77798817e-01  -4.39267857e-01]
 [ 5.66336961e-01  -2.61893212e-01  2.53462279e-01  7.28071627e-02
  -2.99597005e-01  4.61175068e-01  -1.62644882e-01  -3.17956963e-01
   1.01724075e-01  3.90744559e-01]]
```