CS 6375
ASSIGNMENT 3

Names of students in your group:

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Number of free late days used: _____0_____

Note: You are allowed a **total** of 4 free late days for the **entire semester**. You can use at most 2 for each assignment. After that, there will be a penalty of 10% for each late day.

Please list clearly all the sources/references that you have used in this assignment.

Approach

The data set obtained needed to be pre-processed as it contained null values, special characters and non-numerical values to numerical values. The class values range from 0 to 1. This was done using preprocessed.py code in python.

The pre-processed file was used to generate a neural network based on the input given which contains the number of hidden layers and number of neurons in each layer. The data was fed to backpropagation algorithm. Various parameters were changed to obtain varied results. The best set of parameters for each data set and the corresponding result obtained is as shown below,

Car Evaluation dataset

C:\Users\Sreevatsa H V\Desktop\Assign3\DATA\car>python network.py car_preprocessed.csv 80 10 2 4 2

Layer 0:

Neuron0 weights : [0.34394717 0.13308669 0.23314407 0.66070478]

Neuron1 weights : [0.34009137 0.64003331 0.74686884 0.59565272]

Neuron2 weights : [0.04158347 0.38779049 0.53296826 0.92367841]

Neuron3 weights : [0.30598675 0.64109289 0.67717377 0.00867594]

Neuron4 weights : [0.44787687 0.83774676 0.79310445 0.30698079]

Neuron5 weights : [0.94586966 0.5265626 0.42073995 0.82106585]

Layer 1:

Neuron0 weights : [0.18371932 0.96023572]

Neuron1 weights : [0.71956089 0.49172224]

Neuron2 weights : [0.4362601 0.30781075]

Neuron3 weights : [0.13009802 0.78529069]

Neuron4 weights : [0.01719786 0.34617283]

Layer 2:

Neuron0 weights : [-1.10752878]

Neuron1 weights : [-0.37284428]

Neuron2 weights : [-0.52605005]

Total training error = 0.0601828194422

Total test error = 0.0692952253363

Iris dataset

C:\Users\Sreevatsa H V\Desktop\Assign3\DATA\iris>python network.py iris_preprocessed.csv 80 20 2 4 2

Layer 0:

Neuron0 weights : [0.78038705 0.23595616 0.13102132 0.47687878]

Neuron1 weights : [0.10284048 0.81020721 0.73777295 0.82029348]

Neuron2 weights : [0.40107361 0.83041694 0.85972813 0.28811945]

Neuron3 weights : [0.92311176 0.27647467 0.48293642 0.68486217]

Neuron4 weights : [0.68181822 0.6607356   0.27905715 0.82223841]

Layer 1:

Neuron0 weights : [0.17217487 -0.12112879]

Neuron1 weights : [0.65912941 0.50184771]

Neuron2 weights : [0.71566692 0.37130985]

Neuron3 weights : [0.72584185 0.00593025]

Neuron4 weights : [0.80759251 0.41167312]

Layer 2:

Neuron0 weights : [0.14803635]

Neuron1 weights : [-0.3130134]

Neuron2 weights : [0.45068596]

Total training error = 0.168814224496

Total test error = 0.168504220033

Adult Census Income dataset

C:\Users\Sreevatsa H V\Desktop\Assign3\DATA\adult>python network.py adult_preprocessed.csv 80 10 3 8 4 2

Layer 0:

Neuron0 weights : [0.12229237 0.57722966 0.47937395 0.16510133 0.57695722 0.1293968 0.32417126 0.23971013]

Neuron1 weights : [0.86436491 0.4489405 0.52240282 0.78015294 0.5374873 0.84106399 0.85753918 0.97552094]

Neuron2 weights : [0.63967117 0.33109909 0.28405583 0.52946653 0.68397692 0.90259344 0.09308013 0.86333892]

Neuron3 weights : [0.71520074 0.54179674 0.62538509 0.71108079 0.97433237 0.43098048 0.25635745 0.95038933]

Neuron4 weights : [0.34716779 0.73922788 0.73451421 0.35302515 0.55094218 0.45113235 0.34392101 0.13612082]

Neuron5 weights : [0.40089523 0.37050112 0.1213485 0.08870417 0.57652491 0.03957619 0.93850753 0.94671956]

Neuron6 weights : [0.83797094 0.27687826 0.67148997 0.31246093 0.92546465 0.51435223 0.67257263 0.78891009]

Neuron7 weights : [0.33820882 0.7932763 0.79364202 0.82430661 0.06189912 0.60668261 0.47759 0.13161903]

Neuron8 weights : [0.41013011 0.74920611 0.65707704 0.72472987 0.26402308 0.44943613 0.01606689 0.32948082]

Neuron9 weights : [0.76704556 0.54817291 0.49517742 0.18892918 0.94032539 0.46116775 0.89767708 0.47465246]

Neuron10 weights : [0.41328075 0.06968042 0.37227717 0.90511757 0.12870778 0.50929493 0.42655457 0.77332707]

Neuron11 weights : [0.01864369 0.57494953 0.21721623 0.43194176 0.56947544 0.89833565 -0.00108871 0.65736222]

Neuron12 weights : [0.49351759 0.23985472 0.22330065 0.39373795 0.42568998 0.61239871 0.8840006 0.49925579]

Neuron13 weights : [0.59563515 0.55226346 0.52916693 0.83107962 0.36848005 0.04375199

0.02974761 0.20966052]

Neuron14 weights : [0.23113906 0.17670976 0.66217521 0.46049042 0.20916782 0.03865426

0.39794764 0.97027107]

Layer 1:

Neuron0 weights : [0.35171468 0.05124315 1.02430281 0.10922782]

Neuron1 weights : [0.24296604 0.76140759 0.14576886 0.2623468]

Neuron2 weights : [0.25223507 0.36155472 0.69682473 0.89743613]

Neuron3 weights : [0.51962786 0.29655364 0.23147573 0.85539336]

Neuron4 weights : [0.84530766 0.91922993 0.1390997   0.14523709]

Neuron5 weights : [0.21705754 0.09755529 0.49693237 0.13289239]

Neuron6 weights : [0.37451467 0.17322383 0.39252998 0.08920434]

Neuron7 weights : [0.11832926 0.62521993 0.94688337 0.42077462]

Neuron8 weights : [0.4296599   0.88756171 0.30039056 0.18333473]

Layer 2:

Neuron0 weights : [0.36358708 0.97207738]

Neuron1 weights : [0.35946127 1.00562655]

Neuron2 weights : [0.46201184 0.78292781]

Neuron3 weights : [0.10102891 0.89955153]

Neuron4 weights : [0.28594225 0.28266896]

Layer 3:

Neuron0 weights : [-0.90304057]

Neuron1 weights : [0.24989805]

Neuron2 weights : [-0.41099042]

Total training error = 0.187349717874

Total test error = 0.185400772252