Programming Test :Learning Activation in Neural Network

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This Technical Report is based on three data sets which are classified and analyzed with different activation functions: datasets (iris, mnist , bank notes)

My Dataset :

iris - https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.data
mnist – fom keras data set (from keras.datasets import mnist)
bank-note-
https://raw.githubusercontent.com/jbrownlee/Datasets/master/banknote_authentication.csv

Common Setup for the Datasets :

Since Few steps are common for the initial stage of this algorithm ill explain the common step below

1 – To upload any dataset we can use Pandas library :
Eg – dataset = pd.read_csv(url , or direct data set name)

2 – To select the paramentrs for k0 , k1 by dividing the data set with respect to its contains
in my code i have paramentrs k0 ,k1 as x , y

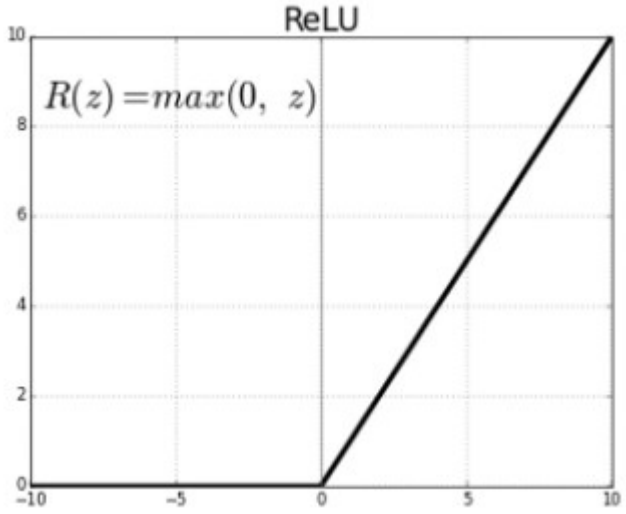
3 – Since we have words or string in our data set we need to convert them into arrays or number to classify it
i have used Labled encoder function to transform the parametres

4 – To classify any model we need to splite the data set into tranning , testing .
In my code i have used from sklearn , train test-split model with test size as 20 % on any ramdom simple

Iris Dataset

About the dataset, the iris dataset consists of 3 different types of iris plants including the parameters of the plants. We consider 1 parameter which includes all the different parameters of the plans and 2 parameters the names of the plant. To classify the data set I used Rectified Linear unit(Relu) in the input activation function and softmax as the output layer activation function. The Below plot represents the Relu function.

Algorthim :



The rectified linear activation function or ReLU for short is a piecewise linear function that will output the input directly if it is positive, otherwise, it will output zero. It has become the default activation function for many types of neural networks because a model that uses it is easier to train and often achieves better performance.

Samplinf of parametes :

#Paramentre k0,k1

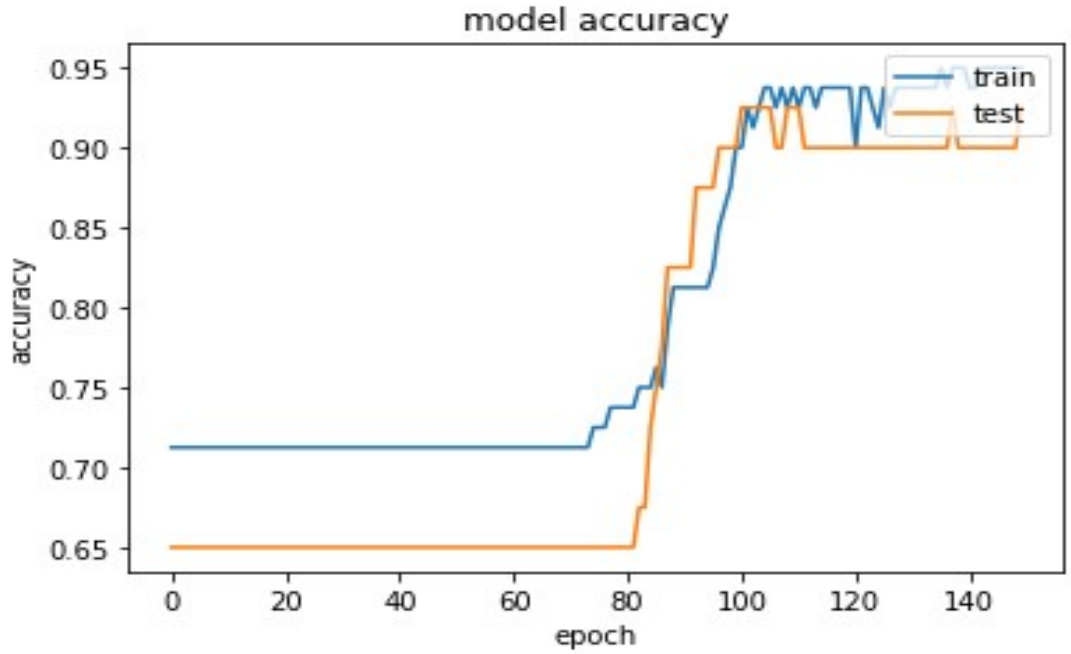
X= dataset.iloc[:,0:4].values

Y = dataset.iloc[:,4].values

	precision	recall	f1-score	support
0	1.00	1.00	1.00	11
1	0.00	0.00	0.00	13
2	0.32	1.00	0.48	6
accuracy			0.57	30
macro avg	0.44	0.67	0.49	30
weighted avg	0.43	0.57	0.46	30

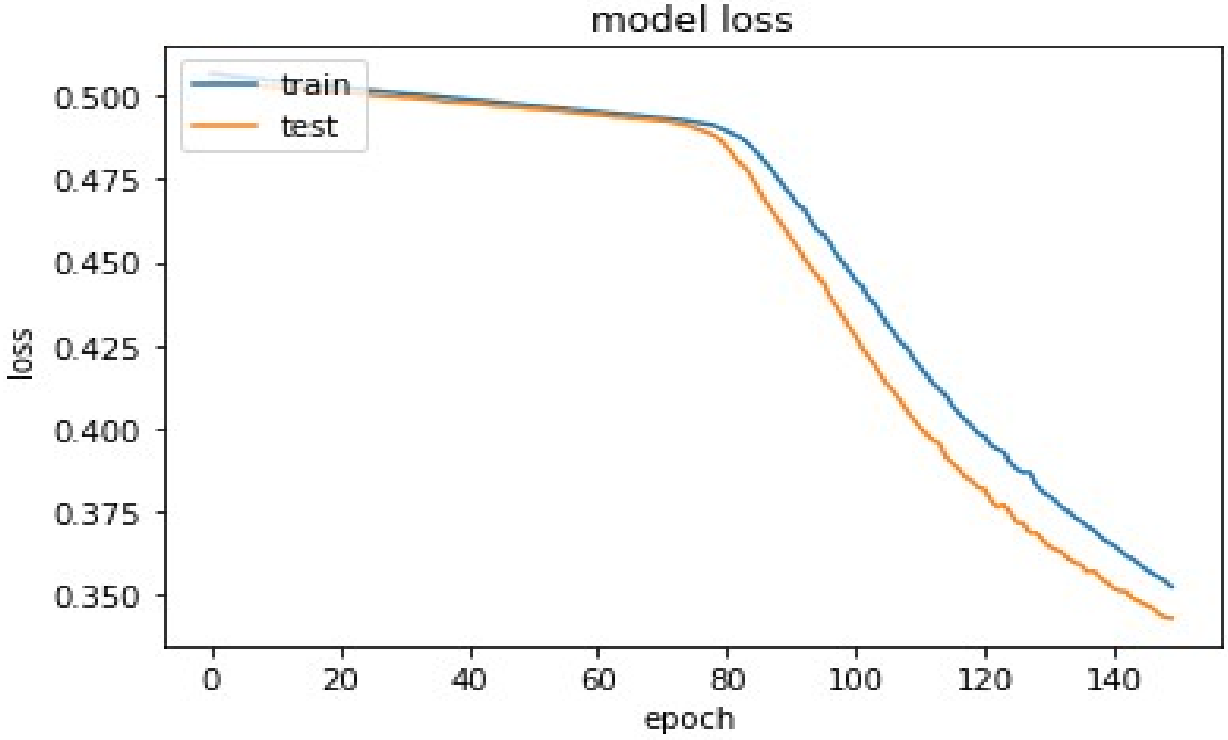
```
[[11  0  0]
 [ 0  0 13]
 [ 0  0  6]]
```

F1 score -confussion matrix



Model Accuracy

Model Loss



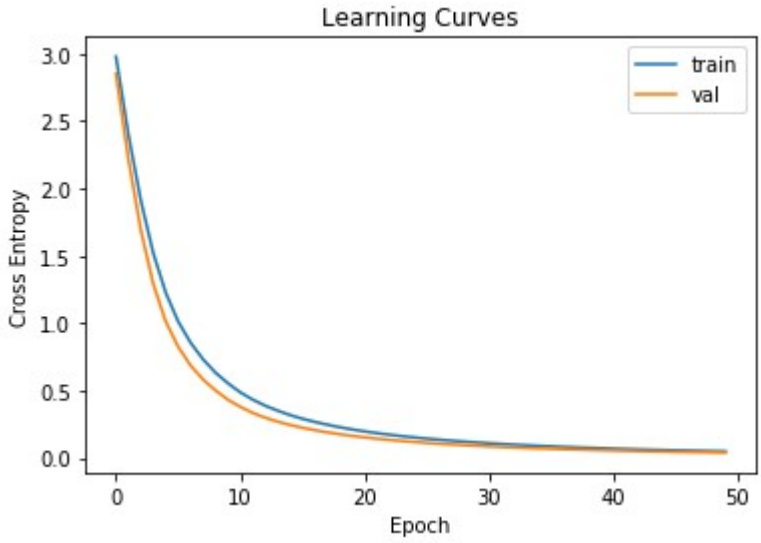
Bank Note Data set

The banknote dataset involves predicting whether a given banknote is authentic given a number of measures taken from a photograph.The dataset contains 1,372 rows with 5 numeric variables. It is a classification problem with two classes (binary classification).

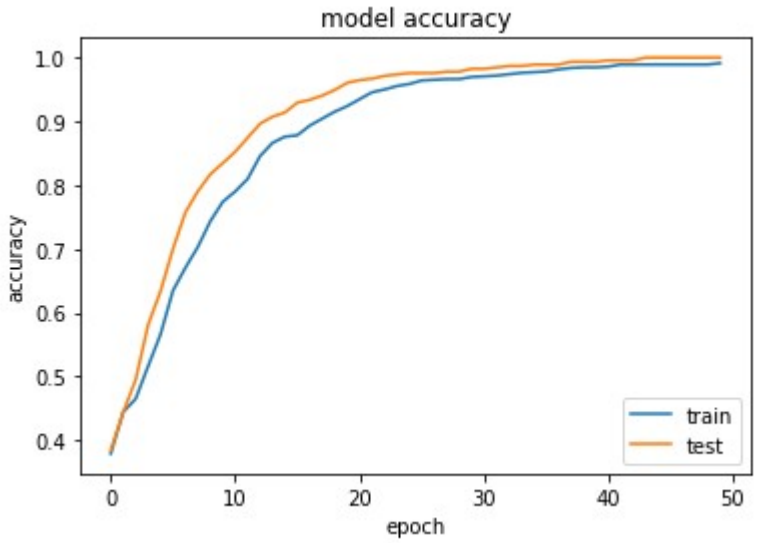
Sampling parametrs

```
X = df.values[:, :-1]
y = df.values[:, -1]
```

Learning curve



Model accuracy



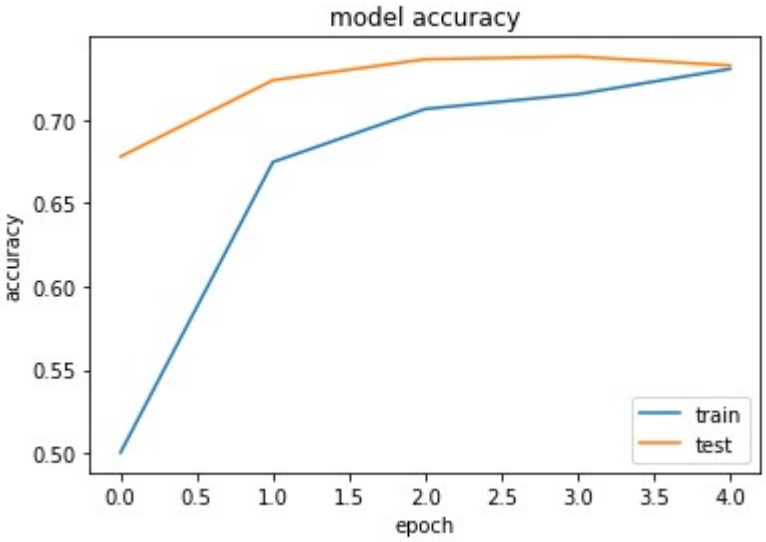
Mnist Dataset

This data set consists of an image of a different handwritten number. Which we classified. To classify this dataset I used the sigmoid activation function for input hidden layer and softmax for output activation function with input size (28,28)

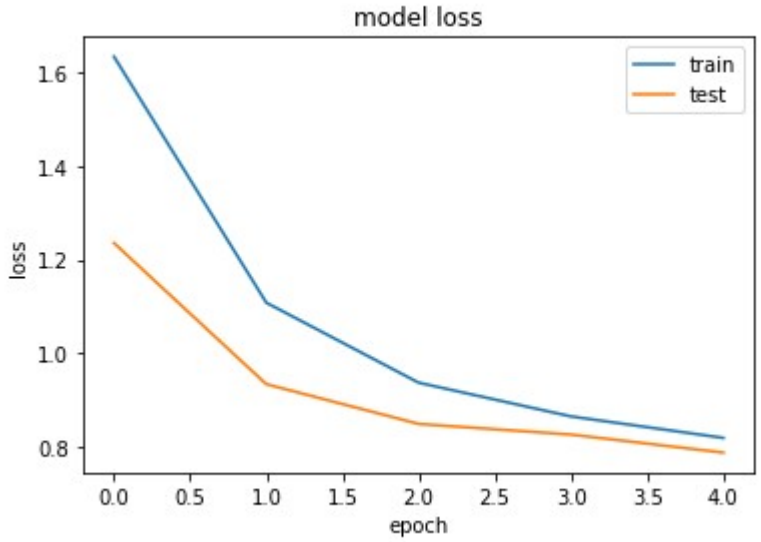
F1 Accuracy :

	precision	recall	f1-score	support
0	0.87	0.93	0.90	980
1	0.92	0.91	0.92	1135
2	0.80	0.81	0.80	1032
3	0.67	0.83	0.74	1010
4	0.46	0.83	0.59	982
5	0.71	0.61	0.66	892
6	0.72	0.95	0.82	958
7	0.86	0.88	0.87	1028
8	0.80	0.54	0.64	974
9	0.50	0.00	0.01	1009
accuracy			0.73	10000
macro avg	0.73	0.73	0.69	10000
weighted avg	0.73	0.73	0.70	10000

Model accuracy



Model lose :



All the 3 Code are uploaded in github

GitHub Link : https://github.com/wajoud/Monk-AI-Programming-Test-