Happy_monk Assignment

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This is technical technical report which is based on Mnist Dataset, Banknote Dataset
and Iris Dataset.Here Classifying and analyzing the dataset based on activation function.

Dataset Link

Mnist - <u>Source</u> `tf.keras.datasets.fashion_mnist`

Iris - Source
https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.data

Banknote-
https://raw.githubusercontent.com/jbrownlee/Datasets/master/banknote_authentication.csv

Common Setup

Few step are common in for the initial stage of this algorithm i will
explain it below-
1 - upload the dataset we can use panda library
2 - to select the parameter for k0 and k1 by diving the dataset with
respect to it contents in my code i have parameters ko,k1 as x,y
3 - since we have words or string in our data set we need to convert
them into array or number to classify it
I used the label encoder function to transform the parameters.
4 - In order to split the data we have to change it into a test and
train like X_train,y_ytrain,X_test and y_test. Take test_size as 20%.
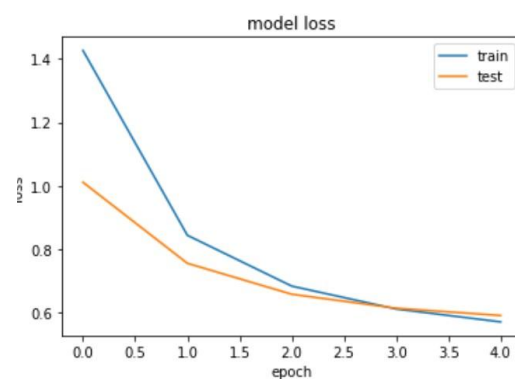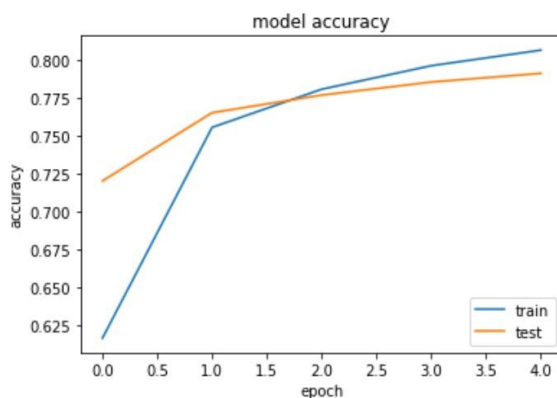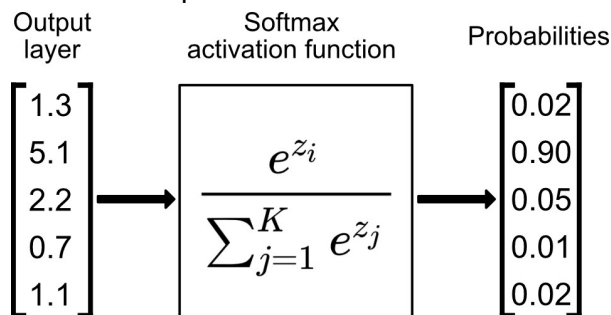
F Mnist Dataset

Fashion-MNIST is a dataset of Zalando's article images—consisting of a training set of 60,000
examples and a test set of 10,000 examples. Each example is a 28x28 grayscale image,
associated with a label from 10 classes. Zalando intends Fashion-MNIST to serve as a direct
drop-in replacement for the original MNIST dataset for benchmarking machine learning
algorithms. It shares the same image size and structure of training and testing splits.

Sigmoid Activation Function: This function takes any real value as input and outputs values in the range of 0 to 1. The larger the input (more positive), the closer the output value will be to 1.0, whereas the smaller the input (more negative), the closer the output will be to 0.0, as shown below.

$$\phi(z) = \frac{1}{1 + e^{-z}}$$
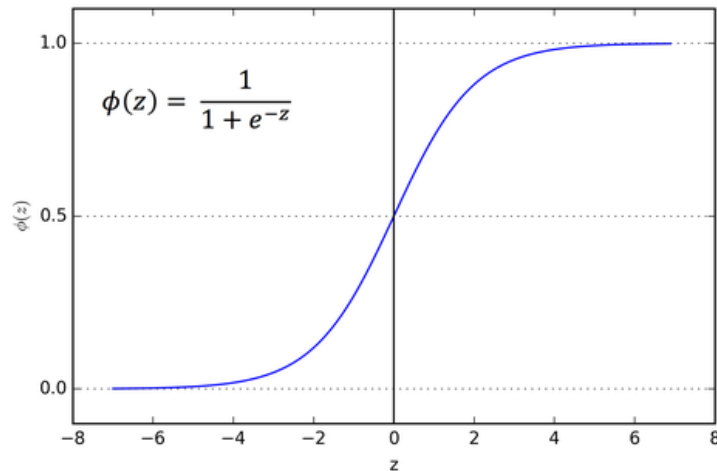
Softmax Activation Function:

The softmax activation function transforms the raw outputs of the neural network into a vector of probabilities, essentially a probability distribution over the input classes. Consider a multiclass classification problem with N classes.

Output layer	Softmax activation function	Probabilities

$$\begin{bmatrix} 1.3 \\ 5.1 \\ 2.2 \\ 0.7 \\ 1.1 \end{bmatrix} \rightarrow \boxed{\frac{e^{z_i}}{\sum_{j=1}^{K} e^{z_j}}} \rightarrow \begin{bmatrix} 0.02 \\ 0.90 \\ 0.05 \\ 0.01 \\ 0.02 \end{bmatrix}$$

1- from figure 1 as number of epochs increase the accuracy is increasing
2- from figure 2 as number of epochs increase the loss is decreasing

Iris Dataset

The Iris Dataset contains four features (length and width of sepals and petals) of 50 samples of three species of Iris (Iris setosa, Iris virginica and Iris versicolor). These measures were used to create a linear discriminant model to classify the species.

Relu: Removes negative numbers and solves vanishing gradient problem

$$R(z) = max(0, \ z)$$
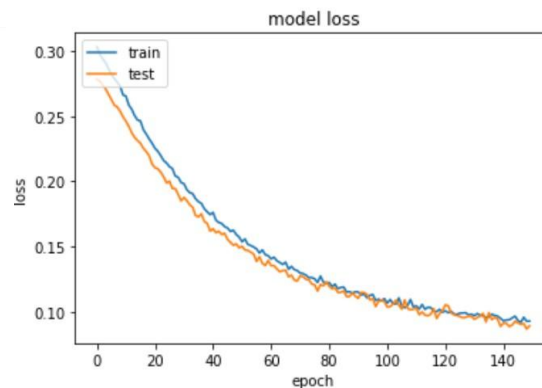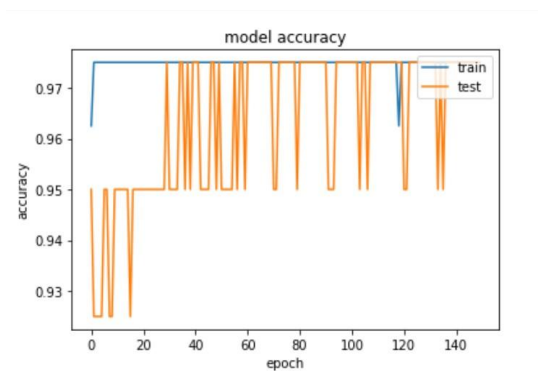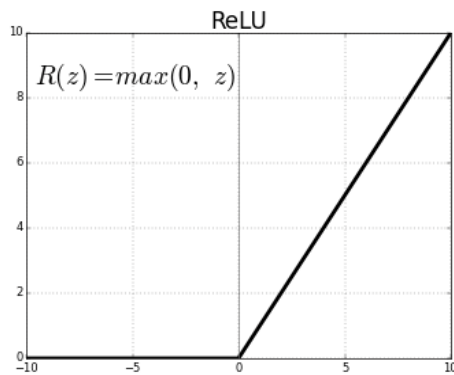
1 Accuracy lie approx 95%
2 As epochs increase, the loss decreases.

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 1372 rows with 5 numeric variables. Its a classification problem with two classes.
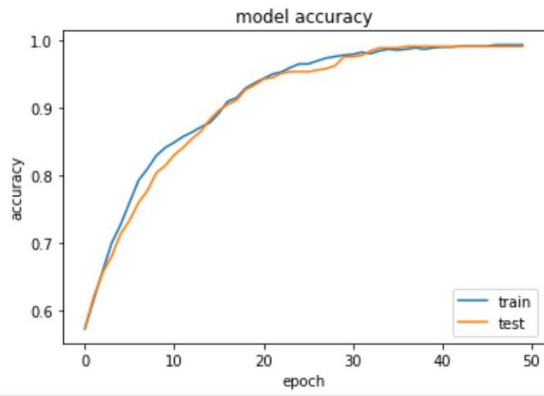
As epochs increase the accuracy will also increase.