Computer Science & Information Systems

Deep Learning - Lab sheet - Module 2

Exercise 3 - Deep Neural Network with Early stopping

1 Objective

The objective is to

- implement a deep neural network using Tensorflow and Keras.

- train the DNN with MNIST dataset.

- implement early stopping.

2 Steps to be performed

Tool Python3

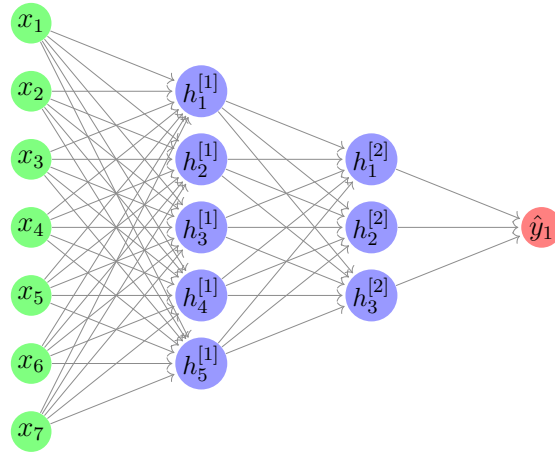**Libraries required** numpy, matplotlib, tensorflow, keras

Input MNIST Dataset - Dataset of 60,000 28×28 grayscale images of the 10 digits, along with a test set of 10,000 images.

Deep Learning Model Deep Neural Network

Implementation 2C Deep Neural Network with Early Stopping.ipynb

Steps .

- Import required Python libraries.
- Load the dataset from Keras.
- Prepare the dataset for training.
- Create the Deep neural network architecture.
- Add early stopping.
- Configure the model for training, by using appropriate optimizers and regularizations.
- Train the model.
- Test the model using the test set.
- Report the results.

x_1 x_2 x_3 x_4 x_5 x_6 x_7

$h_1^{[1]}$ $h_2^{[1]}$ $h_3^{[1]}$ $h_4^{[1]}$ $h_5^{[1]}$

$h_1^{[2]}$ $h_2^{[2]}$ $h_3^{[2]}$

$\hat{y}_1$

3 Expected Results

- Report the Training and Validation accuracy and loss.

4 Observation

- The DNN with early stopping was defined, configured, trained and tested.

- The results were plotted and displayed.

5 Modifications

- Change the number of hidden units.

- Increase the number of hidden layers.

- Use a different optimizer.

- Train for more epochs.