IT416: TOPICS IN DEEP LEARNING

Assignment 5 : Comparative Analysis using different concepts used in Artifical Neural Network

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1 LEARNING OUTCOME

At the end of this assignment you will learn the importance of parameters like Weight Initialization , Dropout , Batch Normalization in Neural Networks

2 PROBLEM DESCRIPTION

Implement Artificial Neural Network using different concepts like Weight Initialization , Dropout , Batch Normalization etc and justify your observations.

3 IMPLEMENTATION

3.1 Task 1 (Weight Initialization)

- Implement an Artificial Neural Network for Classification problem
- Take any architecture of your choice which gives a reasonable performance
- Train and validate the model **with different Weight initialization techniques and make a comparative analysis** [use different cases like initializing with uniform distribution , glorot , HeNormal initialization]. Also include a trivial case of initializing weights with 0s.
- You need to plot distribution curves for each case after training the model.
- Comment on the **best initialization technique with proper reason**. Comment on the visualizations for each case.

3.2 Task 2 (Optimizers)

- Implement an Artificial Neural Network for Classification problem
- Take any architecture of your choice
- Train and validate the model with **different optimizers available in Keras and make a comparative analysis**
- Comment on the best initialization technique

3.3 Task 3 (Batch Normalization)

- Train and Validate a simple Artificial Neural Network for Classification problem
- **Use Batch Normalization (BN) technique** and observe the difference. Comment and **justify the application of this technique**. Try both ways of using BN i.e, before and after calling the activation function

3.4 Task 4 (Dropout)

- Train and Validate a simple Artificial Neural Network which overfits the dataset for Classification problem
- Try using dropouts in various layers, play around with it. Show your different observations which you get and choose the **best configuration which reduces the overfitting**. Make sure you **use the same no. of layers as used for overfitting** the model.

3.5 Points to note

- Visualizations with Explanation is the best way to justify your conclusion

3.6 Instructions

- You can use functions from Sklearn for the implementation of above tasks.
- Dataset link: Click Here
- Make an appropriate train_test_split and obtain accuracies for classification with both train and test set
- You can use functions from Tensorflow 2 for the implementation of the neural network.

4 SUBMISSION

- You have to submit your assignment in Google Colab notebook (.ipynb file) with proper comments and explanation of your approach.
- Your filename should be named as **LabAssignment5_StudentId** . If your id is 202011001 then filename will be **LabAssignment5_202011001.ipynb**
- The submission deadline for this assignment is **19th October 2020 11:59 pm**