

**DL/DLOps (2023)**  
**Lab Assignment 2: Autoencoders [20 Marks]**  
**Deadline: 29/01/2023, 23:59:59**  
**There will be a 25% penalty for each day of late submission.**

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**Guidelines for submission**

1. Perform all tasks in a single colab file.
  2. The colab file should be properly named with your complete roll number XYZ (ex: "XYZ\_Lab\_Assignment\_2.ipynb").
  3. Try to write the code in functions and provide comments for readability wherever possible.
  4. Submit the downloaded colab file [.ipynb] in the classroom.
  6. Plagiarism will not be tolerated, and strict action will be taken as per institute policies.
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**Question 1 [10 Marks]**

Implement a denoising autoencoder using X encoding and decoding layers on fashion MNIST dataset for image reconstruction. (You can add any type of noise. The weightage of noise addition should be 20%.)

1. Use 1 FC layer with Y activation for 10 class classification [4 marks]
2. Use 3 FC layer with Y activation for 10 class classification [4 marks]
3. Compare the performance between 1FC and 3FC layer results and report the accuracy on test set and plot loss curves on training and test dataset. Display the first 10 images of the test set and their reconstruction using the 1FC and 3FC layer models. [6 marks]
4. Plot t-sne for both the models i.e. with 1FC layer and 3FC layers. Use the first 1000 images from the test dataset for this visualization. Contrast the performance. [6 marks]

X = 4, if last digit of your roll no. is odd

X = 5, if last digit of your roll no. is even

Y = sigmoid, if last digit of your roll no. is odd

Y = relu, if last digit of your roll no. is even

**Note - Use of TensorFlow is not permitted, and marks shall not be given for the same.**