COMP 5511 Assignment (20% of the Final Score)
Deadline: 23:59 9-Nov-2025

October 27, 2025

WARNING: It is not allowed to copy from lecture materials or any AI models. Any cheating or copying detected will result in a 0 score, and all candidates involved will be reported to the department.

1 Transformer (50 marks)

We'll build a Transformer network to classify handwritten digits. You need to download the MNIST dataset via Pytorch (Other tools are also fine).

(1) You should build a network with multiple multi-head attention layers (15 marks).

(2) You should use cross entropy loss, Adam optimizer and a suitable learning rate. (5 marks)

(3) Both your training and testing accuracy should be above 95%. (10 marks)

(4) Your should plot your training and testing loss curves. Note, the test set should not be used for updating the network parameters. (10 marks)

(5) You need to submit the executable python code (a single .py file). Please attach screenshots of your running results and curves. (10 marks)

2 Diffusion Model (50 marks)

We'll build a Diffusion model to generate simple colour images. You need to download the CIFAR10 dataset via Pytorch (Other tools are also fine).

(1) You should build a network with multiple CNN layers to encode features (15 marks).

(2) You should use L1 or L2 loss, Adam optimizer and a suitable learning rate. (5 marks)

(3) Your should define suitable sampling steps given starting noise. (10 marks)

(4) Your should plot your training loss curve, and pick up a suitable metric to evaluate the quality of your generated images. (10 marks)

(5) You need to submit the executable python code (a single .py file). Please attach screenshots of your training curve, and qualitative and quantitative results. (10 marks)

Note: you are free and encouraged to choose many other settings in your network based on your own understanding of the techniques.