University of Dayton, Dept. of ECE

ECE 595-End Semester Examination

Date: Thursday, July 26, 2023

Maximum Marks : 40, Time : 2 Hours

Answer ANY FOUR questions. Question 1 is compulsory.

Each question carries 10 marks.

Question 1

Consider a degraded image y is formed under the image formation model given by $y = f * h + n$, where * denotes the convolution operation.

1. Describe any one technique to recover f from y under the assumption that h is known.
2. Appropriately modify the above model for your course project problem and propose any one solution for the same.

Question 2

Given a particular class of training images and a random vector. It is required to generate images similar to the training images.

1. Explain how a Generative Adversarial Network (GAN) can be utilized for the above purpose.
2. Write the loss function required and explain the relevant terms in the same.

Question 3

It is required to generate photo-realistic Super Resolution (SR) image from a given Low Resolution (LR) image. You are given training examples consisting of LR and its corresponding High Resolution (HR) images.

1. Draw a Super Resolution GAN architecture for the above problem.
2. What is VGG loss? What is its importance in the above problem.

Question 4

1. Explain the different building blocks in the encoder-decoder networks in the transformer architecture.

2. What is attention and explain how it is computed in the transformer network.

Question 5

1. What is a vision transformer? Explain how this network can be used for image classification?.

2. Explain the major differnces between a CNN architecture and transformer network.

Question 6

1. Make a comparison between Alexnet and VGGNet interms of different layers and filter sizes.

2. What is Resnet? What is its major advantage compared to other CNN based networks.