North South University

Department of Electrical and Computer Engineering

CSE465 - Pattern Recognition

Final Assessment, Spring 2020

Total Marks - 20, Submit by: 11:59pm 20th of May 2021

Question 1: (10 marks)

Consider a *120 x 120 RGB image* as input. Design a single neural network that can be used to convert this RGB image to a grayscale image as well as a CMYK image using a single forward pass. Note that while there exists established algorithms to convert between colour spaces, your job is to devise a neural network model configuration to do the task.

Question 2: (10 marks)

Suppose you have a Model **m** that outputs an embedding vector **e.** In a normal classification task, **e** is transformed into scores (s_i) by multiplying with weight matrix **W,** which contains one row vector per class. These scores are usually calculated by doing a matrix multiplication, implicitly doing a dot product of the embedding vector and each of the row vectors of **W**. The scores are then passed through a softmax activation function to get normalized scores that can be interpreted as probabilities.

How will this process have to be modified to use the Euclidean distance as a method of calculating the scores (s_i) instead of the usual dot products. Outline your solution using equations (instead of long drawn out texts).