CS 5970/6970
Fall 2025
Assignment 1 – Image Fundamentals
Due: 09/08/2025 11:59 pm

This assignment consists of two mini-projects that will test and strengthen your understanding of photometric and geometric image transformations. Both are designed to be fun, puzzle-like challenges that require you to use the core operations covered in Lectures 4 and 5, from grayscale and gamma correction to rotation and flipping. You can work as a group of 2 or as an individual, as you prefer.

Task 1: Photometric Decoder   [25 Points]

A hidden message is embedded inside a regular-looking image using brightness, contrast, grayscale conversion, and gamma correction.

Instructions:
1. Download the provided image (`photometric_hidden_image.png`)
2. Use photometric operations such as:
    a. Grayscale conversion (average and weighted)
    b. Brightness adjustment
    c. Contrast stretching
    d. Gamma correction
   … to reveal a hidden message or code inside the image.

Task 2: Geometric Puzzle Solver   [25 Points]

You are given a scrambled image composed of 16 tiles that have been:

- Randomly flipped (by 90 or 180)
- Rotated (vertically or horizontally)
- Or left as is

Instructions:
1. Download the image (`geometric_puzzle_scrambled.png`)
2. Write a script to:
    a. Split the image into 64×64 tiles and extract each one

b. Test possible transformations on each tile (rotation, flip)
c. Reconstruct the correct (original) image

Deliverables:
1. An IPYNB notebook that can run on Google Colab.
   a. You can use the same notebook for each part. Make sure to label them correctly with a description using a text cell.
2. Your code that you used to uncover the message
   a. Provide proper documentation on how to run your code, any dependencies, etc. as a text cell *before* your code cell.
3. A description of your approach, what worked and what didn't and GenAI usage declaration, and a statement of contribution for each member in your team. If it is an individual project, then just say "This was an individual project and I did everything in it."