ECE 477/595 Artificial Neural Networks

Department of Electrical and Computer Engineering

University of Dayton

Fall 2022

Assignment 5 (Due Date: 11/03/2022)

ART based Image Compression

Design and implement an image compression framework using a self-organizing learning system (*Adaptive Resonance Theory neural network*).

- Divide the input image into non-overlapping blocks.
- Choose suitable block size, vigilance parameter, learning rate parameter and choice parameter for efficient classification of input blocks.
- Create the block codes and codebook after classification.
- Perform run-length encoding (RLE) for reducing the size of the block code sequence (*Optional*).

- Reconstruct the image (*de-compression*) by replacing the block codes with the respective codebook information.
  (*Create the block code sequence from the run-length encoded data if needed*)

Show the original image and the reconstructed image, and compute the compression ratio, MSE and PSNR for **at least 3 example images of different complexities**.

Notes:

- The project should be implemented in MATLAB.
- **The methodology, program outline with flow chart and/or illustrations, implementation results with sample data sets, comments/discussions on the obtained results, and appropriate technical references** should be submitted on **Isidore**.
  (*Report Format: single column, single space, 11-point Times New Roman font*).
- The program codes along with the dataset used for testing and validation should be submitted through **Isidore** for evaluation.
- **Late submissions will not be accepted**.