AI TechStack 2025
Week 1 Task

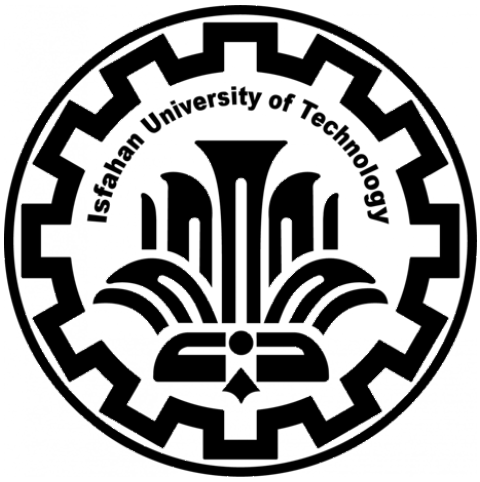
July 29, 2025

1 DeWatermarking

Task Description

In this task, you are provided with the following files:

- `iut.png` – the watermark image with an alpha (transparency) channel.
- `watermarked.png` – an image obtained by blending the original image with the watermark image using the alpha channel and a ratio of 0.3 (watermark) and 0.7 (original image) in the overlapping areas.
- `original.png` – the original image (only provided so that you can calculate the PSNR for evaluation purposes).



(a) Watermark Image (`iut.png`)

(b) Watermarked Image (`watermarked.png`)

Figure 1: Images provided for the DeWatermarking task.

The blending process can be expressed as:

$$I_{\text{watermarked}} = (1 - \alpha \cdot 0.3) \cdot I_{\text{original}} + (\alpha \cdot 0.3) \cdot I_{\text{watermark}}$$

where α is the transparency mask extracted from the alpha channel of `iut.png`, scaled to the range $[0, 1]$.

Objective

Your objective is to reconstruct the original image I_{original} from the given `watermarked.png` and `iut.png` files by reversing the blending process that uses the alpha channel as a mask.

You must complete the `calculate_psnr` and `dewatermark` functions inside the provided `part1.ipynb` notebook and visualize the results.

Note: Although `original.png` is provided for testing and PSNR calculation, your solution will be evaluated on a different set of images where the original image is not available.

2 Puzzle

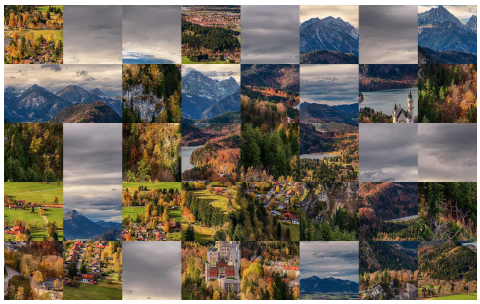
Task Description

In this task, you are provided with a set of files and a folder containing the shuffled pieces of an image puzzle:

- A folder containing square image pieces (tiles) extracted from an original color image of dimensions 1920×1200 pixels. These pieces are stored with random file names.
- `Output.tif` – an image showing the four correct corner pieces in their correct positions.
- `Shuffled_Patches.tif` – a visualization of all puzzle pieces arranged randomly. This file is provided for display purposes only and **must not** be used in solving the puzzle.
- `Original.tif` – the original image (provided only at the end for verification and performance evaluation).
- `assemble_process.mp4` – a video located in the `images_part2` folder that demonstrates an example assembly process. This video is provided as a reference only and must not be used as an input to your algorithm.

The number of puzzle pieces is specified in the folder name.

(a) Example Output with Corners (`Output.tif`)



(b) Example Shuffled Pieces (`Shuffled_Patches.tif`)

Figure 2: Example provided files for the Puzzle task.

Objective

Your objective is to reconstruct the original image from the provided shuffled puzzle pieces and display the assembly process to the user. The assembly process should be visualized so that the user can observe how the image is reconstructed step-by-step.

After reconstructing the image, your program should:

1. Compare the reconstructed image with `Original.tif` (available only after solving) to calculate the reconstruction accuracy.

2. Report the calculated accuracy to the user.

Note: Although `Original.tif` is provided at the end for evaluation purposes, the final grading of your solution will be based on other images with the same conditions. Additionally, `Shuffled_Patches.tif` and `assemble_process.mp4` are provided for reference only and must not be used as part of your solving algorithm.