DIGITAL IMAGE AND VIDEO PROCESSING LAB - EXPERIMENT NO. 3

FREQUENCY DOMAIN TRANSFORMATION

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Overview:

This experiment involves performing frequency domain transformations on grayscale images using the Fast Fourier Transform (FFT) and its inverse. The provided Python code includes functions to compute and visualize FFT and inverse FFT, as well as to perform specific image processing tasks as described in the experiment.

Files Included:

1. `Exp3_21EC39027.py`: Python script containing the necessary functions.
2. `Exp3_21EC39027.ipynb`: Jupyter Notebook containing the same code.
3. `Exp3_21EC39027_report.pdf`: The experiment report detailing the objective, methodology, results, and conclusion.
4. `images/`: Directory containing the input images.
5. `output images/`: Directory containing the output images obtained from the code.
6. `README.pdf`: This ReadMe file.

Functions Overview:

1. `FFT2D(image, magnitude_filename="magnitude_spectrum.png", phase_filename="phase_spectrum.png")`:
   This function computes the 2D FFT of an image and visualizes and saves the magnitude and phase spectra.
2. `inv_FFT2D(fft_image, output_filename="reconstructed_image.png")`:
   This function computes the inverse FFT to reconstruct and save an image from its frequency domain representation.
3. `process_image(image_path, output_filename="dip_processed.tif")`:
   This function modifies the specified channel ('R', 'G', 'B') of the input image by setting it to zero and saves the resulting image.