

# Project Proposal

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**Option 1:** Implementation of a Research Paper

**Title of the Project:** Image Restoration Using Deep Image Prior

**Main Paper:**

- *Title:* Deep Image Prior
- *Authors:* Dmitry Ulyanov, Andrea Vedaldi, Victor Lempitsky
- *Publication Venue:* Published at IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
- *Year:* 2018
- *DOI/Link:* <https://arxiv.org/pdf/1711.10925v4>

## Problem Statement:

The project focuses on fixing poor-quality images that have been damaged or have missing parts, like those that are blurry, noisy, or incomplete. Normally, deep learning methods need large amounts of labeled data to train models for this kind of task. However, the Deep Image Prior approach uses a unique method by relying on the internal structure of a convolutional neural network (CNN) for image restoration. This method works without needing any extra training data or datasets.

## How is it Different:

The technique differs from the topics covered in class by not relying on large datasets or pre training for image manipulation tasks. Also, for the upscaling and smoothing tasks, instead of just directly convolving with filters, the structure of a randomly initialized CNN is used.

## Approach:

The project will use the deep image prior method by adjusting a randomly created CNN to produce a clear, high-quality image that looks like the original. This model will gradually improve by working with the corrupted image alone, without needing extra data. The architecture, like U-Net, will help avoid overfitting and guide the image restoration process. The main tasks will involve recreating results for image denoising, enhancing resolution, and filling in missing parts of images (inpainting).

## Data:

This project doesn't use big datasets or pre-trained models. Instead, it works directly with the corrupted image that needs fixing. The model is trained on the image itself without using other images. For testing, we will manually create damaged images by adding noise, blur, or covering parts of a few chosen images. These images will help test how well the model performs on tasks like removing noise, improving resolution, and filling in missing parts.

## References:

- Ulyanov, D., Vedaldi, A., & Lempitsky, V. (2018). Deep Image Prior. CVPR  
Link - <https://arxiv.org/pdf/1711.10925v4>

## Team Member Responsibilities:

- *Tushar Gwal* - Project coordination, implementation of image restoration algorithms (denoising and inpainting tasks), report writing.
- *Manoj Gembali* - Implementation of super-resolution tasks, dataset handling, and experimental analysis.