

**ECE501- DIGITAL IMAGE PROCESSING**

# **WEEKLY REPORT – Week 1: (4-10-2025)**

## **Project No.: 6**

## **Project Title: Image Inpainting for Object Removal**

**Group Name: 12**

| **Group Details:** | | |
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| **Sr No** | **Name** | **Enrollment No:** |
| 1 | Sakina Jambughodawala | AU2340114 |
| 2 | Prina Patel | AU2340040 |
| 3 | Aneri Maniar | AU2340080 |
| 4 | Nidhee Adesara | AU2340196 |

## **Objective of the Week:**

1. To understand the concept of image inpainting and its applications.
2. To define the problem statement clearly.
3. To study existing techniques by referring to various research papers related to our topic.

**Problem Definition:**

The goal of this project is to remove the unwanted objects from an image and to fill the missing regions using the information of surrounding texture and color so that the image looks natural.

Image inpainting is the process in which an image whose parts are lost are reconstructed based on information of remaining context  
  
Input: Any image whose object is to be removed.  
Output: Image with the region filled naturally without visible artifacts.

**Literature / Background Study with Referred reference papers:**

• Studied some methods which would be used for image inpainting:

1. Diffusion-based
2. Patch-based
3. adaptive fourth-order partial differential equation

• Comparison between 2 techniques

| **Feature** | **Diffusion based** | **Patch based** |
| --- | --- | --- |
| Principle | Spreads nearby pixel info using interpolation | Copies texture patches from known areas |
| Best for | Small, smooth, or edge regions | Large, textured regions |
| Output | Smooth but blurry | Detailed and realistic |
| Speed | Fast | Slow |
| Weakness | Texture loss | Patch mismatching |

* From paper: [*Novel image inpainting algorithm based on adaptive fourth-order partial differential equation*](https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/iet-ipr.2016.0898)*:*

In this paper, the method used to fill missing or damaged regions is done by smoothly spreading the surrounding pixel information while maintaining sharp edges and textures. Unlike basic diffusion methods that can blur edges, this approach uses the diffusion strength according to image features, which helps to preserve structure and reduce artifacts in the filled area.This study helps us understand how PDE-based techniques can perform natural and visually consistent image restoration without using deep learning.

* [Github Repository:](https://github.com/geekyutao/Image-Inpainting)

In this the image inpainting is done through propagating image information that is color and structure from the boundary of the missing region into the masked area.

This implementation helped me understand how diffusion-based inpainting can restore small damaged or unwanted regions using only pixel information, without any learning model.

## **Plan for Next Week:**

Deciding Methodology for our project (will also discuss it with the group that has the same project to avoid implementation with the same method)

Reading the research papers, we found in deep and understanding it thoroughly

Dividing task among members