

**6FTC2085-Advanced AI
Computer Vision Mini Project Specification
Object Recognition in CIFAR-10 Dataset: A Benchmark for Image
Classification**

1. General Instructions

This mini-project aims to help you understand and apply the module material. The following programming guidelines must be followed:

- a) Your name and SRN must appear at the top of all files you create or modify.
- b) Write clear and understandable code. Enhance code clarity using meaningful variable names, proper indentation, comments, and appropriate vertical and horizontal spacing.
- c) Precede each function with comments indicating:
 - The purpose of the function.
 - The use of each parameter/variable.

2. Deliverable

The project must be submitted as a zipped file on the Canvas module page. The deliverable should include your implementation (“**Jupyter Notebook**”) and a **report** containing the following:

- A problem statement, including a description of the dataset.
- An explanation of the used approaches.
- The performance of your model on unseen data.
- A discussion of your results.

You will be implementing a software artefact, and feedback will be provided in the form of a score that highlights the strengths of your work as follows:

Deliverables	Maximum points
Deliverable 1: Building a model and making a prediction	70/100
• Data preprocessing	20
• Building and validating model	30
• Testing on unseen dataset	20
Deliverable 2: Report	30/100
• The problem statement and description of the dataset	10
• An explanation of the used approaches.	10
• A discussion of your results.	10
Total	100

3. Assignment: Object Recognition in CIFAR-10 Dataset

Object recognition is a computer vision technique for identifying objects in images or videos. The main goal of this mini project is to use an object recognition technique to analyze images and deduce the object within.

3.1 Business Case

A web-based company develops educational tools to help nursery students learn about different objects and their categories. Each image is one of the ten following objects: airplane, automobile, bird, cat, deer, dog, frog, horse, ship, and truck. This can be particularly useful for teaching visual recognition and classification in educational settings.

The project will utilize a supplied dataset of labeled images, but you are also encouraged to add your own labeled images if needed. Additionally, the nursery will retain a set of images to test the solution independently. The deliverables to the client will include:

1. A fully functional object recognition model.
2. A short report

3.2 Model Building

Your Computer Vision mini project is expected to implement the steps described below. The main aim is to correctly identify objects in a range of unknown images. Your implementation will consist of two deliverables: **your object recognition software** and a short, **two-page report**.

3.2.1 Dataset

Start by using the supplied dataset, it is then advisable to add representative images of your own.

3.2.2 Data Preprocessing

Perform data preprocessing. We have discussed preprocessing methods in the lectures, such as greyscaling and histogram equalization, which should be considered. Split up our data into training and testing sets.

3.2.3 Build and evaluate the object recognition system

Build a tool that parses an image and attempts to identify which objects are present. Train an object recognizer on the training set.

3.2.4 Prediction of Unseen Images

Evaluate the performance of your model on a reserved test dataset of images.

3.2.5 Report

Write a short, two-page report evaluating and summarizing your process and results.