**PDE4433 – Machine Learning for Robotics – Coursework2 – Proposal (refined)**

*Topic: Automatic Number Plate Recognition (ANPR) Using CNNs*

Introduction

Automatic Number Plate Recognition (ANPR) systems are widely used for vehicle tracking, parking management, and security enforcement. Traditional OCR-based approaches, such as Tesseract, often struggle with accuracy due to variations in font styles, lighting conditions, and image noise. This project proposes developing a Convolutional Neural Network (CNN)- based ANPR system specifically designed to recognize Dubai number plates with higher accuracy than conventional OCR methods.

Problem Statement

OCR-based ANPR systems are prone to errors, especially with non-standard fonts and challenging lighting conditions. A machine-learning-based approach can improve accuracy by training a CNN model to recognize characters directly from license plate images.

Proposed Solution

This project will develop a CNN-based ANPR system that:

- Uses OpenCV to capture and preprocess license plate images.

- Trains a CNN model to classify and recognize Dubai plate characters.

- Replaces Tesseract OCR with a custom-trained deep learning model.

- Logs detected plate numbers in an Excel database for further analysis.

Methodology

1. Dataset Collection: Acquire a dataset of labeled Dubai number plates.
2. Preprocessing: Convert images to grayscale, resize them, and normalize pixel values.
3. CNN Model Training: Train a deep learning model to recognize alphanumeric characters.
4. Real-Time Detection: Implement a live camera feed for real-time plate recognition.
5. Logging & Analysis: Store recognized plates in an Excel database for tracking.

Expected Outcome

The system will be able to accurately detect and recognize Dubai number plates in real time, providing better accuracy than traditional OCR-based ANPR solutions.

Tools & Technologies

* Programming Language: Python
* Libraries: OpenCV, TensorFlow/Keras, Pandas
* Hardware: Laptop webcam for real-time detection

Significance & Future Scope

This project has applications in parking management, traffic monitoring, and security enforcement. Future improvements may include enhancing model accuracy with more data or deploying the system on embedded devices for edge computing.