CS-542 Project Progress Report

Project Title :-

Application of Machine Learning in UAV Swarm Synchronization

Team Members :-

Team Member	Role	Progress
Vaasu Gupta (Team Lead)	MLOps Engineer	Interfacing LattePandas with Drone and Test flights
Gopal Bansal	Cloud Architect & DevOps	Implemented ANN Model
Harsh Raj Srivastava	Edge ML Engineer	Implemented CNN Model
Aman Harcharan	Data Engineer	Dataset Preparation
Shreyansh Dubey	Communication Systems Engineer	Literature Review
Jatin	System Reliability Engineer	Initializing Adalm Pluto Radios on Linux Environment

Objectives :-

The primary objective of this project is to enable seamless communication and synchronization among drone swarms using machine learning (ML) techniques. This involves deploying ML models on edge devices for real-time processing and synchronization, complemented by cloud-based analysis for tasks such as object detection and environmental monitoring. The ultimate aim is to ensure scalability, reliability, and robust communication among drones operating in dynamic and challenging environments.

Progress :-

- Read research papers on similar problems (Paper 1 , Paper 2 , Paper 3 , Paper 4 , Paper 5)
- Differentiated between conventional and AI-based approaches for drone system configuration.
- Finalized the architecture of the system, deciding on the components that need to be implemented at the edge and those that will require cloud support.
- Trained different types of models and analyzed data for small and high values of f1 and f2.
- Interfacing LattePandas with Drone and Test flights and Initializing Adalm Pluto Radios on Linux Environment.

Milestones :-

- Week 1 & 2: Literature Review
- Week 3 & 4: Dataset Preparation & Model Training & Hyperparameter Tuning and Optimization
- Week 5: Interfacing LattePandas with Drone and Test flights
- Week 6: Initializing Adalm Pluto Radios on Linux Environment

Plans :-

- Integrate and test ML models on physical drone hardware after ensuring success in the simulated environment.
- Plan to explore interpretability, explainability, and try different models to find the right balance of computational cost vs accuracy.