Hybrid Deep-Machine Learning Model for Modified Leader-Follower Consensus Tracking Control UAVs Flock Strategy

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ABSTRACT

A flock or swarm of Unmanned Aircraft Vehicles (UAVs) can be thought of as a flock of flying computers. Individuals in these communities all adhere to the same norms, practices, and tasks as those in their immediate vicinity. Since UAV is a trendy topic, many studies have focused on how to make it better. The current work introduces a novel model, called hybrid deep machine learning (HDML), to address the issue of leader failure in leader-follower algorithms. The findings show that splitting the process into two phases allows for the successful fusion of two DL and ML models. Extensive experiments demonstrated that the new hybrid method offered improved performance in terms of precision, recall and f1-measure of 100%. Also, the results show that the HDML model can eliminate the leader fail problem by incorporating a sub-leader to ensure the work is completed successfully for everyone involved.

CCS CONCEPTS

• **Computing methodologies**; • **Artificial intelligence**; • **Control methods**; • **Robotic planning**; • **Evolutionary robotics**;

KEYWORDS

Artificial intelligence, Machine Learning, Deep Learning, Hybrid deep learning, Hybrid Machine learning, Performance Hybrid systems, control strategies, leader-follower algorithm

*Place the footnote text for the author (if applicable) here.

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1 INTRODUCTION

In contrast to heavy vehicles, UAVs can quickly examine high-risk buildings and locations. Flocking is superior to other problem-solving methods, especially for difficult tasks that may be accomplished in a short amount of time with the help of a single operator [1, 2]. The most basic definition of a UAV is a flying computer equipped with sensor(s) and UAVs feature firmware software that issues orders to the hardware. A UAV flock can be thought of as a type of Multi-Agent System (MAS) [3, 4] with competing goals. Flock is the collective noun for groupings of UAV agents. Flocking is a natural phenomenon observed in swarming insects, birds, fish, and human populations. having a structure of leaders and followers in which the leaders are outnumbered. An algorithm that uses a leader-follower structure to direct a group to a specific destination and then back again. In the leader-follower algorithm, leader failure is the most critical cornerstone of the emergency case. Since the leader possesses the information and the followers only know who the leader is, an efficient multi-object categorization and detection system is a vital prerequisite for a flock UAV Multi-Agent System (MAS) [5, 6]. Since its inception, the cutting-edge technologies associated with Artificial Intelligence (AI) have made life easier and served humanity easier due to the optimization of algorithms through the implementation of AI, which represents a novel breakthrough that has paved the way for a wide range of applications across many different domains. The advent of Deep Learning (DL) [7, 8] has led to a significant improvement in the intelligence of artificial systems.

Machine learning (ML) includes a subfield called Deep Learning (DL) [9, 10] that mimics the way the human brain learns from data by employing artificial neural networks and algorithms. AI has had a significant impact on the field of imaging science, especially