MACHINE LEARNING MINI PROJECT PROPOSAL

Project Title: Drone-Assisted Disaster Relief: AI-Powered Aid Delivery

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Contents

1 Project Description

The **Autonomous Aerial Humanitarian Assistance and Disaster Relief (A2-HADR) System** aims to revolutionize disaster management by leveraging the capabilities of drones equipped with artificial intelligence (AI) to **provide rapid and effective assistance in severe earthquake and flood situations**. **This innovative system integrates cutting-edge Computer Vision technologies to automatically detect human beings from altitudes of 50-100 meters above the ground at slanted angles** and deploy essential payloads, such as food, clothing, and rescue tools, to assist those in need.

Realizasation of the Idea

The A2-HADR System comprises several key components, including drones equipped with high-resolution cameras, a robust processor board (such as Raspberry Pi or Intel NUC), sophisticated AI algorithms, and a payload dropping mechanism. Through real-time object recognition powered by AI, the system can identify individuals requiring assistance amidst disaster-stricken areas. Upon detection, the system triggers an automatic alarm, alerting rescue teams to the location of the individual in distress.

Social Relevance and Impacts

The development of the A2-HADR System represents a significant advancement in disaster management technology, offering a versatile and scalable solution that can be deployed in a wide range of scenarios, including civilian applications and military operations. By automating critical tasks such as object recognition and payload delivery, the system enhances the efficiency and effectiveness of disaster response efforts, ultimately saving lives and mitigating the impact of natural disasters.

With its potential to revolutionize humanitarian assistance and disaster relief operations, the A2-HADR System holds immense promise for DRDO projects and civilian applications alike. By harnessing the power of AI and drone technology, this innovative system exemplifies the Ministry of Defence's commitment to leveraging cutting-edge solutions for the greater good of society, particularly in times of crisis.

Our Objective/Contribution

our objective in this idea is to ***create a system integrates cutting-edge Computer Vision algorithms and models to automatically detect human beings from altitudes of 50-100 meters above the ground at slanted angles.***

Proposed Solution

Our proposed solution integrates **YOLOv8**, **an advanced object detection algorithm**, with drones for efficient disaster relief. YOLOv8's real-time capabilities enable accurate detection of humans in crisis situations, guiding drones to drop aid precisely. This fusion of AI and drone technology promises swift and targeted humanitarian assistance during emergencies.

Figure 1: Cars in Flood

Figure 2: Humans in Flood

2 Data set

1. **Datasets for deep learning applied to satellite and aerial imagery.**
2.**Top Aerial Dataset (water also there)**
3.**Kaggle Flood images dataset**
4.**NTUT 4K Drone Photo Dataset for Human Detection 4K Drone Photos with Labels of People in different Poses**
5.**Drone Human Dataset Kaggle**
6. **Search for Missing People Notebook and dataset**
7. **Flood Area Segmentation (Kaggle) Segment the flooded area.**

2.1 Citation

1. **Machine Learning in Disaster Management: Recent Developments in Methods and Applications** [1]
2. **Machine Learning for Disaster Management: Insights from past research and future implications** [2]
3. **Disaster and Pandemic Management Using Machine Learning: A Survey** [3]

References

[1] V. Linardos, M. Drakaki, P. Tzionas, and Y. L. Karnavas, "Machine learning in disaster management: Recent developments in methods and applications," *Machine Learning and Knowledge Extraction*, vol. 4, no. 2, pp. 446–473, 2022. [Online]. Available: https://www.mdpi.com/2504-4990/4/2/20

[2] V. Chamola, V. Hassija, S. Gupta, A. Goyal, M. Guizani, and B. Sikdar, "Disaster and pandemic management using machine learning: A survey," *IEEE Internet of Things Journal*, vol. 8, no. 21, pp. 16 047–16 071, 2021.

[3] S. Sreelakshmi and S. S. Vinod Chandra, "Machine learning for disaster management: Insights from past research and future implications," in *2022 International Conference on Computing, Communication, Security and Intelligent Systems (IC3SIS)*, 2022, pp. 1–7.