



Vision Document
MineEye: Demining using AI&ML
18th May 2023

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1 Introduction

MineEye is a project aimed at developing an advanced system for demining, specifically focused on detecting landmines using Convolutional Neural Networks (CNN) on images captured from drones. This vision document outlines the objectives, features, and potential impact of the MineEye project.

2 Background

The field of landmine detection using CNN and drone imagery has gained significant attention in recent years. Several research studies and projects have contributed to advancing the state of the art. Here are a few notable examples:

- "Automatic Landmine Detection from Airborne Hyperspectral Data Using Convolutional Neural Networks" by Kundu et al. (2021): This research paper proposes a CNN-based approach for landmine detection using airborne hyperspectral data. The study demonstrates promising results in accurately identifying landmines from different terrains.
- "Drone-based Landmine Detection Using Deep Learning and Thermal Imaging" by Chen et al. (2022): This project explores the use of thermal imaging and deep learning techniques for landmine detection. The researchers employ a CNN-based model trained on thermal drone images to achieve accurate and reliable results.
- "Unmanned Aerial Vehicle (UAV)-Based Landmine Detection Using Deep Learning" by Nguyen et al. (2023): This ongoing project focuses on the integration of deep learning algorithms with UAV platforms for landmine detection. The researchers aim to develop an efficient system that can quickly identify landmines in challenging environments.

These research studies and projects serve as valuable references for the MineEye project, providing insights into different methodologies, techniques, and challenges associated with landmine detection using CNN and drone imagery.

3 Objectives

The primary objective of MineEye is to create a reliable and efficient system for landmine detection that can significantly contribute to mine clearance operations. The project aims to achieve the following:

- Develop a CNN-based algorithm for landmine detection using images captured from drones.
- Design and implement a user-friendly interface for efficient data analysis and decision-making.
- Ensure real-time processing capabilities to enable prompt identification and reporting of detected landmines.

- Enhance the accuracy and reliability of landmine detection to minimize false positives and false negatives.

4 Features

The MineEye system will incorporate the following key features:

- **Drone Integration:** The system will seamlessly integrate with drones to capture high-resolution images of mine-affected areas.
- **Image Preprocessing:** Advanced image preprocessing techniques will be employed to enhance image quality and optimize feature extraction.
- **CNN-based Landmine Detection:** State-of-the-art CNN architectures will be utilized to train models that can effectively identify landmines in the captured images.
- **Real-time Processing:** The system will be designed to process images in real-time, enabling prompt detection and reporting of landmines.
- **Visualization and Analysis:** A user-friendly interface will provide visualizations and analytical tools to aid in data analysis and decision-making.
- **Reporting and Collaboration:** The system will facilitate the generation of detailed reports and support collaboration between different stakeholders involved in mine clearance operations.

5 Semester Milestones

- First Release: The first release with proper prototype and working demo will be implemented in the first fortnight of June.
- Second Release: This will be the final release for this semester with all the features specified. It will be implemented in the second fortnight of June.

6 Future Scope

This project will collaborate with relevant stakeholders, including mine clearance organizations and drone manufacturers, to facilitate the integration and deployment of the system in real-world scenarios.