Problem Statement

Machine Learning : Farmers face delays and inaccuracies in assessing crop damage after natural disasters, which hampers their ability to claim subsidies. Manual inspections are slow, inefficient, and often inaccurate, causing financial strain and delayed recovery. There’s a need for faster, more accurate damage assessments to streamline subsidy claims

IDEA : Use drones to capture images of disaster-affected farms. Machine learning analyzes the damage, generating reports to help farmers quickly claim government subsidies. This ensures fast, accurate damage evaluation and speeds up the subsidy process**.**

TITLE : Advanced Drone-Based Assessment for Agricultural Loss & Government Subsidy Automation

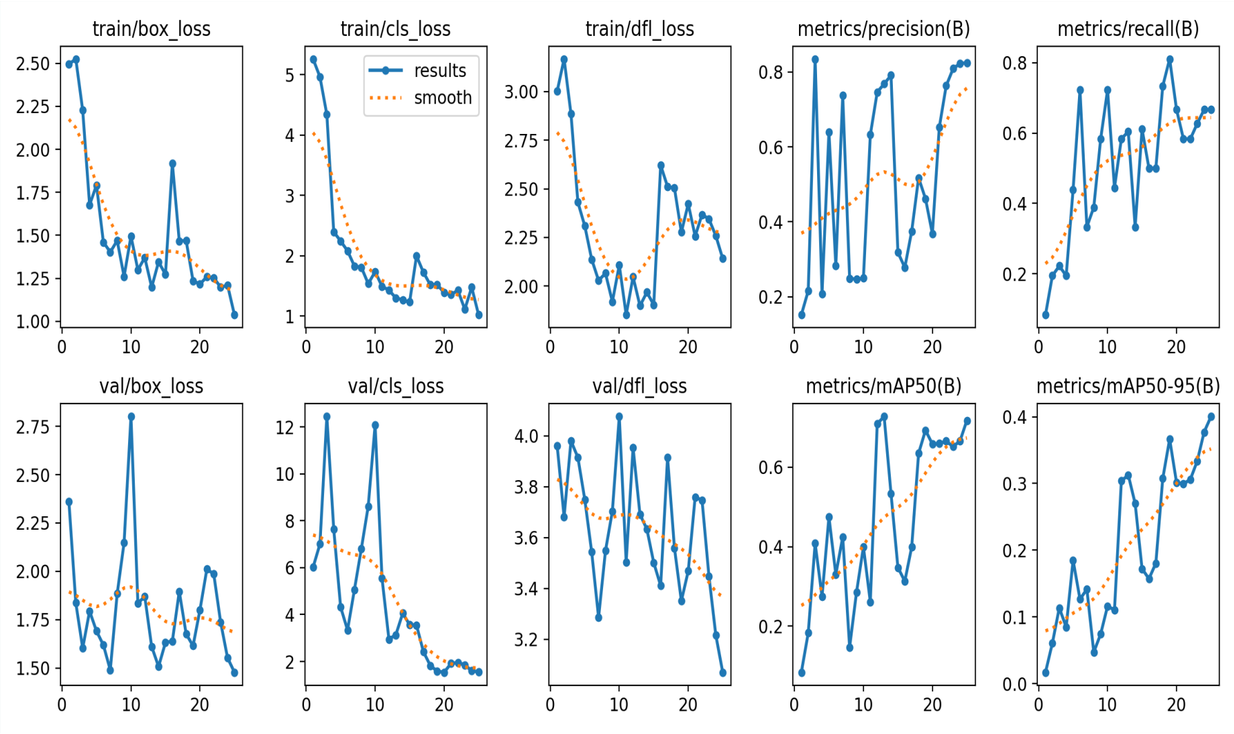
Team Name : SkyHarvest

Problem Statement : Farmers experiencing natural disasters—such as floods, droughts, hailstorms, and pest infestations—often struggle to accurately assess agricultural losses. Current manual inspection methods are slow, error-prone, and lack real-time insights, resulting in inadequate compensation and delayed government subsidy claims. There is a critical need for a faster, more accurate system to evaluate agricultural damage and streamline subsidy claims.

Write the overview of your problem here : Farmers face significant challenges in recovering from natural disasters like floods, droughts, and pest infestations, which devastate crops and land. The current damage assessment and subsidy claim process is slow, inaccurate, and reliant on manual inspections, delaying compensation and threatening farmers' livelihoods. A technology-driven solution is needed to assess agricultural damage efficiently and streamline subsidy claims, ensuring timely and fair compensation.

Briefly tell your problem history and products :Farmers face challenges in assessing agricultural damage after natural disasters, leading to delays and inaccuracies in claiming government subsidies. This results in financial hardships and prolonged recovery. Our technology-driven solution offers real-time damage assessments and streamlines the subsidy claim process, ensuring timely and fair compensation to enhance farmers' resilience against future disasters.

Solution :



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Data Analysis and Prediction: Machine learning algorithms analyze historical and real-time data to identify patterns and predict the extent of agricultural damage caused by natural disasters. This helps in creating accurate assessments that reflect the true impact on crops and land.

Automated Damage Classification: Machine learning models can automatically classify the severity of damage based on various input parameters, such as satellite imagery and sensor data. This automation reduces the need for manual inspections and speeds up the assessment process.

Continuous Improvement: As more data is collected over time, machine learning models can be continuously trained and improved, enhancing their accuracy and effectiveness in predicting agricultural damage. This iterative learning process ensures that farmers receive increasingly precise assessments and compensation recommendations.

Tech Stack

ALIGNMENT WITH CENTRAL SCHEMES

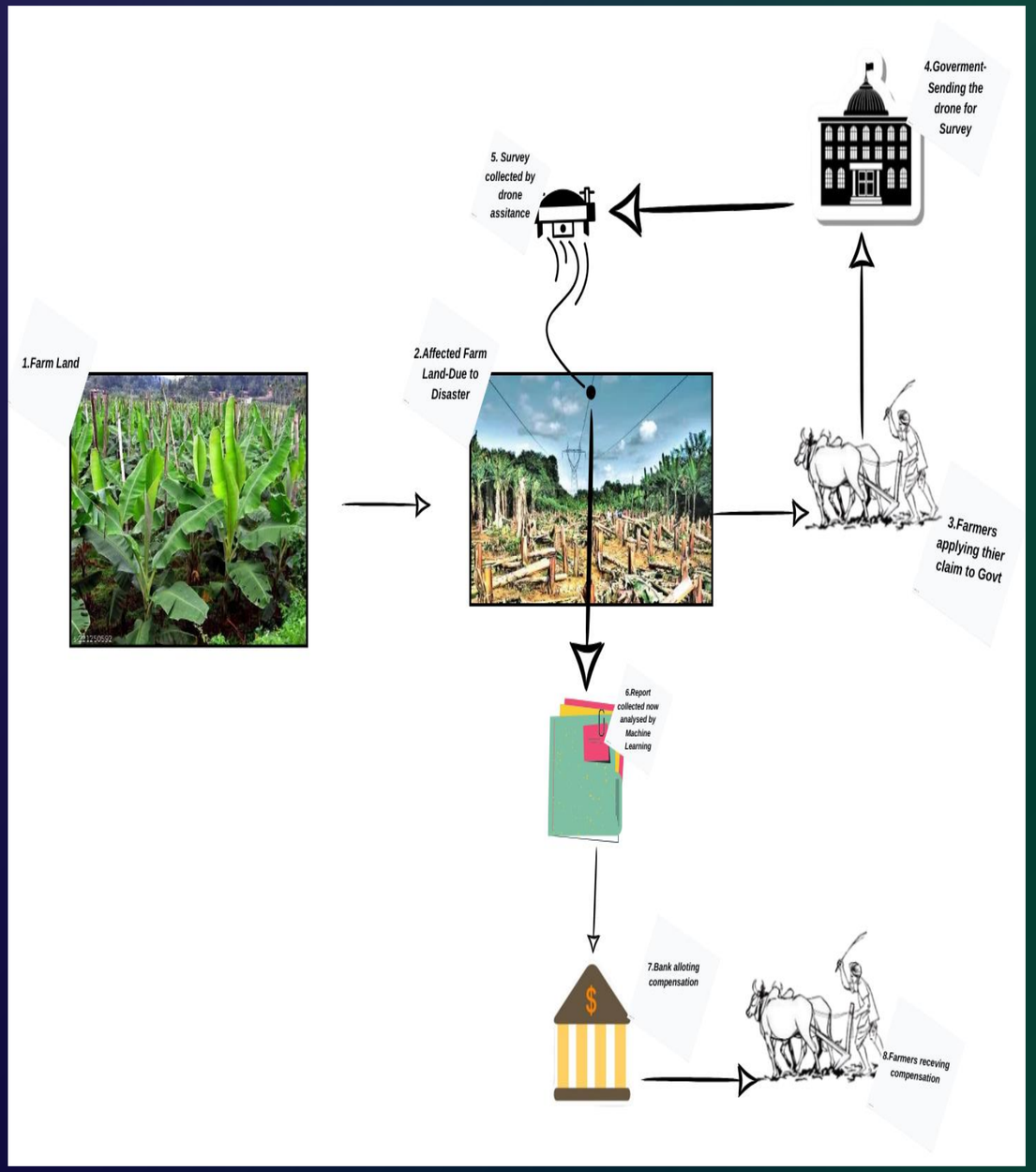
1.Namo Drone Didi : This initiative empowers women through SHGs by providing drone operation training. Our system can leverage this to enhance local drone usage, promoting gender inclusivity in agricultural assessments.
2.Sub-Mission on Agricultural Mechanization (SMAM): By integrating with SMAM, we can ensure farmers have access to the necessary software and hardware support for drones, improving their efficiency in damage assessments and subsidy claims.
3.Digital Agriculture Mission: This scheme allows us to store and publicly access reports generated from drone assessments, facilitating transparency and better decision-making in agricultural development.
4.National e-Governance Plan in Agriculture (NeGPA): Our system can support pre-disaster planning by providing data that helps Agricultural Technology Management Agencies (ATMA) implement effective disaster mitigation strategies.
5.Ministry of Agriculture and Farmers' Welfare: The Ministry can utilize our data for improved planning and decision-making during pre- and post-disaster events, enhancing overall disaster management.

BENEFITS FOR STAKEHOLDERS

The data generated will be crucial for State Agricultural Departments and insurance companies, ensuring timely compensation for farmers under government subsidy schemes. Additionally, our system will provide valuable insights to the National Disaster Management Authority (NDMA) for better disaster response planning.

Dependencies

For this project, we utilized several key dependencies to build a comprehensive system for analyzing drone data, generating PDF reports, and integrating plant health assessment using YOLOv5 as the base model. The primary libraries include FPDF, which is used to create structured and formatted PDF reports, and Faker to generate synthetic data such as location, dates, and random values for testing purposes. For plant health classification and land assessment, we incorporated the YOLOv5 model, which leverages PyTorch for deep learning, allowing real-time object detection and plant health monitoring. Additionally, OpenCV was used for image processing, enabling efficient handling of images captured by the drone. Randomization for test data was achieved using random, and Numpy was employed for data manipulation and numerical operations. These dependencies together facilitate a streamlined process from data collection via drones to plant health classification and the generation of detailed PDF reports.



Additional Info

- Objective: To develop a system for assessing plant health and land coverage using drone technology, integrating advanced deep learning models for real-time analysis and generating comprehensive PDF reports for stakeholders.
- Data Collection: Drones equipped with cameras capture high-resolution images of agricultural fields, providing crucial data for plant health assessment.
- YOLOv5 Model: Utilized as the base model for object detection, YOLOv5 effectively identifies healthy and unhealthy plants, enhancing the accuracy of plant health evaluations.
- PDF Reporting: The system generates structured reports using FPDF, including key metrics such as affected area, compensation calculations, and geographical data.
- Synthetic Data Generation: Leveraged the Faker library to create realistic synthetic datasets for testing and validation of the system, ensuring robustness and reliability.
- Image Processing: OpenCV is employed for pre-processing images, improving the quality of inputs fed into the YOLOv5 model, facilitating better detection outcomes.
- Future Enhancements: Plans to integrate real-time data analytics and a user-friendly dashboard for stakeholders to visualize plant health metrics and make informed decisions.
- Impact: Aims to empower farmers and agricultural businesses with actionable insights to improve crop yield, optimize resource usage, and enhance overall farm management practices.

Youtube Link: https://youtu.be/BsA9bOTGmso?si=O6dzBGggV0jN_vrh

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