AN INTEGRATED AGRICULTURE SYSTEM FOR PEST DETECTION AND PESTICIDE RECOMMENDATION

Project Reference No.: *47S_BE_0169*

College *: Adichunchanagiri Institute Of Technology, Chikkamagaluru*
Branch *: Department of Information Science And Engineering*
Guide(s) *: Dr. Anjali B V*
Student(S) *: Ms. Ananya L S*
Ms. M Sneha
Ms. Prerana A
Ms. Spandana M S

INTRODUCTION

Agriculture has long been the bedrock of human civilization, providing sustenance, economic stability, and a means of survival. However, the agricultural sector faces an ongoing and increasingly complex challenge – the management of pests. Pests, encompassing insects, fungi, and diseases, have become formidable adversaries, jeopardizing crop yields, food security, and the very foundation of our global food supply. In the quest for sustainable, efficient, and ecoconscious solutions, we find ourselves at the nexus of technology and agriculture, where artificial intelligence (AI) promises to play a transformative role. Our project, the "AI-Driven Pest Identification and Plant Protection System," represents a groundbreaking initiative in the domain of agricultural pest management. The contemporary agricultural landscape grapples with a paradox. On one hand, advances in farming practices, technology, and agrochemicals have led to significant increases in crop yields, feeding a growing global population. On the other hand, this agricultural intensification has inadvertently exacerbated the challenges posed by pests. Pests adapt, multiply, and evolve, causing substantial economic losses and ecological imbalances.

OBJECTIVES

Develop a robust AI model capable of accurately identifying various pests affecting crops. This involves training the system on a diverse dataset of images, ensuring it recognizes distinct features of insects, fungi, and diseases. Implement cutting-edge computer vision techniques to not only identify pests but also determine the specific part of the plant under attack. This involves segmenting and analyzing images to pinpoint affected areas, whether leaves, stems, roots, or fruits. Integrate a recommendation system that offers personalized, data-driven suggestions for pest mitigation. This involves considering factors such as pest species, plant type, and ecological conditions to propose effective and sustainable pest management strategies.

METHODOLOGY

The specific procedures or techniques used to identify, select, process, and analyze information about a topic. In a research paper, the methodology section allows the reader to critically evaluate a study's overall validity and reliability..

System Requirements: The system architecture of the pest detection system using Convolutional

Neural Network (CNN) consists of several interconnected components designed to facilitate the accurate and efficient identification of pests in agricultural fields. The architecture is structured to handle various stages of the pest detection process, including data preprocessing, model training, inference, and user interaction.

Hardware Requirements

Hard Disk : 500 GB

System : Intel i5 2.4 GHz.

Ram : 8 GB

Software Requirements

Operating system : Windows 10

Software Tool : Flask

Coding Language : Python 3.7.0 Toolbox : Visual Studio

Tensorflow:

TensorFlow is an open-source machine learning framework developed by Google. It's designed to allow researchers and developers to build and train machine learning models, particularly neural networks, for a variety of tasks, such as image recognition, natural language processing, and more.

Pip:

Pip is the standard package manager for Python. It is used to install and manage software packages written in Python.

Flask:

Flask is a micro web framework for Python based on Werkzeug, Jinja2, and inspired by Sinatra. It's lightweight, flexible, and designed to make getting started with web development in Python quick and easy.

RESULT AND CONCLUSION

The pest detection project has made significant strides towards the development of an automated and efficient solution for identifying pests in agricultural fields. The literature survey provided valuable insights into state-of-the-art techniques and methodologies in pest detection using CNNs, guiding the project's research and development efforts. Problem identification highlighted the limitations of existing pest detection methods and underscored the need for automated and accurate solutions.

Future Enhancement:One potential enhancement could be incorporating machine learning algorithms to analyze historical data on pest outbreaks, weather patterns, crop health, and pesticide usage to predict future pest occurrences with greater accuracy. Additionally, integrating real-time data from sensors placed in fields could provide up-to-date information on pest populations and environmental conditions, allowing for more timely and targeted pesticide recommendations.

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