Project Proposal

Members: 20k-0488 20k-0477 20k-0385 20k-0319 20k-0155 20k-1067

Research Topic: Research on Advancement in Computer vision and AI in Agriculture and Agritech

Research Problem Statement: With the rapid growth in world population,food production worldwide has to be increased rapidly.To meet those demands,farmers need more sophisticated technology to produce more from limited labor and land. However, there are several challenges farmers face such as pests,monitoring crop growth, nutrient deficiencies in plants and unpredictable weather patterns. Computer vision and AI can be used to monitor these factors and increase the production of the crops. Data will be collected from government organizations and analyzed. Computer vision will be used to detect features of crops and that will be used to increase the production. Some of the potential challenges that need to be addressed are lack of accurate data to train models, data privacy and potential impact on traditional farming practices. The smart farming concept using modern technology is the solution to increase the quantity and quality of agricultural products with minimal loss and labor.

Research Question/s:

- What are the current applications of computer vision and AI in agriculture and Agritech, and how effective are they in addressing the challenges faced by farmers?
- What are the ethical and social implications of using computer vision and AI in agriculture and Agritech, and how can they be mitigated?
- What is the potential impact of the adoption of computer vision and AI technologies on food security, agricultural productivity, and sustainability?
- How can computer vision and AI technologies be integrated with other technologies, such as IoT and robotics, to create a more comprehensive solution for agricultural production and management?

Purpose statement:

The purpose of this research is to explore the challenges and opportunities of advancing computer vision and AI in agriculture and Agritech, and to investigate the potential benefits of these technologies for sustainable agriculture and food security. Specifically, this research aims to identify the current applications of computer vision and AI in agriculture, the key technical, economic, and social challenges that need to be

addressed to facilitate their adoption, and the ethical and social implications of using these technologies. Farmers will be able to take advantage of the technology to grow more crops of better quality and in quick time with low losses and labor work. This will also encourage the youth who have interest in technology to gain interest in farming and give their contribution towards solving the global issue of food security

Relevance and Benefits of the study in CS:

The research addresses a critical application area of computer vision and AI in agriculture and Agritech. The potential impact of computer vision and AI on agriculture is enormous, as it can contribute to more efficient, sustainable, and productive agriculture, improving food security and livelihoods for millions of farmers worldwide. Moreover, this research can advance the field of computer vision and AI by addressing some of the unique technical challenges that arise in the context of agriculture, such as limited data availability, variability in environmental conditions, and the need for interpretability and explainability of AI models.

Literature Review:

According to FAO, 793 million people-one in every nine people in the world lacks food for leading their daily life [1]. Early advancements in the food business date back many centuries. They began with the use of rudimentary tools and evolved into the use of large machines.Through periodic field surveys and data assessment, the integration of computer vision and robotics created a new inventive way to farming. Drones, unmanned aerial systems for crop imaging, are among the most recent breakthroughs in site-specific crop management. Artificial Intelligence (AI) is a combination of numerous varieties of methods and phenomena, among which two major concepts called Neural Networks (NN) and Deep Learning (DL) are responsible for AI to attain such an outstanding advancement. [2] . It is being used for various purposes in agritech recently which includes disease detection, soil and irrigation management, weed management and yield prediction[3].However, we have still not reached the full potential in this sector due to reasons like lack of accurate data and data privacy

[1] V.Kakani,H.Kim “A critical review on computer vision and artificial intelligence in food industry ” www.sciencedirect.com/science/article/pii/S2666154320300144
[2] K.Spanaki “Artificial intelligence and food security: swarm intelligence of AgriTech drones for smart AgriFood operations”
https://www.tandfonline.com/doi/full/10.1080/09537287.2021.1882688
[3] R.Sharma “Artificial Intelligence in Agriculture: A Review”
https://ieeexplore.ieee.org/abstract/document/9432187

Research Methodology: Data will be collected from various resources including government owned organization so accurate data is provided to the model for training. Iot based devices using computer vision and Artificial Intelligence are used to calculate the chemical composition of fertilizers and soil such as phosphorus,potassium contents are needed to ensure plant fertility Data from the sensors help us to determine the precise amount of fertilizers required for the growth of the crops. All this data will be analyzed and studied to ensure crops get the correct amount of fertilizer and chemical components .Iot divides such as robots, drones will be employed to detect pests and diseases. By this, the overall cost and factors affecting the environment are significantly reduced.