



Computational Learning through Context Adaptation for Effective and Efficient Agriculture

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Description

To develop **fundamental principles on the design of context-aware cyber infrastructure** that employs AI and machine learning methods that sense crop health and recommend **contextualized** crop management practices to boost yield

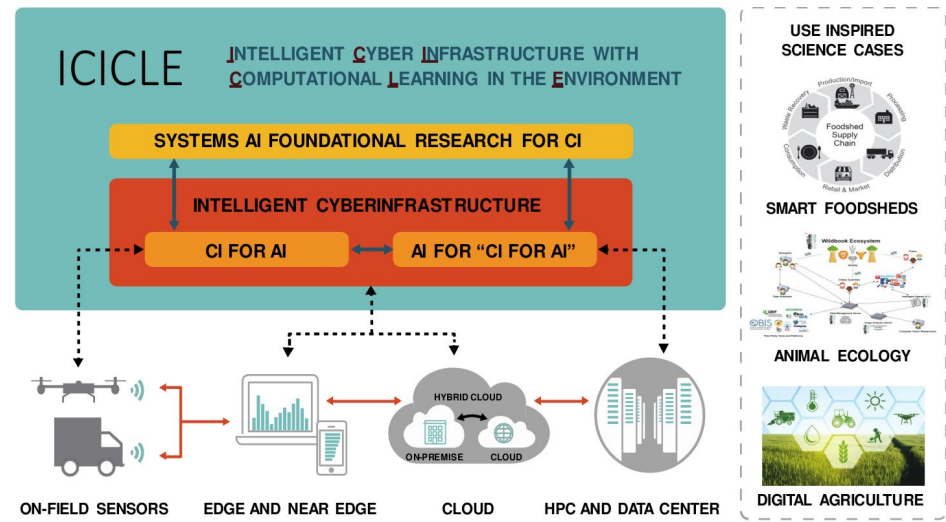
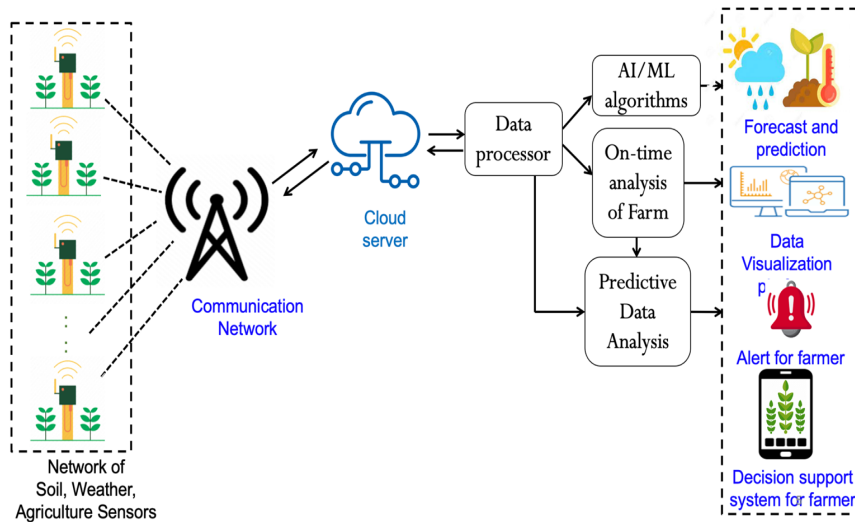
Cyberinfrastructure (CI) for digital agriculture

- Crop/plant datasets across regions
- Machine learning and data analytics for crop health monitoring/modelling
- Autonomous unmanned aerial vehicles for crop scouting
- Ensuring privacy-preservation in data corresponding to farmers/farm

Description

Three thrust areas

- Crop health modelling
- Privacy-preserving information sharing
- Crop scouting



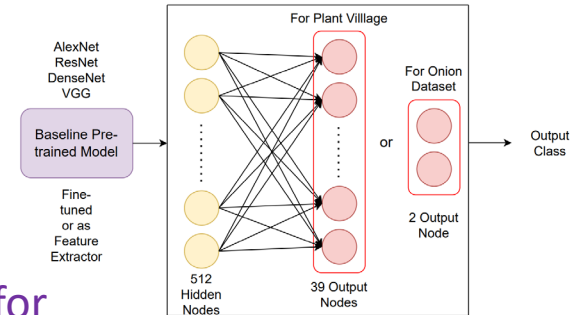
Findings

Narrowed down our focus crops to be **Onion** and **Soyabeans**

Crop health modelling

- Approach: Transfer learning from existing PlantVillage dataset
 - Helped in Onion disease detection
 - Did not help in Soyabean disease detection
- Ongoing: Dataset similarity metrics to choose dataset for transfer learning

Disease detection in Onion (small dataset)



Accuracy	0.924
Precision	0.65
Recall	0.93
F-score	0.767

Privacy-preserving information sharing

- Identified farm attributes with potential privacy risks
- Ongoing: Assessment and application of epsilon-differential level privacy (using public domain data from India)

Crop scouting

- Difficulty in deploying UAV platform compatible with US infrastructure in India
- Ongoing: Intermediate solution to manage UAV imaging (based on US PI's visit to Onion farms)