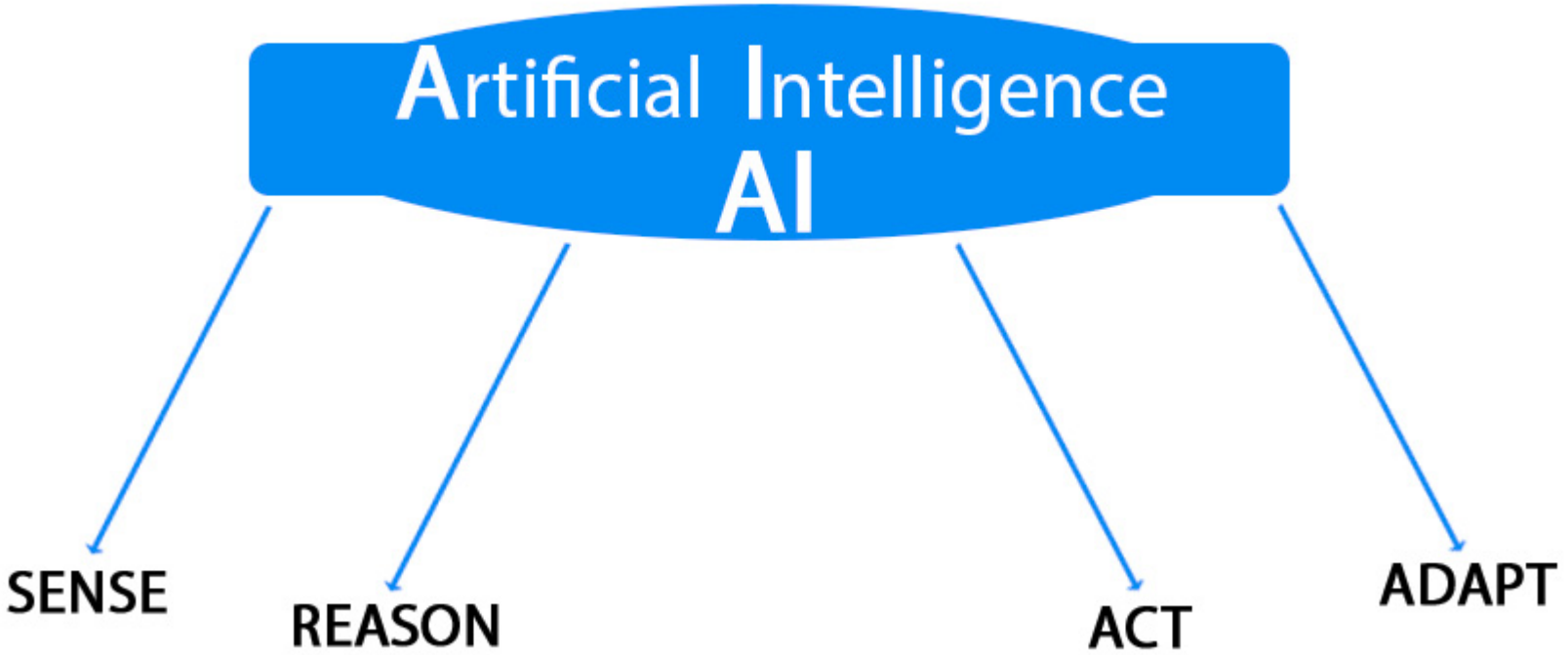
Artificial intelligence for extension advisory service



Artificial intelligence (AI)

- The ability of a computer or a computer-enabled robotic system to process information and produce outcomes in a manner similar to the thought process of humans in learning, decision making and solving problems.

McCarthy (Father of Artificial Intelligence): The ability of a machine to perform cognitive functions we associate with human minds such as perceiving, reasoning, learning and problem solving

AI in Agriculture

- **Holds the promise of meeting the demand to produce 50% more food and cater to an additional 2 billion people by 2050 as compared to today**

- **Has the potential to address challenges such as**
  - **inadequate demand prediction**
  - **lack of assured irrigation**
  - **overuse / misuse of pesticides and fertilisers.**

- **Improvement in crop yield through**
  - **real time advisory**
  - **advanced detection of pest attacks**
  - **prediction of crop prices to inform sowing practices**

Insect – Pest prediction enables farmers to plan

•Microsoft + United Phosphorous (UPL) developed **Pest Risk Prediction App,** predicts attack of Jassids, Thrips, Whitefly and Aphids

•Helps to take preventive action, provide guidance on the probability of pest attacks

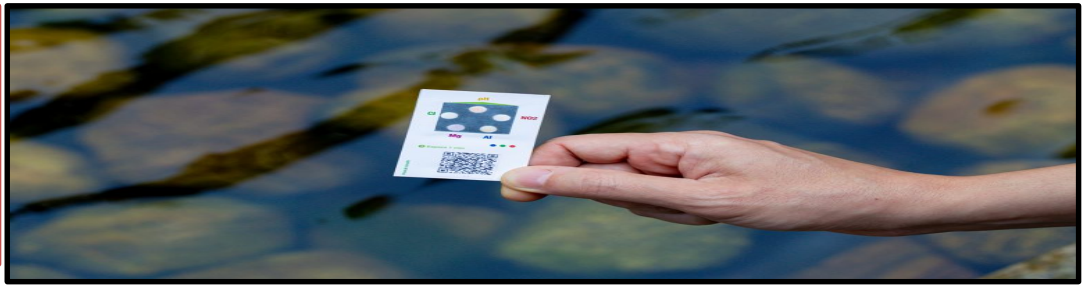
- More than 3,000 farmers with <5 acres of land in 50 villages across in Telangana, Maharashtra and Madhya Pradesh are receiving voice calls for their cotton crop
- The calls indicate the risk of pest attacks based on weather conditions and crop stage in addition to the sowing advisories.
- The risk classification is High, Medium and Low, specific for each district in each state.

Crop yield prediction model

- NITI Aayog in collaboration with IBM developed a crop yield prediction model using AI to provide real time advisory to farmers
- IBM’s AI model for predictive insights
  - To improve crop productivity
  - Control agricultural inputs
  - Early warning on pest/disease outbreak, use data from ISRO
  - Soil health cards
  - IMD’s weather prediction and soil moisture/temperature etc.
- Being implemented in Assam, Bihar, Jharkhand, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh

AgroPad: Chemical analysis of the soil and water

- Enables real-time, on-location, chemical analysis of soil and water
- A drop of water or soil sample is placed on the AgroPad
- The microfluidics chip inside the card performs on-the-spot a chemical analysis of the sample, provides results in less than 10 seconds
- The set of circles on the back of the card provide colorimetric test results; the color of each circle represents the amount of chemical in the sample
- Using a smartphone, the farmer takes a single snapshot of the Pad using a dedicated mobile app and immediately receives a chemical test result



AI Sowing App

- Developed by Microsoft in collaboration with ICRISAT, Hyderabad
- Sends sowing advisories to farmers on the optimal date of sowing
- No need of any sensors in their fields. Need a phone for receiving text messages
- The advisories contained essential information including
  - the optimal sowing date
  - soil test based fertilizer application
  - farm yard manure application
  - seed treatment
  - optimum sowing depth etc
- More than 3,000 farmers across the states of Andhra Pradesh and Karnataka are getting benefits for crops including groundnut, ragi, maize, rice and cotton
- The increase in yield ranged from 10% to 30% across crops

AI and Challenges in Agriculture

- Lack of familiarity with machine learning solutions among farms
- Exposure of farming to external factors like weather conditions, soil conditions and presence of pests is quite a lot
- AI systems also need a lot of data to train machines and to make precise predictions.
- In case of vast agricultural land, though spatial data can be gathered easily, temporal data is hard to get. For example, most of the crop-specific data can be obtained only once in a year when the crops are growing. Since the data infrastructure takes time to mature, it requires a significant amount of time to build a robust machine learning model.

Conclusion

- The future of farming depends largely on adoption of cognitive solutions.
- In order to explore AI in agriculture, applications need to be more robust. Only then will it be able to handle frequent changes in external conditions, facilitate real-time decision making and make use of appropriate framework/platform for collecting contextual data in an efficient manner