Using Artificial Intelligence to solve problems faced by farmers in traditional farming

Artificial intelligence:

Artificial intelligence is based on the principle that human intelligence can be defined in a way that a machine can easily impersonate and execute tasks, from the simplest to those that are even complex. The goals of artificial intelligence include learning, reasoning, and perception.AI is making a huge impact in all domains of the industry. Every industry is looking to automate certain jobs through the use of intelligent machinery.


Agriculture and farming are one of the oldest and most important professions in the world. It plays an important role in the economic sector. Worldwide, agriculture is a $5 trillion industry. The global population is expected to reach more than nine billion by 2050 which will require an increase in agricultural production by 70% to fulfil the demand. As the world population is increasing due to which land water and resources becoming insufficient to

continue the demand-supply chain. So, we need a smarter approach and become more efficient about how we farm and can be most productive.

Life-Cycle of Agriculture:

We can divide the process of Agriculture into different parts:
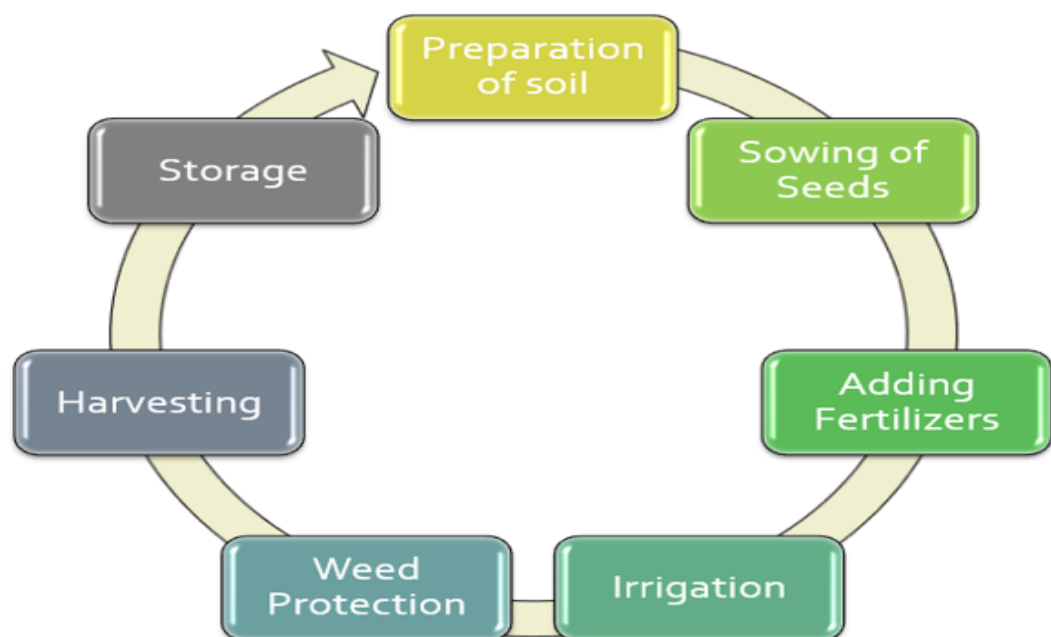
Preparation of soil:

It is the initial stage of farming where farmers prepare the soil for sowing seeds. This process involves breaking large soil clumps and remove debris, such as sticks, rocks. Also, add fertilizers and organic matter depend on the type of crop to create an ideal situation for crops.

Sowing of seeds:

This stage requires taking care of the distance between two seeds, depth for planting seeds. At this stage climatic conditions such as temperature, humidity, and rainfall play an important role.

Adding Fertilizers:

To maintain soil fertility is an important factor so the farmer can continue to grow nutritious and healthy crops. Farmers turn to fertilizers because these substances contain plant nutrients such as nitrogen, phosphorus, and potassium. Fertilizers are simply plant nutrients applied to agricultural fields to supplement the required elements found naturally in the soil. This stage also determines the quality of the crop.

Irrigation:

This stage helps to keep the soil moist and maintain humidity. Underwatering or overwatering can hamper the growth of crops and if not done properly it can lead to damaged crops.

Weed protection:

Weeds are unwanted plants that grow near crops or at boundary of farms. Weed protection is an important factor as weed decreases yields, increases production cost, interfere with harvest, and also, lower crop quality.

Harvesting:

It is the process of gathering ripe crops from the fields. It requires a lot of laborers for this activity so this is a labour-intensive activity. This stage also includes post-harvest handling such as cleaning, sorting, packing, and cooling.

Storage:

This phase of the post-harvest system during which the products are kept in such a way as to guarantee food security other than during periods of agriculture. It also includes packing and transportation of crops.

Challenges faced by farmers by using traditional methods of farming:

Listing down general challenges that exist in the agricultural domain.

- In farming, climatic factors such as rainfall, temperature, and humidity play an important role in the agriculture lifecycle. Increasing deforestation and pollution result in climatic changes, so it's difficult for farmers to take decisions to prepare the soil, sow seeds, and harvest.
- Every crop requires specific nutrition in the soil. There are 3 main nutrients nitrogen(N), phosphorus(P) and potassium(K) required in soil. The deficiency of nutrients can lead to poor quality of crops.
- As we can see from the agriculture lifecycle that weed protection plays an important role. If not controlled it can lead to an increase in production cost and also it absorbs nutrients from the soil which can cause nutrition deficiency in the soil.

Applications of Artificial Intelligence in Agriculture:

The industry is turning to Artificial Intelligence technologies to help yield healthier crops, control pests, monitor soil, and growing conditions, organize data from farmers, help with the

workload, and improve a wide range of agriculture-related tasks in the entire food supply chain.

Use of weather forecasting:

With the change in climatic condition and increasing pollution it's difficult for farmers to determine the right time for sowing seed, with help of Artificial Intelligence farmers can analyse weather conditions by using weather forecasting which helps them plan the type of crop and when should seeds be sown.
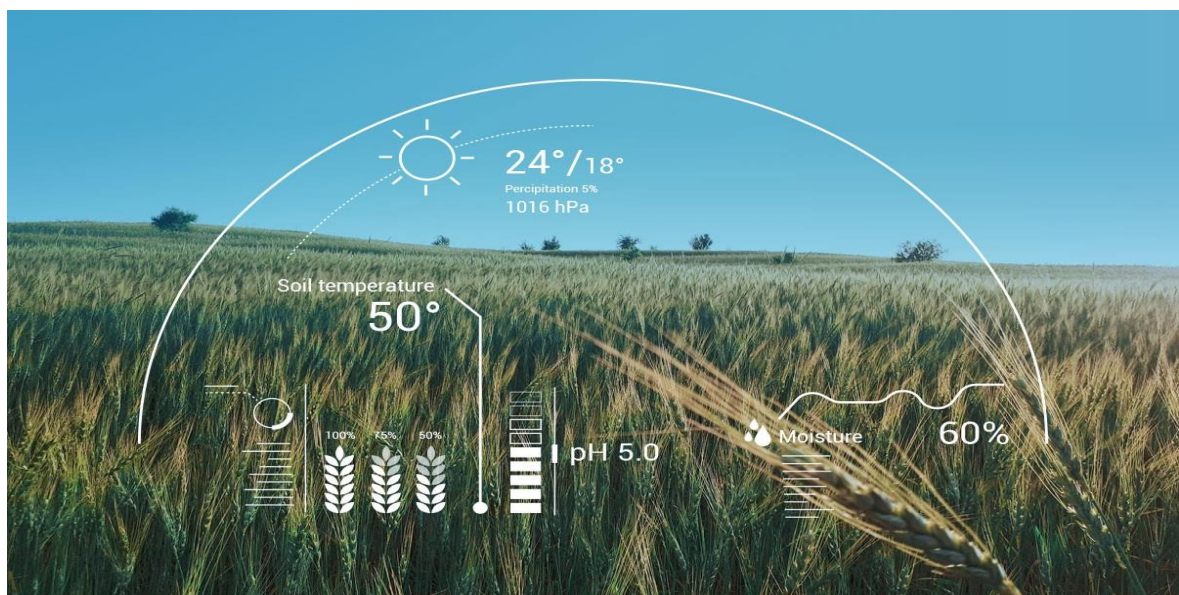
Soil and crop health monitoring system:

The type of soil and nutrition of soil plays an important factor in the type of crop is grown and the quality of the crop. Due to increasing, deforestation soil quality is degrading and it's hard to determine the quality of the soil.

A German-based tech start-up has developed an AI based application called Plantix that can identify the nutrient deficiencies in soil including plant pests and diseases by which farmers can also get an idea to use fertilizer which helps to improve harvest quality. This app uses image recognition-based technology. The farmer can capture images of plants using smartphones.

Similarly, Trace Genomics is another machine learning-based company that helps farmers to do a soil analysis to farmers. Such type of app helps farmers to monitor soil and crop's health conditions and produce healthy crops with a higher level of productivity.
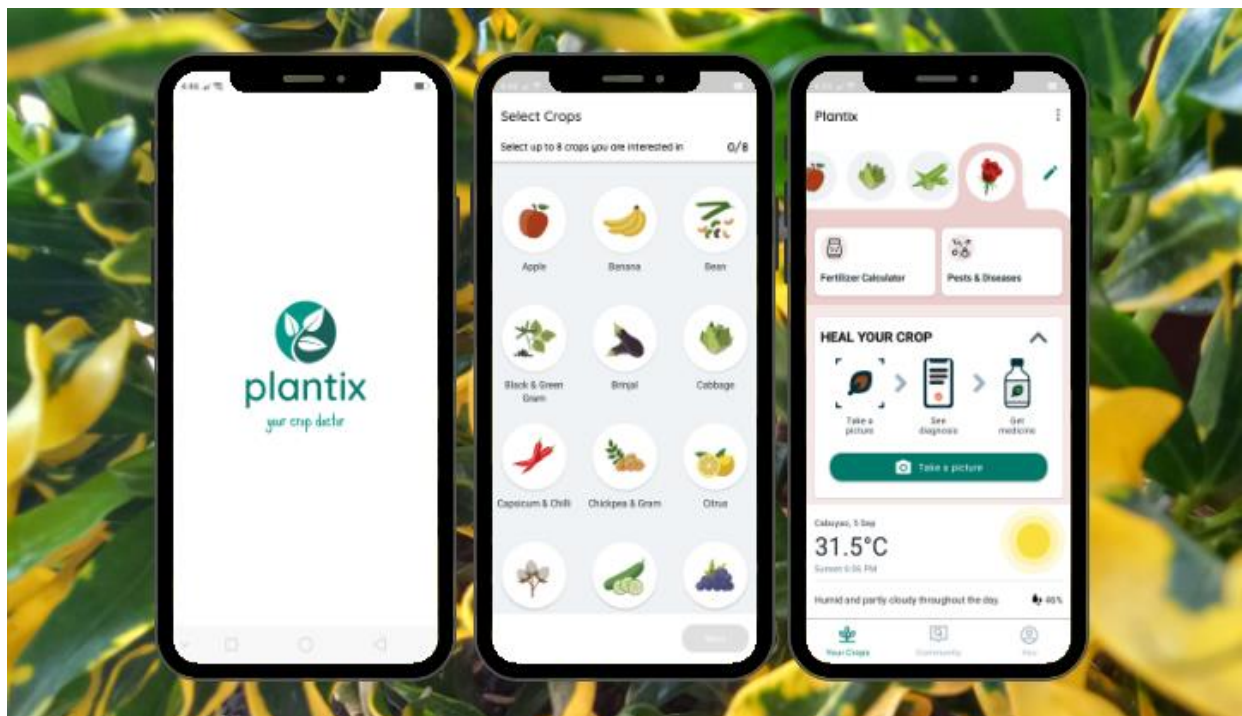
Analysing crop health by drones:

SkySquirrel Technologies has brought drone-based aerial imaging solutions for monitoring crop health. In this technique, the drone captures data from fields and then data is transferred via a USB drive from the drone to a computer and analysed by experts.

This company uses algorithms to analyse the captured images and provide a detailed report containing the current health of the farm. It helps the farmer to identify pests and bacteria helping farmers to timely use of pest control and other methods to take required action.

Precision Farming and Predictive Analytics:

AI applications in agriculture have developed applications and tools which help farmers inaccurate and controlled farming by providing them proper guidance to farmers about water management, crop rotation, timely harvesting, type of crop to be grown, optimum planting, pest attacks, nutrition management.

While using the machine learning algorithms in connection with images captured by satellites and drones, AI-enabled technologies predict weather conditions, analyse crop sustainability and evaluate forms for the presence of diseases or pests and poor plant nutrition on farms with data like temperature, precipitation, wind speed, and solar radiation.

Farmers without connectivity can get AI benefits right now, with tools as simple as an SMS-enabled phone and the sowing App. Meanwhile, farmers with Wi-Fi access can use AI applications to get a continually AI-customized plan for their leads. With such IoT and AI-driven solutions, farmers can meet the world's needs for increased food sustainably growing production and revenues without depleting precious natural resources.

In the future, AI will help farmers evolve into agricultural technologists, using data to optimize yields down to individual rows of plants.

Agricultural Robotics:

AI companies are developing robots that can easily perform multiple tasks in farming fields. This type of robot is trained to control weeds and harvest crops at a faster pace with higher volumes compared to humans.

These types of robots are trained to check the quality of crops and detect weed with picking and packing of crops at the same time. These robots are also capable to fight with challenges faced by agricultural factor labour.


AI-enabled system to detect pests:

Pests are one of the worst enemies of the farmers which damages and detect that if any insect has landed and which type of insect has landed like the locust, grasshopper, etc. And send alerts to farmers to their smartphones so that farmers can take required precautions and use required precautions and use required pest control thus AI helps farmers to fight against pests.

AI enabled system to detect weeds:

The weed-controlled device works by integrating cameras, computer vision, machine learning and robotics to make an intelligent sprayer which drives through fields to target and spray weeds, leaving the crops intact, working essentially the same the way facial recognition technology operates. The program was shown thousands of pictures of weeds until it was able to recognize the difference between the weeds and crops.
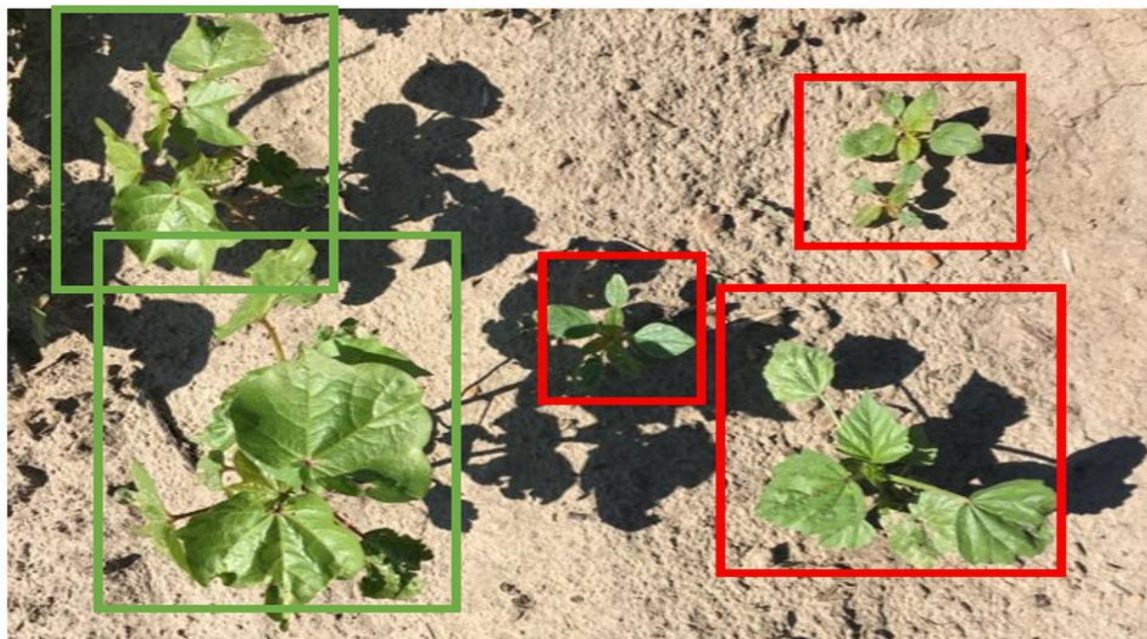
Conclusion:

Artificial Intelligence in agriculture not only helping farmers to automate their farming but also shifts to precise cultivation for higher crop yield and better quality while using fewer resources.

Companies involved in improving machine learning or Artificial Intelligence-based products or services like training data for agriculture, drone, and automated machine making will get technologies advancement in the future will provide more useful applications to this sector helping the world deal with food production issues for the growing population.