Artificial Intelligence in Agriculture

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Abstract—**The paper presents a comprehensive survey on Artificial Intelligence techniques in agriculture and its importance. The United Nations FAO (Food and Agriculture Organization) states that the world population would increase by another 2 billion in 2050 while the additional land area under cultivation will only 4% at that time. In such circumstance use of latest technological solutions to make farming more efficient. A direct application of AI or machine intelligence across the farming sector could act to be an epitome of shift in how farming is practiced today .Using Artificial intelligence we can develop smart farming practices to minimize loss of farmers and proved them with high yield .Farming solution which are AI powered enables a farmer to do more with less, enhancing the quality, also ensuring a quick (GTM) go-to-market strategy for crops. The current paper throws a vision of how the diverse sectors of agriculture can be fuelled using AI. It also investigates the future of agriculture and the challenges ahead.**

Keywords—*Agriculture, Artificial Intelligence, Robotics, Smart Farming.*

I. INTRODUCTION

Artificial Intelligence is one of the key areas of research in computer science because of its rapid technological advancement and vast area of applications. One of the main areas where the presence of AI is extremely necessary is agriculture. Agriculture is generally a primary occupation which takes a lot of hard work, perseverance, persistence with low income and uncomfortable lifestyle. Farmers work very hard to grow suitable crops which takes a lot of time and therefore they are forced to accept agriculture as their main source of income but because of low income and sometimes no gain from land due to weather conditions or scarcity of resources, farmers have to face loss and declination in financial conditions which ultimately result in suicide due to depression. The main reason for the same problem is failing in choosing a proper secondary occupation due to more time consumption and drainage of energy. AI in agriculture will allocate in fixing these sensible problems by reducing time consumption and nearly null hard work. Proper use of AI will absolutely result in better yield with uniform plantation and proper growth of crops resulting in better lifestyle for farmers.AI in agriculture will help farmers to plan a secondary path for income which will help them to bolster their moral avoiding depressions and suicides. With an aim of increasing domination of AI in agriculture, I have done a survey on AI in agriculture and have recorded responses with reviews of some students and teachers.

## II. IMPORTANCE OF AI IN AGRICULTURE

Artificial Intelligence (AI) can be applied cross disciplinary and it can also bring a paradigm shift in how we see farming today. AI-powered solutions will not only enable farmers to do more with less, but it will also help farmers to acquire more yield, as per the increasing utilization of high tech machineries in general life, such as education, hospitals and even governance. Agriculture is the most reverberated of all, as artificial intelligence is focused on easiness and smart working. Agricultural fields should be enhanced with AI on low costs and easy processing. Through Artificial Intelligence various agriculture problems are controlled in quick interval of time. In Artificial intelligence various techniques like improve harvesting quality, introduce indoor farming for better production rate of crops. There are many applications of AI which will genuinely help farmers such as Analyse farm data by improving quality and accuracy of crops, with the help of AI sensor target weeds can be detected, and also it can detect diseases in plants, pests etc.AI tackles with labour challenges, As we know less people are entering this profession, therefore farmers are facing problems of a workforce shortage, less manpower so solution to this is agriculture bots which will work along with farmers. This bots harvest crops at higher volume and faster too. There are agricultural robot which are used in Blue river technology for controlling weeds. Harvest CROO Robotics which leads to crop harvesting, Robotics had develop a robot for farmers which will pick and pack the crop.

AI also does diagnostic analysis like Satellites for Weather Prediction and Crop Sustainability; this would really help farmers if they previously have idea of weather changes. Driverless Tractors one of the AI techniques as it operates without presence of human inside the tractor itself it will reduce much work of farmers. One of the interesting technologies that must be highlighted is Farmer's Alexa which will be able to converse with farmer same like chatbots to figure out tough problems. Crop spraying technique also helps farmers by aerial spraying is five times faster with drones than traditional machinery.One of the smart applications is introduced in AI for farming is agri-E-Calculator which helps   which helps farmerfor choosing suitable and affordable crops,it calculates its price. There are many more applications available in market but problem is it contains high cost,difficult manual.In simple words we can say that ,the use
of AI in Agriculture is allowing farmers worldwide to run more efficiently.

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III. SURVEY ON SMART FARMING

The survey which was conducted by me got a great response. More than 100 people responded and reviewed. According to the survey, 3 questions were asked which concentrated on the implementation, compatibility and melioration of agriculture through artificial intelligence and a review has been taken. Subsequently the questions are

*A. Do you actually think that technology can revolutionize the traditional farming?*
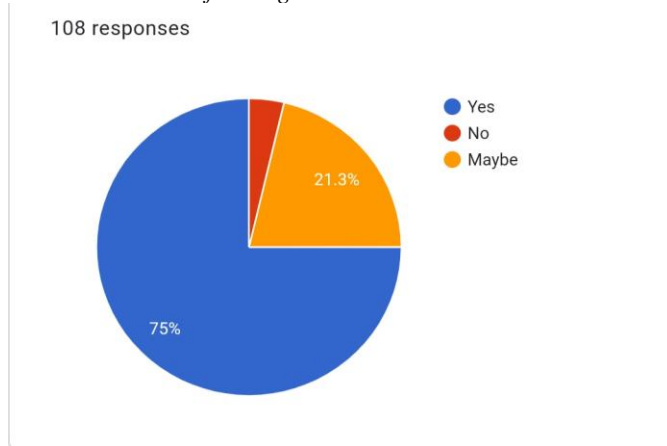
Many responses that is almost 75% are positive, 3.7% responses are negative while 21.3% responses are neutral. According to the responses it is clear that majority of people can imagine the artificial intelligence as a tool to upgrade traditional farming. Very few are against the thought that artificial intelligence in agriculture is useful. Some are not able to adjudge accurately whether artificial intelligence should be implemented in agriculture or not. My personal stand goes with majority which states that genuinely technology can revolutionize the traditional farming to a greater extent.

B. Do you think that smart farming can genuinely help farmers to acquire better yield?
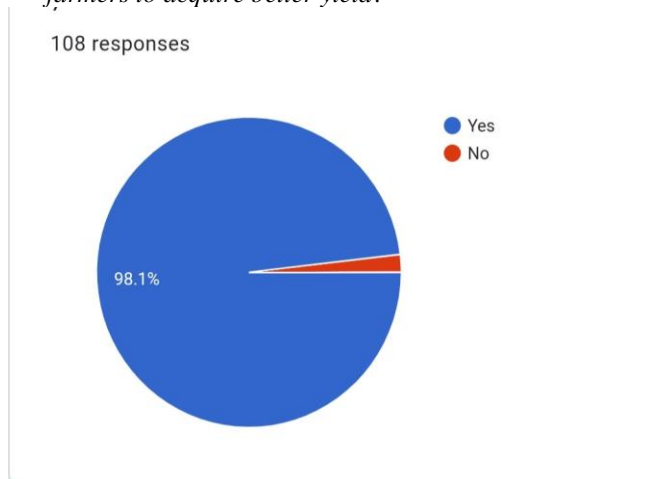
The response was actually predictable, it came almost 98% positive and remaining negative. Majority of vote is in accordance with the point that better yield can be acquired with the modification of farming techniques with help of artificial intelligence.

C. Particularly for small scale farming, will smart farming be beneficial? What factors can affect the mentality of farmers?
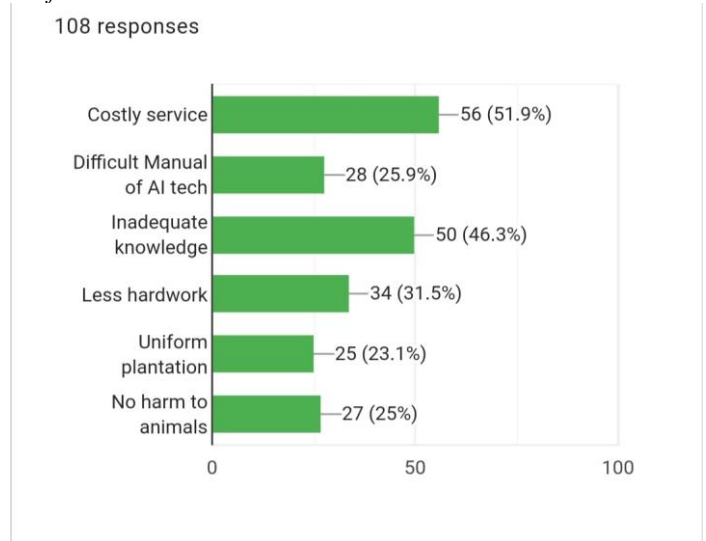
According to survey this question contains 6 factors that can affect the mentality of farmers. As you can see the bar graph factor that affects most are costly services of AI with 56%, due to AI higher technology their cost will be more, so farmers usually prefer traditional farming. Second factor which contain more percentage that is Inadequate Knowledge with 50% of vote. Third factor is Difficult Manual of Artificial technology which contains 28% of responses of peoples. I would personally prefer these three factors as barriers of AI in Agriculture but if these will solve then farming sector will be at another level, to get aware of these technologies to farmers some seminars and functions should be organized. Another factor is less hard work with 34%, Using AI farmers will get maximum profit with minimum efforts. Next factor is Uniform plantation with least votes 25% and last factor is No harms to animals which contain 27% of votes. So we got to know that if farmers want to use AI in farming sector in day to day life then cost of technologies should be reduced.

D. Review of AI in Agriculture.

According to survey more than 50 peoples gave their review and most of the people thinks that AI has many advantages and some disadvantages which should be eliminated then farming will be at next level, we can say Modern Farmer.

IV. FUTURE SCOPE

It is not easy to predict the future of Artificial Intelligence. Artificial Intelligence in the 90's was focused on enhancing research and development, but is that the only goal in future? Research is centered on contrasting human-like machines or robots. If machine start doing work for humans then, the role of humans will definitely change. The hard work of researchers may pay them off someday and we will find our work done by machines and a robot walking with us. In future we will see the Robots working in agricultural field and will have more quantity of yield with quality.

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V.   RESULT

According to survey Artificial Intelligence is helpful to farmers concerning their hard work and profit, it may be costly but farmers can survive from atmospheric disaster and they can smartly earn profit in opposite condition. These technologies will boost productivity and efficiency. Review says that the AI is much beneficial in farming by eliminating some factors like cost and difficult manual of technology. Cost can be reduced by promoting the idea through government policies and by practically demonstrating the farmers the demo of correct utilization and with practice artificial agriculture will be a boon for farming.

CONCLUSION

This paper has been prepared to make it as informative as possible with details of various AI techniques employed in agriculture. During the early 1980s and 1990s, the rule based expert systems were extensively used whereas from 1990 onwards, artificial neural network models and fuzzy inference systems have taken the dominant role. In the survey many people have provided their view by saying AI will be much useful to farmers today and in future. Further researches are being conducted with more advanced tools so that traditional agriculture can move towards precise agriculture with low cost.

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