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# Precision farming and Predicate analytics

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**Abstract:** This paper tries to capture the concept of precision agriculture and predictive analytics. This documentation throws light on the need for precision agriculture, associated technologies, the different ways to achieve it and mainly how to deal with the shortcomings by using the best possible solution. Different technologies are involved here to find the type of area, soil and other different factors by using various sensors. The primary objective is to cultivate the appropriate crop at the correct time so as to produce larger yield for the farmer

## I. INTRODUCTION

In earlier times when agriculture come into topic, we think about cultivation, fertility of soil, appropriate crops and mainly irrigation. But in modern world, agriculture has changed a lot where science has a upper hand. Now when we think of agriculture it is important to ensure that various factors like climate change, types of irrigation facilities, technological advancements etc are also considered.

That is people now are more interested in knowing how science can help us in agriculture. While the population keeps on increasing, the crop production resources are rapidly decreasing. Crop failure is the main problem faced by the farmers which pull them back from the field of agriculture. Its because they don't have a resource to find the appropriate crop. This situation can be avoided by introducing the agriculture through precision farming and predictive analytics. The three main components of precision agriculture are information, technology and management. These components are used collectively that uses technology to collect data from various sources which factors into the decision making. The technology associated are Global Positioning System (GPS), Geographic Information System (GIS), Sensors, Yield Monitors and guidance systems.

## II. NEED

According to UN world population report, it is expected that the population will reach 9.7 billion. That means the population is going to increase for about 34 percentage.

Inorder to provide food for this 9.7 billion people, the food products must be increased to 70 percentage than what it is today.

Thus it is necessary to implement techniques like precision farming to achieve higher crop gain. It also help us to mitigate the impact of crop failure which results in high profit and the entire world population can be feeded.

So we can use science and technological innovation to gather solutions for critical issues faced by the farmers as well as the entire world population.

## III. TECHNOLOGIES INVOLVED

### A. Global Positioning System (GPS)

GPS is a network of orbiting satellites, sending precise positional details of earth from space. It's obtaining a birds- eye point of view, but from space. The signals are obtained by GPS receivers, to calculate the exact location and time. It has an accuracy of between 100 and 0.01 m. Some GPS receivers are accurate they can establish their location within 0.4 inches,It enables farmers to identify field information, such as soil type, farm planning ,pest occurrence, field mapping ,weed invasion, water holes, soil sampling etc based on a precise location. This becomes particularly helpful when farmers need to make decisions regarding seed plantation, pesticides, fertilizers and irrigational needs etc[2]

  

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B. Geographic Information System (GIS)

It is a system designed to capture, store, manipulate, manage, checking and displaying data related to positions on earth surface. GIS comprises of hardware, software and procedures for supporting the storage, retrieval and also helpful for analysis of location data to produce maps. GIS binds information in one place so that it can be used when needed. GIS maps contain layers of information like yield, crop type, nutrient levels . A farming GIS database can provide information on field topography, surface drainage, soil types , rainfall, irrigation, rates of chemical application and crop yield. Once analyzed, this information is used to understand the relationships between the various elements effecting a crop on a specific site[3].The power to collect and analyze farmland data is one of many reasons why geographic information systems (GIS) are so valuable in agriculture. Field machinery on the ground and drones and satellites in the sky collect GIS agriculture data. Then, this information can be used for a wide variety of purposes, from precision farming and crop prediction etc. This tool that helps the users to create multi layered interactive maps that used for visualization of complex data and for spatial analysis.by visualizing data GIS helps farmers to spot trends and patterns.

C. Grid soil sampling and variable –rate fertilizer (VRT)application

Grid sampling is an unbiased, simple and relatively quick method for site specific soil management. Variable-rate technologies (VRT) may be applied to numerous farming operations. They set the rate of delivery of farms according the type of soil. The GIS extrapolated information control the process. such as crop determination, levels of seeding etc. Grid soil sampling, using the same principles, increases the intensity of sampling. Samples collected in a systematic grid can be mapped to specific locations thus giving us an application map. Grid soil samples are analyzed and interpreted to determine crop nutrient needs. Then using this information a fertilizer application map is plotted. Both maps are fed into a computer which generates a detailed and systematic schedule for plantation and fertilizer needs. The use of grid sampling can improve the yields and crops of farm, and also explore what nutrients are limiting the yield and correct the issue .

D. Sensors

The use of electronic devices such as smartphones, tablets etc and availability of internet connectivity it is very easy to get or share any information from anywhere. use of android apps will provide quick and efficient functionality to be grown with technology. use of apps will provide more benefits in the field like precision farming .apps used for the agricultural monitoring gives information about the whether information, availability etc and also if smartphone sensors installed in any field they can measure the temperature and humidity of the soil and the air .and apps used for agriculture monitoring give information like weather information, market rate and availability etc. Similarly apps can also provide predictive weather analysis, variety of seedlings available, fertilizers, pesticides and herbicides available etc [8].growing use of electronic devices is one of the major technology we used in now a days .it helps the farmers to easy accessing of informations .[2]

E. Rate controller

Rate controllers controls the rate of chemicals to used for the crops such as fertilizers and pesticides, either liquid or granular.it controls or monitors the speed of tractor /sprayer used in the field. and also it controls the flow rate and pressure of the materials . It helps to prevent the overusing of chemicals on the field and improves the production.it mainly used in the stand-alone systems.

F. Precision livestock farming

It is defined as the continuous monitoring of the control systems using sensors for early problems detection and also a methods for managing the livestock.

It is mainly focus on egg and milk production and detection and monitoring of diseases , growth of animals etc.it includes monitoring of milk that check the quality , fat and the microbial level and also it helps to find any infections .PLF technology includes Camara , sensors etc for tracking livestocks. and also it involves continuous monitoring of animals to improve their productions , reproductions , health etc.[1]

G. Mobile Apps

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## IV. APPROACH

There are basically two classification for precision agriculture to be specific soft and hard PA. Soft precion agriculture essentially depends on visual perception of crop and soil and management decision based on experience and intuition.The cutting edge innovations like GPS, RS, VRT etc are classified beneath hard precision agriculture.

For better cultivation, agriculturists ought to know how to develop crops in a specific zone, the development of seed in a legitimate climate and the contaminations and a few natural affect of planting that seed.

The agriculturists make expectation such as, on the off chance that agriculturists expect overwhelming downpours another day, they may choose not to utilize fertilizer, since it would get washed absent. This could be accomplished with the assistance of prescient climate analytics.[1]

## V. OBSTACLES

Nearly 90% of accuracy rural thinks about detailed that accuracy farming strategy have been executed for the most part on a single field or on test premise or as it were on commercial ranches. This is often since exactness horticulture is however to gotten to be an necessarily portion of the typical cultivating handle. Subsequently agriculturists hesitate to select advanced agrarian procedures which are not known to them..

Need of data is additionally one of the essential reasons for restricted usage of PA. Agriculturists require adequate information and opportune guidence to realize successful usage of PA. Usually troublesome to achive with the nonappearance of recognized authority or organization encouraging the mindfulness of PA strategies and giving the vital hardware. Farmers got to be familiarized with the utilize of these supplies and ought to be kept routinely updated.
both financial and non financial assistance. and also they can provide the technical assistance for them .

## VI. FUTURE PROSPECTS

Future prospects of PA includes improvements in the performance of existing technologies and their availabilities. These improves the internet connectivity, GIS sensor technologies and mobile applications etc.

The most promising prospects in the future of PA is the applications of drones. with the use of drones we can speed up the crop scouting and identifying any issues for the pests and their nutrition issues in crops and identifying them right away ,and also checking the whether changes , drainage system performance , the list is goes on . And also the use of sensors are very useful for the future in agriculture.[2]

## VII. POSSIBLE SOLUTION AND CURRENT APPLICATION

The implementation of PA for small scale farmers are

## VIII. CONCLUSION

impractical for the reason stated above.The large multinational corporations can provide a agreement with small scale farmers to providing the technical and financial things that are needed for conduct the PA, that helps the small scale farmers to conducting the PA in their farm , instead of that they return a percentage of their profit according to the agreement. This elevates the burden of the farmers, of being aware of the technical know- how and receiving guidance towards effective implementation. For instance, companies like TechMahindra are conducting whiteBudget research on the subject.[1]. And also provide an awareness classes about the usage and benefits of the PA and also provide knowledge about the sources that provide financial and technical support for them.

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For instance there are drones that are flying over the fields in the marathwada region, assessing crop losses due to deficit rainfall and other weather conditions, as the Maharashtra government turns to technology to ensure timely intervention and compensations for farmers in an area known for farmer suicides. The state has also started cloud seeding on a pilot basis in the marathwada region to create artificial rains.

However, it still limited and not provide to all farmers in need of assistance ,and also some of the farmers are not aware of this scheme.on the other hand the government can provide

Precision agriculture provides knowledge regarding the crop inputs like fertilizers, pesticides, irrigation.
Using this inputs effectively lead to greater crop yield without affecting the environment.
Precision agriculture completely depends on doing the right thing in the right place at the right time.
With increasing population,the need for crop production has also increased. Adoption of technology will help in sustaining food security and enhanced livelihood opportunities.

However, the success of precision agriculture and predictive analytics depends on how quickly the knowledge about this can be implemented by the farmers to enhance the crop yield.

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