

Era of Artificial Intelligence - Prospects for Indian Agriculture

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ABSTRACT

Artificial Intelligence is noiselessly but progressively entering Indian farming and hence affecting our society at hefty. Artificial intelligence methods are creation inroads in all arenas including Farming. Amid tall prospects about how Artificial aptitude will assistance the mutual man and too alter his mind set, opinions and boldness towards the welfares that it may carry, there are convinced anxieties about unkind effects of such urbane tools as well. Artificial Intelligence techniques like auto-translation among various languages, text to speech and speech and speech to text in Indian languages can help the poor farmers in accessing the required knowledge generated by National Agricultural Research and Education System. By the year 2050, the United Nations projects that 2/3rd of the world's populace will live in town areas, plummeting rural workforce. The new technologies will be desirable to ease the assignment on agriculturalists operations will be completed at all, procedures will be mechanical, risks will be recognized and issues resolved. In the future, ever farmer's skills will increasingly be a mix of huge technologies and biology skills rather than pure agricultural. In Light of all these transformations this paper tries to find out the advantages and disadvantages of using Artificial Intelligence in Farming, traveling the various techniques of Artificial Intelligence in Farming in Indian and Foreign republics also.

Keywords: Artificial intelligence, technology, cultured, auto-translation.

OBJECTIVES

1. To find out the advantages and disadvantages of using Artificial Intelligence in Agriculture.
2. To explore the various techniques of Artificial Intelligence in Agriculture in Indian and Foreign countries also.
3. To find out various Agricultural startups.

RESEARCH METHODOLOGY

Research methodology is descriptive and data is based on secondary. For this study data and information has been collected with the help of many Books, Magazines, Newspapers, Research Articles, Research Journals & E-Journals

INTRODUCTION

Improving agricultural productivity is not a simple task. It involves activities starting from crop decision to final harvest and marketing of farm produce. Typically, numerous of our agriculturalists trust on empirical knowledge/ old-style understanding to choose on tilling, spreading seeds, smearing nourishments and pesticides and reaping the produce. But, it is fewer feasible in limitation the wide collection of tests viz., bother, disease, rainy season etc. Foremost to little yields and thus face economic privations. So, scientific interference is safeguarding agriculturalist to be knowledgeable is vital to improve farm output. Hence, the solution for these problems and challenges is to have a self-guided automatic model that understands the behavior of various stakeholders for the benefit of all. Moreover, artificial intelligence (AI) is part of the solution towards improved agriculture productivity. AI can be described as simulated algorithms computer models that mimic the human behavior. The process begins with imaging a robotic friend/installed request that guides our agriculturalist when to produce, yield and sell his/her yield and connection our farming resource. People to path the most persistent glitches faced by agriculturalists through hunts (Google analytics)

complete by the growers so that they container act/react directly. It could also act as numerical data for politicians for travelling numerous real programme / policy choices and interferences thereof. Furthermore, AI will be judicious option to influence before policy formations who are laboring to binary the agriculturalists revenue by 2022. The gathering of huge data by method of digitalization of agriculture is to give a new dimension to develop and deploy AI in farming. Previous year, agriculturalists of Karnataka and Andhra Pradesh trusted on the mails for spreading crops delivered by AI by Microsoft and global harvests investigation organization for semi-arid tropics (ICRISAT). Internationally, AI has providing broader chances to agriculturalists, organizations and administrations. Though, it is initial to instrument the influence of AI in arithmetical terms but confidently AI will alter the farming package and performs countryside.

CURRENT DIGITAL DRIVE WHICH HAS LED TO POLICY SHIFT IN AGRICULTURE

Digitalization of farming is on its path even though it has been ranked on bottom in the industry surveys on the state of digitalization. In India digitization over numeral India programme attainment the communities over OFC is vital contribution in leveraging AI methods in cultivation. With the navy of 30 million keen telephone possessing agriculturalists and an predictable upsurge of internet practice in rural India to 315 million by 2020, it's an easy way to attach, interconnect and organize. The accenture study discloses that numerical agricultural and linked farmhouse facilities can influence 70 million Indian growers in 2020, addition USD 9 billion to farmer returns.

Creativities to upsurge the alphanumeric literateness are additional advantage before us to shove AI as a inclined changer. Furthermore, info obtainability throughout crop manufacture and marketing will assistance to decrease the crop and revenue damage, thereby understanding of expanding agriculturalists revenue at the original. Perhaps, in the correct opinion, NITI Ayog and IBM have employed a declaration of determined for emerging a crop harvest forecast model expending Artificial (AI) for providing actual stint optional to agriculturalists in ambitious Districts.

Technology in India has travelled several miles touching the lives and aspiration of 1.3 billion people. It improved the lives of many people and agriculture has shown unprecedented progress beginning from high yielding variety to algorithm trade strategies/models. However, segment motionless continue undersized in terms of linking harvest openings on manufacture façades and bettering source side restraints thus charitable marketplace and local crop preparation can originate nearby with AI. Start-ups are emerging in agriculture and the technologies developed by them are matching the global standards and has aspirations to solve these problems through AI. However, needed support of government in disseminating their technology via extension network is warranted in the initial stages. The immediate reform needed is to bring the AI policy to involve AI deployment to solve the urgent and most pressing problems on priority basis. This policy has to touch upon most pressing sector in current and vulnerable area in future

USES OF AGRICULTURAL TECHNOLOGIES

1. The internet of things (IOT) driven development:

Smart Farming based on IOT technologies has helped growers and farmers to reduce waste and improve productivity ranging from the quantity of fertilizer utilized to the number of journeys the farm vehicles have made. Specifically there are 5 ways IOT can recover farming: loads of data, composed by keen farming devices, e.g. Climate circumstances, earth excellence, crops development progress or cattle's fitness.

2. Image based insight generation

In the present world situation one of the greatest abandoned zones in farming nowadays is exactness agricultural. Imaging through drones can assist in rigorous field analysis, in monitoring crops and scanning of fields. With a combination of computer vision Technology, Drone data and IOT will ascertain that the farmers take Rapid actions. Data feed from Drone image could bring forth alert in real time which would accelerate precision farming.

3. Disease detection

The image sensing and analyzing shows that the plant leaf images are sectioned into surface areas like background, diseased area and turn on deceased area of the leaf. The infected or diseased area is then copied and sent to the laboratory for further diagnosis. This for the reminder's assistant in the identification of pest and sensing nutrient deficiency.

4. Identify the readiness of the crop

Images of various crops captured under white light and UVA light for to check out the green fruits are. From this analysis the former could create different level off on the radius of the fruit or crop category. Then add them into added Tax before sending them to the market.

5. Field organization

Paying descriptions of IV description from Drone and copters scheme, actual time approximation can be reached during the period distance of farming by structure a field map and learning Parts where the yields obligatory water, manures and insecticides. The optimization of capitals is aided to a use degree by this.

6. Identification of optimum mix for agronomic products

Cognitive solution recommends the farmers on the best choice of crops and hybrid seeds which is grounded on multiple parameter like soil condition, weather forecast, type of seeds and pest infestation in a specific area. A personalized recommendation based on the farm's requirement, native condition, and data pertaining to successful forming in the past. The Other external factors like trends in Marketplace, crop prices, consumer needs, requirements and aesthetics may also factor to enable farmers take a clue-up decision.

7. Crop fitness monitoring

Distant Sensing methods lengthways with hyperspectral imaging and 3D laser skimming are a vital to concept produce metrics over thousands of lands of cultivable terrestrial. It has the possible to present a Radical change in farmhouse parks are checked by agriculturalists from the viewpoint of together period and exertion. This skill will also be active in nursing crops through their life series counting mastermind of bang in case of irregularities.

8. Mechanization systems in irrigation and permitting farmers

Irrigation is one among the maximum labor-intensive procedure in agribusiness. AI Pullman agriculturalists conscious of past climate configuration, soil excellence and caring of crops to be grown-up, can mechanize irrigation and upsurge overall harvest. Closely 70% of the biosphere's pond capitals used for irrigation such mechanization can preserve aquatic and welfares farmers in handling their sea problems.

9. Significance of drone in Agriculture

According to fresh PWC (Price water house coopers) study, entire obtainable marketplace for Drone based answer through the creation is \$127.3 billion. And for farming is at \$32.4 billion. Exploration drone's rudimentary key in agrarian segment has a portion of insinuation like commerce with opposing climatic disorder, Amended 3D chart of the arena comets, irrigation drainage and earth discernibility necessity be developed by the drone.

MARKET PREDICTION AND SUPPLY CHAIN MANAGEMENT

With the help of AI modules automated price feeding can be made thereby lessening the scope of price manipulation and errors due to false feeding in a significant development, a private firm markets valued AI in agriculture market across the globe to USD 432.2 million in 2016

10. Soil and water management

Soil and water are facing severe threat under modern agriculture practices involving inorganic chemical to influence the crop productivity. It hampers the efficient resources utilization and technology adoption in the long run that may result in reducing the yields and posing severe threat to food security. The most preferable type of AI model which predicts on evolutionary ladder would be helpful. Reactive AI models store the crop specific moisture requirement and assess message. This can also augment laying of auto irrigation from bore well. This assistances in limitation the unselective use of rainwater in crop production. As the Indian earths

are flattering the warehouse of biochemical remains causing noteworthy inequities in earth fitness on one pointer and harvest gaps crossways dissimilar crops and areas, it is authoritative to influence Also hold down the fit soil to food cohort ahead. NITI Ayog has lately interrogated about plain water disaster that nation might face in next periods as closely 70 percent is dirtied. This sounds clears signal to look for an alternative methods for judicious resource use.

Agri-Startups in India

Agri start-ups become key in unleashing the farm potential by providing the crucial technology. Some of the AI start-ups similar intello workrooms, aibono, automation and Satsure are succsively consuming the AI to forecast harvest, steady the harvest, earth examination and forecasting economic worth of upcoming yield. Additional giving stress and inducements to AI controlled novelty and start-ups determination add important number of services. Given the detail that startup develop new stage tech massive in India that might be right-hand to attain maintainable agriculture growth on one pointer and safeguarding food and nutritious safety to the persons on the additional hand. This may go a extended way in attaining maintainable developing goals (SDGs) effectively.

SUBMISSIONS OF AI IN INDIAN FARMING APPEAR TO FALL ADDICTED TO THREE MAIN CATEGORIES

1. Crop and soil nursing – Businesses are leveraging devices and various IOT-based skills to monitor crop and earth fitness.

- ❖ The CropIn is a Bengaluru-based startup company which rights to be an intuitive, brainy, and self-evolving schemes that brings future- prepared rural answers to the agricultural segment. With the CropIn's 'clever farm' explanation, all the conspiracies were geo-tagged to find the definite plot zone. The explanation assisted in remote detecting and climate optional, preparation and nursing farm activities for whole traceability, humanizing farmers on acceptance of right bundle of practices and efforts, nursing crop wellbeing and yield estimation, and alarms on pest, illnesses etc. Principally, CropIn uses machineries such as AI to benefit patrons analyze and construe data to originate real-time illegal insights on stand-up crop and schemes spanning topographies. Its agri-business intellect explanation named smartRisk “powers agri-alternate statistics and delivers jeopardy extenuation and predicting for effective praise risk valuation and loan retrieval support.
- ❖ The Bengaluru-based intello company was ongoing by IIT-Bombay graduate Milan Sharma in 2016. The business claims to deliver progressive image credit technology that can know objects, expressions, vegetation fauna and label them in any image. It provides
 - Farming product horticultural: Automatic excellence examination of images of nourishment crops is an precise and dependable technique for horticultural fresh foodstuffs categorized by shade ,size,and outline. Their resolution recites the image that a agriculturalist has occupied on his headset and regulates the creation quality in real period,without any physical interference.
 - Warnings on crop plague : Agriculturalists can click an image of their crop and usage their explanation to appreciate the columns,sicknesses,and overseas plants(weeds) rising in their farmhouses. The answer uses bottomless knowledge and image processecing replicas to classify any crop illnesses or pest plague in the crops. Sideways with the limits, it gives references on how that ailment can be preserved and banned from snowballing further.

2. Prognostic Agricultural Analytics – numerous AI and mechanism learning gears are existence used to forecast the best time to spread stones, get warnings on dangers from pest bouts, and more.

Decisive the exact time to propagate crops is frequently one of the main tests for Indian agriculturalists where dearth and extra precipitation can be similarly thoughtful experiments. The microsoft in teamwork with ICRISAT (International Crops Research Institute for the Semi – Arid Tropics), industrialized an AI Spreading App that uses mechanism learning and occupational intellect from the Microsoft Cortana Intelligence Collection.The application directs spreading advisories to partaking agriculturalists on the ideal

date to spread.” All they essential is a eye phone accomplished of receiving text posts.” To compute the crop; spreading old-fashioned, important climate data for the specific area in Andhra Pradesh was analyzed using AI. To control the elective sowing retro, the dampness competence index was intended. MAI is the consistent measure to encounter the possible water obligation of crops. Microsoft has too joined with United Phosphorous (UPL) , India’s main creation of agrochemical’s , to make the bother risk forecast App that over influences AI and mechanism learning to designate in advance the dangers of pest attack.

Today, these agriculturalists across the Indian states of Andhra Pradesh and Karnataka delay to get a text mails before spreading the seeds. As per the quoted above, in a insufficient dozen townships in Telangana, and Madhya Pradesh, growers obtain robotic voice calls warning them whether their produces are at jeopardy of a pest attack based on climate conditions and step of the crop.

3. The Supply Chain Competences – Businesses are by real-time data analytics on data- watercourses pending from manifold sources to shape an efficient and keen supply chain.

❖ Founded in the State of Uttar Pradesh, Gobasco has the benefit of a high-tech squad. Gobasco uses AI and other connected skills in the numerous phases of the agricultural source cable to safeguard it is well-organized and fast. Certain of them are listed below:

- Change Detection: Real-time statistics examination manifold data-streams lengthways with crowd-sourced statistics from producer/buyer markets and lorries feeds their involuntary deal discovery procedure to obtain high-margin changes.
- Quality Maintenance: Processor dream and AI-based involuntary grading and categorization is done for numerous vegetables and fruits for making an global agri-commodity normal for dependable interchange across the nation boundaries.
- Credit risk Organization: Crowd-sourced facts, algorithms and analytics overwhelmed the credit evasion problem, the most stimulating problematic of existing supply-chain, to safeguard a very little risk process.
- The Agri-Mapping: Deep-learning founded cable image examination and crowd-sourced info synthesis gets a real-time agri map of merchandises at a resolve of 1sq-km.

OTHER INDIAN AGRI STARTUPS INCLUDE

1. Gramophone (Agstack Technologies)- Image Recognition for earth science: Grounded on the Indian state of Madhya Pradesh, Gramophone rights to influence the power of image gratitude and earth discipline to assistance agriculturalists with timely evidence, technology, and correct kind of contributions to achieve healthier harvests at their farmhouses.“Our skill platform usages AI and mechanism learning for forecasting pest and illness at farms, prediction product prices for healthier price understandings and endorses harvests to farmers,” this was clamed by Tauseef Khan, co-founder of the business.
2. The Jivabhumi- The “Keen” Agriculture Market: There is frequently a incongruity in source and request of agrarian harvest. While on one side agriculturalists are powerless to discovery appropriate marketplaces for their shaped foodstuffs, on the other hand, customers are absent of harmless and reasonable food. The Jivabhumi’s Food print is a harvest combination and food traceability explanation which collections the farm yield, provides e-marketplace facilities and gears traceability. It rights to usage skills such as blockchain to arrest the material of the yield at various heights through the source chain.“The stage attaches official buyers straight with agriculturalists thus providing wider marketplace admission to the agriculturalists and ensuring fair-trade. Purchasers get to determine the yield, price and be able to acquire straight from the creators though existence sure about the slide of the business and traceability of the yield”. According to Srivatsa, the platform detentions inclusive informations about the merchandises (growing information , pre-harvest, transportation , warehousing etc.) which will be strapped through block chain to produce a digital uniqueness for a physical product and finally shape

traceability to substantiate origin and drive of merchandises from farmhouse to table. On the other pointer all contraption will influence the complete aggregation of data at numerous points in supply hawser to proactively advise agriculturalists on propagating , pest , switch ,collecting etc..

THE AI POWERED AGRICULTURE STARTUPS IN FOREIGN COUNTRIES

The agricultural automatons – Businesses are developing and programming autonomous machines to grip vital agrarian tasks such as gathering crops at a advanced volume and earlier step than human hands.

1. The Blue River Technology – weed Control.

The aptitude to control wildflowers is a highest importance for agriculturalists and an continuing contest as herbicide confrontation develops more ordinary. Nowadays, an projected 250 class of wildflowers have convert confrontation to herbicides. In a investigation study lead by the tidy science civilization of America on the influence of unrestrained weeds on slush and soybean crops, yearly losses to agriculturalists are projected at \$43 billion. Corporations are using mechanization and automation to assistance agriculturalists find more well-organized ways to defend their crops for tidies. The Blue River Technology has developed a machine called See and Spray which allegedly influences computer dream to display and exactly spray weeds on cotton plants. The precision scattering can help stop herbicide confrontation. Conferring to its website, the corporation rights that its exactness technology removes 80 percent of the capacity of substances normally scattered on crops and can decrease herbicide expenses by 90 percent. It has been projected that over 1 billion pounds of insecticides are castoff in the US per annum.

2. Harvest CROO Robotic – Crop Harvesting.

Automation is also emerging in an effort to help address challenges in the labor force. The industry is predictable to experience a 6 percent decline in agricultural workers from 2014 to 2024. The yield CROO Robotics has established a robot to help strawberry agriculturalists pick and carton their harvests. Absence of laborers has allegedly controlled to millions of dollars of income fatalities in key agricultural areas known as California and Arizona. In the Hills borough country, Florida region which has been described as the “nation’s winter strawberry capital,” between 10,000 and 11,000 acres of strawberries are typically harvested in a season. Produce CROO Robotics rights that its robot can yield 8 acres in a single day and substitute 30 human workhands.

3. PEAT – Machine Vision for Diagnosing Pests/ Soil Defects :

The deforestation and squalor of soil superiority continue important threats to food safety and have a undesirable influence on the economy. Nationally, the USDA has approximations that the yearly price of soil attrition is about \$44 billion dollars.

A Berlin grounded agrarian tech startup PEAT, has industrialized a bottomless knowledge claim called Plantix that allegedly classifies possible flaws and nutrient lacks in soil. The analysis is lead by software processes which relate specific greenery designs with sure earth faults, vegetable pests and illnesses. The image credit app classifies likely flaws finished images took by the user’s smartphone camera. The users are formerly provided with earth refurbishment methods, instructions and other conceivable answers.

4. The Sky Squirrel Technologies Inc. – Drones and computer vision for harvest examination.

The company of drones in farming allegedly dates back to the 1980s first crop sprinkling in Japan. The marketplace for drones in farming is projected to reach \$480 million by 2022. Nowadays, businesses are leveraging AI and midair skill to monitor crop fitness. The sky Squirrel Technologies Inc. is unique of the businesses transporting drone technology to wineries. The corporation goals to assistance users recover their crop harvest and to decrease costs. The operators pre-program the drone’s route and when developed the expedient will influence processor dream to greatest images which will be rummage-sale for examination. After the drone finishes its course operators can transmission a USB drive procedure the drone to a processor and upload the taken figures to a haze drive. The sky Squirrel usages algorithms to assimilate and examine the taken images and data to deliver a thorough report on the wellbeing of the winery, specifically the disorder of gossip greeneries. Meanwhile scuttlebutt leaves are frequently snitches for grapevine illnesses,

interpretation the “wellbeing” of the greeneries is frequently a respectable substitution for empathetic the healthiness of the shrubberies and their fruit as a unabridged.

5. Farm Shots – Satellites for Monitoring Crop Health and Sustainability

Constructed in Raleigh, North Carolina, Farm Shots is additional startup absorbed on examining agrarian facts resulting from images took by cable and drones. Exactly, the corporation goals to “notice sicknesses, pests and unfortunate plant nourishment on farmhouses.” For example, the business entitlements that its software can notify users precisely where compost is wanted and can decrease the amount of compost used by nearly 40%. The software is advertised for usage across mobile devices. Agricultural robots will save money, increase yields, reduce energy usage and progress excellence, a robot can help agriculturalists choice and carton their crops, knowledge can support agriculturalists exploit their capitals, it is likely to consequence in amplified agrarian output and returns to speculation ad improved ecological sustainability.

ADVANTAGES OF USING AI IN AGRICULTURE

1. By using AI-powered skills farmers can display the wellbeing of their crops or the crusade of their animals without the necessity of going into the farmstead
2. AI-powered resolutions will improve excellence and ensure earlier go-to-market for harvests.
3. AI offers data foundations such as infection, precipitation, wind rapidity and solar radioactivity along with judgment to historic values for anywhere on the farming earth.
4. It will advance processes in agricultural and provide them with more competent ways to produce, yield and sell indispensable crops.
5. Agriculturalists can use instruments and loam sampling to collect statistics and this data is kept on farm organization systems that allow for better dispensation and examination.

DISADVANTAGES OF USING AI IN AGRICULTURE

1. Though Artificial Intelligence recovers the farming industries in many astonishing ways there are many anxieties regarding fourth conning of AI on service and the workforce of the farming sectors.
2. The charge of knowledge such as drone has completed it unobtainable outdoor to the government and investigation bodies, it is costly to buy the drones, the main test will be found inside from the government labors and research organizations.
3. The robots can alteration the culture the expressive appeal to the farming and the energy questions are expensive.
4. When involuntary milkers or robotic milkers are used in exploiting. Theirs the detail that some intimidates may not want to have whatever to do with the robots at first, training the intimidates to AMS can take a extensive time and would not be confidential as agreeable experience.

CONCLUSION

The world is now equipped to hug the idea of 4th industrial rebellion which is likely to be controlled by Artificial Intelligence (AI). At this occasion it is authoritative to give a large push to a rather deserted sector; Agriculture, by leveraging AI so as to resuscitate and withstand the sector for the peers ahead Technology in farming is a conclusive component in ornamental the scale of manufacture and output. As per Food and Agriculture Organization (FAO) approximations, India has to dual its agriculture production by 2050 to feed the rising population. In the wake of disintegration and sector of land assets coupled with less stress on shared and cooperative farming, the arable land cannot be increased. The only viable option before us is to increase the productivity of the available land through improved technology. However, it is a established act addition the required skill sets at individual farmer level to operationalize the modern agriculture technology is less than required.

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