AN INVESTIGATION ON SHIFT IN AGRICULTURE WITH THE IMPLEMENTATION OF AI

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ABSTRACT

Artificial intelligence is an important research field in computer science because of its fast-paced technological advancement and widespread application. Since agriculture is so important, AI has to be present in the industry. Farming is the most common vocation because it requires enormous effort, persistence, and tenacity, but it doesn't provide a significant income or is tough. This fact compels farmers to use farming as their primary source of income. Farmers experience significant financial loss due to the financial losses associated with having a low income, plus crop failure due to poor weather or lack of resources. The majority of the time, the primary and secondary problems being addressed originate from failure to select a secondary occupation due to excessive time consumption and diminished energy levels. Farmers will have less workload with artificial intelligence because it cuts down on time spent and nearly eliminates difficult work. Advanced artificial intelligence will allow for higher crop yields, as well as better lifestyle and farming conditions for farmers. Farmers will be able to take advantage of the additional income provided by robotic automation, avoiding depression and suicide.

Abstract: Artificial Intelligence, Farmer, Agriculture, Income

Introduction

Artificial intelligence (AI) (Bannayan et al., 2010; Flohre et al., 2011; Szenci et al., 1998; Thies et al., 2011) can be applied across a wide range of academic disciplines, and it is also beneficial for making the world a better place through a new agricultural perspective. Agricultural artificial intelligence-powered solutions will allow farmers to do more with less, but it will also help farmers increase their yield by applying increasing amounts of high-tech machinery to life applications such as education, hospitals, and governance. On the opposite end of the spectrum from artificial complexity, artificial intelligence encourages ease of use and intelligent working(Barbee & Stout, 2009; Kong et al., 2008; Nöremark et al., 2010). Incorporating AI into the agricultural process is simple because it brings down the costs and does not require a high degree of technical proficiency. AI serves to help farmers deal with a wide range of agricultural issues quickly. To increase crop yield, artificial intelligence uses various techniques,

including indoor farming and enhancing crop harvesting quality. farming efficiency can be improved by using AI in a number of ways. Improve crop quality and accuracy by analysing farm data, which can be done by using AI sensors to find weeds, and also by using AI to discover plant diseases, pests, and more. AI aids with labour issues, but due to an increase in farm labour scarcity, farmers are forced to contend with problems due to a lack of workforce. In order to complete these farmers' work, farm bots must be employed. These robots harvest a higher volume of crops and harvest them faster. Agricultural robots are used by Blue River Technology to control weeds in the Blue River. CROO Robotics will spawn a crop harvesting robot once it has been harvested.(Ejiri et al., 1984; Sasaki et al., 2013)

Technological Advancements in Farming

When farmers have long-established knowledge of the variance in weather patterns, computerised diagnostic analysis could prove very useful. Driverless tractors are one of the AI techniques because the vehicle doesn't have a human operator inside. This lessens the amount of time and effort farmers must invest. One of the other unusual technologies to talk about is a computer for farmers that will be able to converse with farmers in the same way as chatbots(Kose & Sakata, 2017; Ren & Martynenko, 2018). Using drones instead of traditional machinery means that planting is five times faster. AI-supported agri-E- Calculator, one of the useful tools, is being made available to farmers. It helps farmers determine which types of crops are efficient and affordable. The problem is that there are many different products available, but they are costly and difficult to use. In order to say this more succinctly, we can say that AI is aiding farmers around the world in terms of the overall efficiency of their farming operations(Leong et al., 2008; McQuiston et al., 2005; Singh et al., 2013).

SDG and Farming

It is challenging to achieve the SDGs around food and agriculture while also providing sustainable and inclusive development. Since the turn of the millennium, there has been a drastic increase in hunger across the globe, with over 800 million people now malnourished. Many people who are chronically hungry must be accommodated with more efficient food systems that are expected to grow to 2 billion people by 2050. This demand for animal-based products must also be met. 4 One-third of all food produced gets discarded, and according to UNCTAD, there is a $200 billion per year gap in funding for food and agriculture SDG goals that will be met by the private sector.

Agtech Innovations

Agtech innovations have vast growth potential because they enable farmers to use resources more efficiently, effectively, and sparingly. Additionally, Agtech empowers farmers to obtain advanced inputs that help them increase crop output, and it allows them to find the resources they need, such as machinery

and finance. These models now use technologies like machine learning, natural language processing, robotics, and computer vision, all of which is driven by artificial intelligence. Agriculturalists (Flohre et al., 2011; Szenci et al., 1998; Thies et al., 2011)in the ecosystem, from small farmers to large farm corporations, can benefit from AI because of AI's applications. There are specific applications of AI that are especially beneficial for small-scale farmers. One such application is smart farm equipment, and this can provide access to alternative credit. The potential exists to cut the cost of providing farmers with service, make use of resource efficiency, and improve market inefficiencies that hold farmers back from being a part of global and regional value chains.

Conclusion

In order to judge the overall interest in AI technologies, it is possible to look at the amount of capital that has been invested in those technologies. The amount of venture capital that has flowed into agriculture technology firms in the last five years has skyrocketed, and the majority of that funding has gone to companies based in the United States. Investing in agtech firms is becoming a bigger part of venture capital investment, with $1.9 billion being invested in agtech startups during the first half of 2018. These flow structures show that it is possible to use AI in agtech. While AI is still in its infancy, investors are beginning to shift their capital to emerging market companies that utilise it. Chinese investors have financed around 200 agtech deals. In other countries, such as India and Brazil, investment is on the rise. In Asia and Africa, agtech startups focus on connecting farmers to buyers or cooperatives, while smaller-scale farmers are important to the sector. Better global agricultural productivity and environmental sustainability are critical to realising the SDGs. In emerging markets, food losses occur in all stages of food production, handling, storage, and processing. Food and Agriculture Organization of the United Nations researchers estimate that about one-third of global food production is lost along the food chain each year. Given that growth in agricultural inputs and land use has been the main driver of productivity growth in low- and middle-income countries since the 1960s, emerging market agriculture sectors are poor performers. The yield gap, (Abdallah & McDaniel, 2000; Baker et al., 1998; Nabavi-Pelesaraei et al., 2018)which is the difference between the crop's potential yield and the yield itself, exceeds 50% in lower-income countries.

References:

1. Abdallah, J. M., & McDaniel, B. T. (2000). Genetic parameters and trends of milk, fat, days open, and body weight after calving in North Carolina experimental herds. *Journal of Dairy Science*, *83*(6), 1364–1370. https://doi.org/10.3168/jds.S0022-0302(00)75004-1

2. Baker, P., McCloskey, W., Dennehy, T., & Sherman, W. (1998). Pesticide use in Arizona cotton: 1995 and 1996. In R. D. Dugger P. (Ed.), *1998 proceedings Beltwide Cotton Conference, January, San Diego, volume 2*. National Cotton Council of America. https://www.scopus.com/inward/record.uri?eid=2-s2.0-

0032449754&partnerID=40&md5=c418c91e662008f7ea8566d03a3905e9

3. Bannayan, M., Sanjani, S., Alizadeh, A., Lotfabadi, S. S., & Mohamadian, A. (2010). Association between climate indices, aridity index, and rainfed crop yield in northeast of Iran. *Field Crops Research*, *118*(2), 105–114. https://doi.org/10.1016/j.fcr.2010.04.011

4. Barbee, G. C., & Stout, M. J. (2009). Comparative acute toxicity of neonicotinoid and pyrethroid insecticides to non-target crayfish (Procambarus clarkii) associated with rice-crayfish crop rotations. *Pest Management Science*, *65*(11), 1250–1256. https://doi.org/10.1002/ps.1817

5. Ejiri, M., Kashioka, S., & Ueda, H. (1984). The application of image processing technology to industrial automation. *Computers in Industry*, *5*(2), 107–113. https://doi.org/10.1016/0166-3615(84)90015-0

6. Flohre, A., Fischer, C., Aavik, T., Bengtsson, J., Berendse, F., Bommarco, R., Ceryngier, P., Clement, L. W., Dennis, C., Eggers, S., Emmerson, M., Geiger, F., Guerrero, I., Hawro, V., Inchausti, P., Liira, J., Morales, M. B., Oñate, J. J., Pärt, T., Tscharntke, T. (2011). Agricultural intensification and biodiversity partitioning in European landscapes comparing plants, carabids, and birds. *Ecological Applications*, *21*(5), 1772–1781. https://doi.org/10.1890/10-0645.1

7. Kong, C.-H., Hu, F., Wang, P., & Wu, J.-L. (2008). Effect of allelopathic rice varieties combined with cultural management options on paddy field weeds. *Pest Management Science*, *64*(3), 276–282. https://doi.org/10.1002/ps.1521

8. Kose, T., & Sakata, I. (2017). Identifying technology advancements and their linkages in the field of robotics research. In K. D. F. D. T. U. K. D. C. P. G. S. H.-J. Anderson T.R. Niwa K. (Ed.), *PICMET 2017 - Portland International Conference on Management of Engineering and Technology: Technology Management for the Interconnected World, Proceedings* (Vols. 2017-January, pp. 1–10). Institute of Electrical and Electronics Engineers Inc. https://doi.org/10.23919/PICMET.2017.8125283

9. Leong, H. K., Goh, C. S., Chew, S. T., Lim, C. W., Lin, Y. N., Chang, S. F., Yap, H. H., & Chua, S. B. (2008). Prevention and control of avian influenza in Singapore. *Annals of the Academy of Medicine Singapore*, *37*(6), 504–509. https://www.scopus.com/inward/record.uri?eid=2-s2.0-48249134061&partnerID=40&md5=ccf85ce08e6d35c7aff5737c0ca3de8f

10. McQuiston, J. H., Garber, L. P., Porter-Spalding, B. A., Hahn, J. W., Pierson, F. W., Wainwright, S. H., Senne, D. A., Brignole, T. J., Akey, B. L., & Holt, T. J. (2005). Evaluation of risk factors for the spread of low pathogenicity H7N2 avian influenza virus among commercial poultry farms. *Journal of the American Veterinary Medical Association*, *226*(5), 767–772. https://doi.org/10.2460/javma.2005.226.767

11. Nöremark, M., Frössling, J., & Lewerin, S. S. (2010). Application of routines that contribute to on-farm biosecurity as reported by Swedish livestock farmers. *Transboundary and Emerging*

Diseases, *57*(4), 225–236. https://doi.org/10.1111/j.1865-1682.2010.01140.x

12. Sasaki, Y., Shibusawa, S., Negishi, H., Tokui, Y., & Takemoto, A. (2013). Development of agricultural work automatic record system by using Kinect for tacit knowledge extraction. *IFAC Proceedings Volumes (IFAC-PapersOnline)*, *1*(PART 1). https://doi.org/10.3182/20130327-3-jp-3017.00084

13. Singh, P., Kumar, D., Kumar, P., Singh, I., & Yadav, P. S. (2013). Cryopreservation and Quality Assessment of Buffalo Bull Semen Collected from Farmer's Doorstep. *Agricultural Research*, *2*(2), 148–152. https://doi.org/10.1007/s40003-013-0056-8

14. Szenci, O., Beckers, J. F., Humblot, P., Sulon, J., Sasser, G., Taverne, M. A. M., Varga, J., Baltusen, R., & Schekk, G. (1998). Comparison of ultrasonography, bovine pregnancy-specific protein B and bovine pregnancy-associated glycoprotein 1 tests for pregnancy detection in dairy cows. *Theriogenology*, *50*(1), 77–88. https://doi.org/10.1016/S0093-691X(98)00115-0

15. Thies, C., Haenke, S., Scherber, C., Bengtsson, J., Bommarco, R., Clement, L. W., Ceryngier, P., Dennis, C., Emmerson, M., Gagic, V., Hawro, V., Liira, J., Weisser, W. W., Winqvist, C., & Tscharntke, T. (2011). The relationship between agricultural intensification and biological control: Experimental tests across Europe. *Ecological Applications*, *21*(6), 2187–2196. https://doi.org/10.1890/10-0929.1