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Proceedings of the One Day INTERNATIONAL CONFERENCE ON "Innovation for A Sustainable Future - Embracing the Path to A Digital Green Deal"

(ICISF) – 2024

13th December, 2024

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Department of B.Com - Accounting and Finance

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ARTIFICIAL INTELLIGENCE AND SUSTAINABLE DEVELOPMENT

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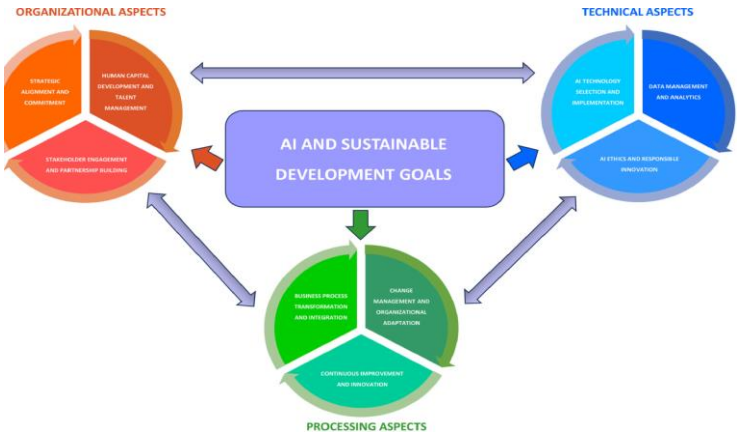
Abstract---The use of artificial intelligence (AI) is rapidly transforming various areas such as business, corporate practices, and governmental policy. With its deep learning capabilities, machines and robotics equipped with AI have brought significant disruptions and opportunities to these fields, as well as larger trends in global sustainability. The AI revolution could lead to a positive future where machines and humans coexist in harmony, or a negative one filled with conflict, poverty, and suffering. The impact of AI on the United Nations Sustainable Development Goals (SDGs) is still uncertain, as it could either accelerate progress or hinder it. This article examines three case studies to understand the implications of AI on business leadership and management education. By combining perspectives from business strategy and public policy, it analyzes the impact of AI on sustainable development, with a focus on the advancement of the SDGs. The study also draws lessons on leadership development and managerial learning for global sustainability in the face of rapid technological and social change.

1. INTRODUCTION

In the past, artificial intelligence (AI) was only seen in science fiction and movies, but now it is a part of our everyday lives. There have been many definitions of AI over time, but most now agree that it involves solving complex cognitive problems associated with human intelligence, helping people through Smartphone's or healthcare, and recognizing problems to create solutions for technology, people, and society. The main goal of AI has always been to create machines that can think like humans. AI is becoming increasingly common in business and industry and has the potential to revolutionize many aspects of our lives, including discovery, learning, communication, and work. The use of AI is becoming more widespread in the business and industry sectors, and it has the ability to transform how we work, communicate, live, learn, and discover. This technology holds significant potential for society and the economy. Additionally, with the emergence of the Age of Sustainable Development, where the 17 Sustainable Development Goals (SDGs) are shaping global development priorities, AI is creating new opportunities in corporate practices, government policy, and business.



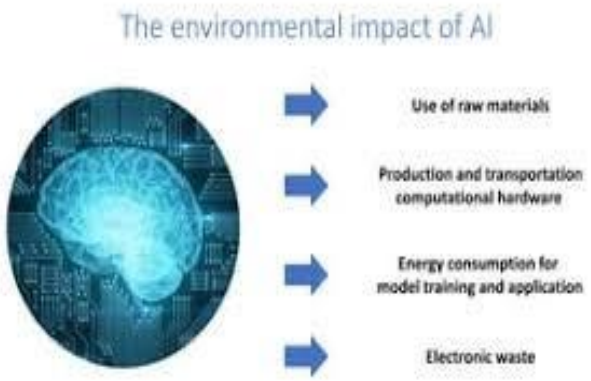
Machines and robots with advanced deep learning capabilities are already solving cognitive problems that were previously thought to require human intelligence. It took humans around 200,000 years to evolve from natural to artificial intelligence, but only 10 years to transition from relying on the earth to using the cloud [4]. During the development of AI, we have gained a better understanding of what it means to be human, how we think, learn, and become experts. The idea that becoming an expert requires about 10,000 hours of deliberate and structured practice was first discovered by Swedish psychologist Anders Ericsson and popularized by Canadian journalist Malcolm Gladwell. AI is gradually taking over certain areas of expertise, offering higher predictive power, efficiency, and results.

2. AI AND AGRICULTURE PLANT VILLAGE

AI and Agriculture Plant Village is a distinctive initiative established by David Hughes, an entomologist from Penn State University, and Marcel Salathé, a digital epidemiologist from the Swiss Federal Institute of Technology [24]. It aims to identify plant diseases by using a low-cost app on a smartphone, which can be used by farmers in the field. Additionally, the team is constructing a database capable of recognizing and diagnosing plant diseases through images taken with a mobile phone. The database currently has 150,000 photos of diseased plants, with plans to increase it to three million. With the help of AI technology, vast amounts of data can be utilized to identify patterns and make predictions, which is the underlying concept of PlantVillage.

Approximately 550 million small farms worldwide, which produce most of the developing world's food, have limited access to information on how to increase their productivity. To assist these farmers, PlantVillage is working with international organizations, extension programs, and Google engineers to customize AI research for farmers in Tanzania who can use inexpensive smartphones to diagnose crop diseases. Plant diseases and local pests can reduce cassava crops by 40 percent or more, even though cassava is a robust crop that can survive drought and barren soil. Cassava feeds roughly 600 million people, and in Nigeria alone, it is a two-billion-dollar crop.

The team led by Salathé and Hughes started the database by identifying the ten most important diseases affecting the 30 most significant crops. While the algorithm could identify both the plant and disease in high-quality images with a success rate of almost 99%, lower quality photos taken in the field had a much lower accuracy rate, at about 32%. Currently, the team provides the photo database free of charge to anyone worldwide. Salathé expressed openness to having other teams or companies develop a better algorithm, but the main goal is to disseminate the information as widely as possible.



Salathé and Hughes founded PlantVillage because they realized that the most necessary plant information was not reaching the people seeking advice, and that images of diseased plants were scattered across various databases, making it challenging for farmers to access them when they find a disease in the field [1]. Salathé and Hughes's database contains the most extensive collection of diseased plant images available in the public domain. Zhiwen Liu, an electrical engineer at Penn State, joined the team, and a tiny spectrometer has been added to the phones currently used in Tanzanian fields. This device can detect the structure of the leaf to identify a disease before it is visible to the naked eye, with the chemical signature of a virus detectable much earlier. This discovery can contribute to global food security by allowing the global community to learn about diseases before they become problematic, contributing to ending endemic hunger (SDG 2) and reducing the spread of crop diseases that have spread due to climate change (SDG 13).

Amanda Gevens, a plant pathology researcher at the University of Wisconsin-Madison, who is not affiliated with PlantVillage, has raised concerns that similar symptoms in multiple plant diseases could result in misdiagnoses, which could have serious consequences for humans, the economy, and the environment. She suggests that a combination of trained observation and testing should be used in conjunction with the app. While Gevens believes that the PlantVillage app might be suitable for home gardeners, she thinks that a more thorough system is needed to confirm a disease based on more than just photo symptoms for commercial farmers who rely on agriculture for their livelihoods.

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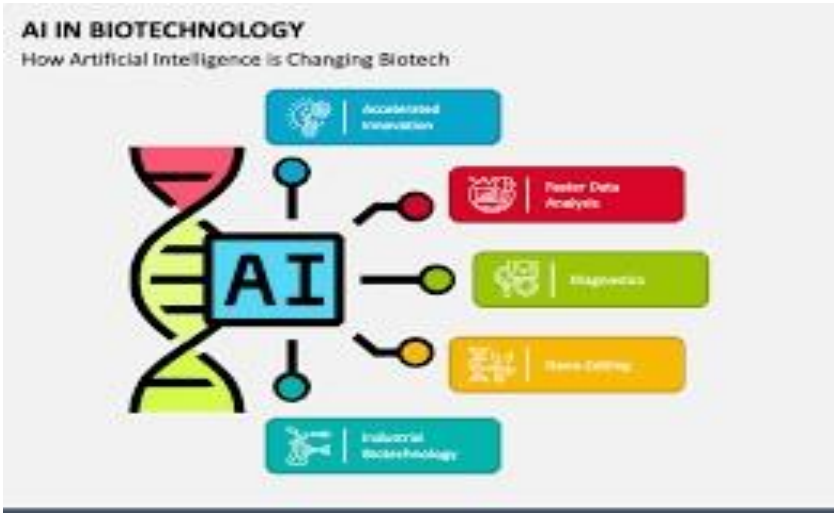

However, for farmers in Tanzania who use a simple AI assistant called Nuru, waving a phone over a plant leaf can provide them with a software diagnosis of the disease or pest and suggestions for low-tech treatments [26]. The app does not require wireless access to cellular data or remote computing power once it has been downloaded, which is a significant advantage for farmers in rural villages. According to Hughes, "In low-income countries that lack human capital in fields like agricultural science, there is an opportunity to use AI to help break the cycle of poverty." This new application of AI using locally-appropriate and low-cost cell phone technology has the potential to increase farm system productivity, improve agricultural output, and enhance food production. It provides a form of development aid that helps to bridge the digital divide between rich and poor nations, diffuse innovative technological solutions in agriculture, and support the achievement of several SDGs, including SDG 2 on Zero Hunger, SDG 9 on Industry, Innovation, and Infrastructure, and SDG #10 on Reduced Inequalities.

3. AI IN SANITATION AND HEALTH

Many people worldwide are affected by waterborne disease, which makes obtaining clean water a critical problem. This issue is difficult to control and requires financial backing and time to learn how to use a new clean water system effectively [27]. The Clean Water AI test system can perform a real-time analysis and identify contaminants without an internet link, making it self-controlled and consists of simple and

inexpensive components that can be bought off-the-shelf, making it affordable. The entire test can be constructed for under US $500, making it within the reach of many organizations that could not afford an expensive traditional system. Peter Ma, an Intel software innovator, recognized that clean water problems are not limited to developing countries and decided to use his AI expertise to develop a system that detects water contamination. The clean water system works by detecting the shape of molecules under a microscope, with each convolutional neural network having specific characteristics that identify bacteria in the water based on their shape, color, density, and edge. In their proof of concept, Ma's team limited their initial identification to E. coli and the bacterium that causes cholera, but they plan to expand their identification to other types of bacteria and eventually viruses [1]. Ma's AI testing system can detect harmful bacteria and map the contamination in real-time, making it easy to use and requiring minimal training. The team envisions the system being used by municipalities to monitor water sources, then developing specialized geographic versions to fit into water pipes, and eventually creating a consumer version that people worldwide can use to monitor the water in their own households.

4. CONCLUSION

The potential of AI to promote sustainable development is vast and can involve actors from different backgrounds and sectors. The UN Global Compact has called on businesses worldwide to contribute to achieving the SDGs. Case studies show that AI can be a crucial tool for promoting economic development while also addressing the impact of production and consumption on society, governance, and the environment. Innovators and global champions of development using AI have made significant advances in industries and sectors, such as conserving non-renewable resources, diffusing knowledge and expertise, bridging global technology gaps, and forging effective partnerships between governments, the private sector, civil society, and citizens to contribute to global sustainability.

The pursuit of the Global Goals and the implementation of the SDGs face significant challenges, including apathy, inertia, ignorance, and a lack of resources and political will from governments and corporations pursuing short-term profits. To fight for global sustainability, a range of public and private organizations, national governments, and civil society must commit all their available resources, including leveraging the capabilities and technologies made available by AI. The rise of SDGs provides a significant opportunity for the emerging AI industry. AI has the potential to create intelligent interventions, reduce waste, transform entire industries, and improve connectivity, bringing technological advancements to people worldwide. However, these innovations and initiatives may come at a cost and potential risks. AI has both positive and negative implications that must be studied and managed to prevent unintended consequences. Although AI can promote sustainability, it can also be used for activities that worsen global issues. Additionally, even low-cost innovations, such as the ones mentioned above, require incentives and partnerships among various stakeholders, including governments, corporations, communities, workers, employers, and academia, to effectively adopt and sustain these transformative applications.

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