AI- Enhanced Decision Support Systems for Migration Management: A Case Study Analysis

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Abstract

This paper explores the increasing role of artificial intelligence (AI) in migration management, focusing on decision support systems. It provides a comprehensive overview of AI's historical development, the concept of migration management, and a literature review on international labor migration. The study highlights the multifaceted applications of AI in migration, such as processing visa applications, preventing irregular migration, and enhancing border control. The role of AI in labor market polarization and security measures, including biometrics and lie detection, is discussed. The paper acknowledges challenges in AI implementation, including computing power, limited knowledge, human-level capabilities, data security, privacy concerns, and biases. The conclusion suggests that while AI advancements in migration management offer both benefits and challenges, their impact on mixed migration remains complex and requires a delicate balance.

Keywords: Artificial intelligence, Migration management, Decision support systems, International Law, Security and border control.

Introduction

Artificial intelligence (AI) technology is being employed more and more in both public and private sectors to carry out tasks that are typically performed by humans, such as learning from data, speech recognition, image recognition, and natural language processing. Although Alan Turing studied the possibility of computers thinking as early as 1950 (Turing 1950), the field of artificial intelligence (AI) was founded in 1956 with the Dartmouth Summer Research Project on Artificial Intelligence. Despite this, the focus on these technologies is relatively new. After that time, the availability of vast amounts of data coupled with an exponential rise in processing capacity has sparked the current wave of interest in artificial intelligence. It is still being determined whether a computer will ever be able to think like a human being because no machine has ever passed the Turing test. Nonetheless, the social sciences and humanities have increasingly seen references to

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artificial intelligence, machine learning, and algorithms. This definition of artificial intelligence (AI) refers to the expanding pool of interactive, autonomous, self-learning agency that empowers computational artifacts to carry out tasks that would otherwise require human intelligence to be effectively completed. In short, AI, according to Calo (2017: 404), is "a set of techniques aimed at approximating some aspect of human or animal cognition utilizing machines." The systematic study of algorithms and systems that enhance their knowledge or performance via experience is known as machine learning, or one of these approaches.

Thus, artificial intelligence (AI) describes technology that carry out operations that are typically performed by humans and behave intelligently by learning from data using algorithms—sets of instructions used to solve issues. Although algorithms have been in use for thousands of years, their significance has increased in today's society as a result of computers' ability to collect and process vast amounts of data far more quickly than a human could. Large volumes of data, including big data, are utilised by artificial intelligence algorithms to identify trends and predict future behaviour. Large-scale, highly changeable, complex data, or "big data," has a lot of applications in the forecasting and management of migratory fluxes. It's claimed that AI algorithms boost productivity by automating monotonous jobs, particularly those that call for the examination of copious volumes of documentation. Thus, artificial intelligence (AI) has the potential to completely change how nations and international organizations attempt to control international migration. Nonetheless, the New York Declaration for Refugees and Migrants (2016) states unequivocally that nations and international organizations want to "manage large movements of people" by "implementing planned and wellmanaged migration policies." Therefore this article focusing on Artificial Intelligence (AI) enhanced decision support systems for migration management.

Concept of Artificial Intelligence

Artificial intelligence refers to the capacity of a digital computer or a robot under computer control to carry out tasks that are typically performed by intelligent entities. The word is commonly used to describe the endeavor of creating systems equipped with the mental processes typical of human qualities, including the capacity for logic, meaning-finding, generalization, and experience-based learning. It has been shown that computers are capable of performing extremely complicated jobs since the development of the digital computer in the 1940s. However, Alan Turing's ground breaking essay "Computing Machinery and Intelligence," which was published in 1950, signified the beginning of the artificial intelligence discourse decades before this notion. Turing posed the query, "Can machines think?" and is frequently referred to as the "father of computer science". His "Turing Test" was released, in which a human interrogator attempted to discern between a computer-generated text response and a human-written response. Despite a great deal of criticism since it was released, this test is still significant to the development of artificial intelligence. AI has had several definitions since the acronym was first used in 1956. One of the pioneers of artificial intelligence, John McCarthy, arranged the second Dartmouth conference where the word was first used. The majority of definitions of AI center on how computers can simulate intelligent behavior.

Concept of Migration Management

Before discussing the idea of migration management, it is crucial to understand what migration means at this point. The act of moving people from one location to another is called migration. Migration can occur both within and across nations. Migration can occur seasonally, temporarily, or permanently. There are several causes of migration. These can be religious, social, political, economic, or environmental. Migration is driven by pull and push factors. Migration has an effect on the places that migrants settle and the places that they leave behind. These effects can have both positive and bad effects; however, discussing the advantages or disadvantages of migration is outside the scope of this article; instead, we concentrate on migration management. The term "migration management"

refers to a broad range of governmental responsibilities within a country's framework for the humane and orderly handling of cross-border migration, with a focus on controlling foreigners' entry and presence within national borders as well as providing refuge to refugees and other vulnerable groups. It describes a methodical process for creating legislative, policy, and administrative answers to important migration-related concerns.

Literature Review:

Piyasiri et al. (2010) studies "International labour migration: A rights-based approach," understand the problems associated with labour migration in the context of globalization and highlight the views of the International Labour Organization on labour migration, the links between development and migration, the normative framework for protecting migrant rights, and the governance of international labour migration. It examines the patterns of migration that are occurring now and in the future, the connection between migration and development, and the impacts of migration on both the countries of origin and destination.

Bolt Oliva et al. (2014) examined the effects of migration on the employment opportunities available to UK native laborers at the time of their migration in their study, "Impacts of migration on United Kingdom native employment: An analytical review of the evidence." According to the study, this type of replacement did not exist during the boom and instead occurred during the slump.

Pearson Elaine, et al. (2006) investigated the "The Mekong challenge, Underpaid, Overworked and Overlooked: The realities of young migrant workers in Thailand" the situation of Burmese migrant workers across Thailand's many industries. The majority of female migrants worked in domestic and agricultural settings, whereas the majority of male migrants worked in manufacturing, fishing, and other related fields. Numerous sectors of Thailand have likewise revealed a high prevalence of child labour. The report also illustrates these individuals' vulnerabilities in Thailand.

Germano De Abreu Alexandra Jose (2012) examines the relationship between migration and development using a country-based approach in his thesis, "Migration and development in contemporary Guinea-Bissau political economy approach". Migration, both domestic and foreign, has a long history in this small South African nation. The people's level of living was raised by remittances and savings, which also raised consumer demand for a range of goods and made it possible for investments across a number of industries.

Moore Napier and Sheill Kate (2016) provide a distinct side of the industry, particularly the problems affecting women migrant workers, in their research paper titled "High rise, low pay: Experiences of migrant women in the Thai construction sector." Despite making up a sizable portion of the industry, they deal with numerous social and economic issues. This industry remains their least undesirable choice, which suggests that more respectable employment opportunities for female migrant workers are required.

Rebecca Napier (2017) conducted research on the topic of "Protected or put in harm's way? ". Prohibitions and limitations on women's labor migration in ASEAN 15 (Association of Southeast Asian Nations) countries" goes into great depth into two policy restrictions: the 2011 Cambodian prohibition on domestic work migration to Malaysia and the 2014 Myanmar ban on domestic work migration to any country. This research aims to determine the degree of migration of female domestic workers in spite of these prohibitions.

Minghui Liu (2017) studies the current circumstances of domestic workers in Beijing on the topic of "Migrants and cities: Research report on recruitment, employment, and working conditions of domestic workers in China." The analysis identifies the discrepancy between convention no. 189's rules and current Chinese legislation pertaining to domestic workers. Along with working hours, leave, pay, social and maternity protection, medical insurance, knowledge of legal protections and complaint procedures, pertinent laws and

regulations, and current issues facing migrant domestic workers in China are all included in the research.

Moreno Gloria and Cantu Fernando (2004) investigates the "Identification of potential for increasing employment and productive investment in Albania, Moldova and Ukraine based on remittances". This study evaluate the likelihood of boosting job opportunities and productive investment in Albania, Moldova, and Ukraine based on remittances. Its goal is to identify the key industries, the talent gaps in local businesses, and the legislative changes that must be made in order to attract migrant remittances. The study looks at the socio-political and economic conditions in the three nations and analyzes the reasons behind labor migration out of these nations.

In their research series Naik Asmita et al. (2007) investigate "Migration, Development and Natural Disasters: Insights from the Indian Ocean Tsunami". This study finds, how the tsunami affected migration-related issues in Thailand, Sri Lanka, and Indonesia. The highlights of the series include how natural disasters affect these nations' socioeconomic conditions and lead to forced migration. The series also discusses the advantages and disadvantages of migration for the nations of origin and destination, the effects of natural catastrophes, the vulnerabilities that migrants confront, and redevelopment initiatives. There is a strong correlation between migration, development, and natural disasters, and migrants have to be treated equitably.

Lamichhane Sandesh's (2018) study, "A Study of Labour Migration and Remittance Economy of Nepal; a System Dynamics Approach." The system dynamics model was employed in the study to establish correlations between different characteristics of labour migration and the economy. It looks more closely at how remittances affect household income, consumption patterns, and poverty. According to the report, there are fewer workers in the primary sector due to increased migration, which also lowers productivity. Remittance growth contributes to the economy's ability to lower poverty and raise living standards.

Zanker Jessica Hagen, (2010) studies the "Modest expectations," Jessica Hagen Investigating the causes and effects of migration in source nations, with a focus on Moldova and Albania specifically, is "Causes and Effects of Migration on Migrant Households in Source Countries." It thoroughly examines the causes of migration and the remittance trend. The connection between the migrant and his or her family members following migration is also covered, as are the aftereffects of migration on families.

Chowdhury, Mahmud Mehdi's (2011) investigates the "Essays on International Migration" is to determine how international migration and economic development are related. They have examined the international labor market rivalry between the nations via their argument. They discovered that the tax systems used by the nations that import labor varies, levying various taxes on various nations. Skilled migration will promote consumer welfare as well as research and development. Additionally, it looks at the ways in which brain drain benefits the exporting nation.

According to Lowry (1966), migration serves as the connection that connects population increase and regional economic growth, as well as behavioral response and economic opportunity. Migration would be impacted by the same economic conditions at the point of origin and destination. Migration is constantly correlated with the size of the population and the distance between them. While in migration is mostly influenced by labor market circumstances and destination population size, out migration is constantly connected to the size and mobility of its population.

Mazek (1966) examined how migration affected the age and occupational mix of these groups in economically disadvantaged locations, he discovered that migration had no effect on these groups. He believed that unemployment and migration were related. The elder age group preferred to be in their own country of origin.

Boventer and Pack (1969) examined the relationship between migration to West German cities and the size of the city. It emphasizes how crucial work opportunities are as a key factor influencing migration.

The Role of Artificial Intelligence in Migration Management

Artificial intelligence plays several functions in international migration management, including facilitating record-keeping and migrant identification.

Processing applications for migration visas: The Immigration Department in Hong Kong has been processing visa applications for more than ten years using eBrains, an award-winning artificial intelligence technology that provides decision support for millions of visa applications annually. The use of AI technology for processing visa applications is faster than handling them manually by humans.

Preventing irregular migration: As part of an expanding security market that is expected to be worth $146 billion in Europe alone by 202099, there is evidence of a growing capacity to use Artificial Intelligence in border control and border management (J Eager et all 2020 Policy Department for Economic, Scientific and Quality life policies June 2020). The European Union declared in October 2018 that it will provide funds for a new automated border check system that would be tested in Latvia, Greece, and Hungary. The technology, known as iBorderCtrl, interrogates people attempting to cross borders using intelligent avitars that can identify lies.

Labor market polarization: The net displacement of workers by machines may widen the gap between returns to capital and returns to labor as automation replaces human labor throughout entire national economies, thereby effecting the global economy. This will result in a larger hollowing out of middle-class jobs and a growing polarization of the labor market into sectors with high and low skill wages.

Use of AI in security and border control: The application of AI in border control has generated discussion about ETIAS and the part AI will play in their procedures, including what screening technologies are used when entering Europe and other nations. Even though artificial intelligence is widely used in the west, there is still controversy around its application, especially when it comes to facial recognition and movement tracking.

AI in face recognition crime detection: Interpol, the body that promotes international police collaboration, has long employed facial recognition technology to identify criminals. The efficacy has been demonstrated in several well-known instances. 2018 saw the capture of a murder suspect who was wanted worldwide after records from Interpol's face recognition database were linked to the suspect's photo. Although face recognition technology is presently only employed in extreme cases for remote identification, the European Commission published a White Paper in February 2020 outlining a framework for the future, more general application of reliable AI.

Smart borders, biometrics, and AI: Travelers must require a biometric passport in order to interact with the outside world. A biometric passport has specific biometrics together with all the biographical data available in a machine-readable document. An essential part of stopping irregular migration and safeguarding people is the Entry-Exit System, which will employ this biometric data. The Entry and Exit System will use biometrics to identify overstayers and stop identity fraud by registering travellers arriving and departing, including nations.

Artificial intelligence lie detectors at borders: Because AI guards can recognize suspicious movement patterns and body language hinting at dishonesty, they offer a more secure approach to border control than human police do.

AI is used to detect anomalous movement: When a person travels to the same nation multiple times, bringing different children with them each time, AI border guards can assist in apprehending those engaged in organized crime, including human trafficking. The ability

of AI to recognize nonverbal cues that point to lying is another intriguing discovery. Artificial intelligence (AI) technology has demonstrated efficacy in identifying falsehoods by leveraging signs like altering posture and facial expressions, which may be challenging for humans to discern. For instance, more artificial intelligence (AI) is being used at the Schengen Area's external borders, which will improve security and cut down on wait times.

Maintaining the Security and Safety of Travel Information: The organization eu-LISA, which is tasked with maintaining detailssafe, oversees the European Travel Information and Authorization System (ETIAS). Modern technology will be employed to encrypt private information, shielding it from identity theft and cyberattacks. The information gathered by ETIAS systems will only be accessible by authorized people, such as border authorities or police officers, when necessary, in accordance with the EU's commitment to defend the basic right to private. Travelers who are directly involved in AI technologies will be safer than those who jeopardize security.

Challenges in the use of Artificial Intelligence

Computing Power: Most developers are put off by these power-hungry algorithms because of how much power they use. Deep Learning and Machine Learning are the foundational technologies of this Artificial. intelligence, and in order to function properly, they require a growing amount of cores and GPUs. They need the processing power of a supercomputer, yet supercomputers are not inexpensive. With the tremendous volume of data being ingested and the complexity of algorithms growing at an accelerating rate, not everyone can afford that.

Limited Knowledge: The fact that deep learning models' output prediction is still unknown is one of the main issues that AI is concerned about. For an average person, it might be challenging to comprehend how a particular combination of inputs can provide a solution for many types of issues. The usage of artificial intelligence and how it is incorporated into products people use on a daily basis, such smartphones, smart TVs, banking, and even vehicles, are not even known to many people in the globe. The understanding of artificial intelligence is the true issue.

Human-level: One of the biggest obstacles facing AI is this, which has academics on tenterhooks for AI services in businesses and start-ups. Although these businesses claim to be above 90% accurate, in every one of these situations, people are still superior. For instance, the model can identify if the picture shows a dog or a cat. The human has an astounding accuracy of more than 99% in predicting the proper result almost often.

Data security and privacy: The availability of data and resources for training deep and machine learning models is the primary tenet upon which they are built. There is data, but since it is gathered from millions of people worldwide, there is a possibility that it may be misused.

Bias issue: An artificial intelligence system's quality is largely determined by the volume of data it is trained on. Therefore, the key to developing effective AI systems in the future is having access to high-quality data. However, the regular data that the organizations gather is actually of low quality and has little intrinsic value. They are prejudiced and only serve to describe the characteristics and nature of a small group of individuals who share certain interests on the basis of race, gender, community, ethnicity, and religion.

Data Scarcity: Several nations, including India, are employing tough IT regulations to limit the flow of user data as a result of allegations against big businesses like Google, Facebook, and Apple for exploiting it unethically. As a result, these businesses are now faced with the challenge of creating global apps utilizing local data, which might lead to prejudice.

Conclusion:

Mixed migration will inevitably be impacted by AI's significant advancements in many ways. While some changes could be advantageous to refugees and migrants, others would not. It is difficult to find a balance between the benefits and drawbacks at this time, as regional and global inequality increases. The three main facets of international migration management will probably be impacted by the advancement of AI technology. the connections between the major players, their methods, and the discourses influencing international migration policy.

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