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Exploring AI-Powered Migration Management in Canada through the Prisms of Algorithmic Governmentality, Technosolutionism, and Critical Data Studies

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Abstract

This research paper explores the implications associated with deploying Artificial Intelligence (AI) technologies in the domain of migration management for human rights in Canada. Drawing insights from *Algorithmic Governmentality, Technosolutionism*, and *Critical Data Studies,* it examines the extent of their effects on human rights outcomes and governance. This paper utilizes a systematic literature-based review as a research methodology and employs a qualitative, thematic model to conduct a comprehensive review of the research topic. It essentially argues that the implementation of AI in this context mandates a rigorous investigation into its governance. This is due to the consequences AI produces for individual rights. Despite its numerous potential advantages, a lack of scrutiny and transparency in its deployment poses risks to protecting fundamental rights. Through the aforementioned theoretical foundation, the paper dissects the partialities and vulnerabilities built into AI-related systems and brings to light the power structures they reinforce. It calls for an equitable approach that champions human rights amidst technological evolution. This is to ensure that AI functions as a catalyst for societal progress, not as an instrument to radically boost state dominance and power. The research findings ultimately challenge pre-existing paradigms and contribute to a more balanced discourse, highlighting the intricate link between AI, migration, and human rights.

Keywords: Artificial Intelligence, AI, Machine Learning, Algorithms, Migration Management, Canada, Governmentality, Algorithmic Governmentality, Human Rights, Technosolutionism, Critical Data Studies, CDS, Accountability, and Transparency

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Introduction

The progression into digital transformation is unfolding across the globe at an ever-increasing pace. Some posit we are now beyond the fourth phase of the industrial revolution, where extensive priority is accorded to developing cyber systems that build further on automation and computers. This phase is signified by the expansion of progressively evolving technological capabilities, with Artificial Intelligence (AI) assuming a central role in the process (Schwab, 2016). There has been substantial focus on deploying automated decision-making systems for optimized management of migration and facilitation of human deliberation in public policy (Akhmetova & Harris, 2021; Ahmad, 2020; Kuziemski & Misuraca, 2020; Molnar & Gill, 2018).

Such technologies are promoted as a paradigm-shifting substitute for existing and anticipated societal, economic, and governmental developments (Bircan & Korkmaz, 2021). They are perceived to optimize government efficiency by enhancing the decision-making process, safeguarding data integrity, and cutting down on costs (Ferguson, 2017). The new socio-economic circumstances that materialize from the prevalent embrace of AI thus become paramount to untangle. This is largely due to its sweeping implications, which reach every facet of life. From human rights (Aizenberg et al., 2020) to labour markets (Su et al., 2021) to healthcare services (Jiang et al., 2017), its impact is substantial and continues to surge. The same is true for the domain of migration management due to its escalating reliance on the technology. From using lie detectors at borders (Gallagher & Jona, 2019) to implementing digital technologies to determine immigration status (Molnar & Gill, 2018) to leveraging drone machinery to gather data (Jat & Singh, 2020), the imprint of AI is widely pervasive.

However, the deployment of such technologies comes with its fair share of challenges. Among them is the use of algorithms to autonomously reach conclusions without any human involvement. This issue continues to be a central topic of debate in the ongoing discourse (Margetts & Dorobantu, 2019). When it comes to understanding the extent of their capability in terms of grasping the complex relationship between technology and societal elements, algorithms are bound by limitations and may even overlook or face difficulty in making sense of such an interplay (Selbst et al., 2019).

Some scholars have raised concerns with regard to the limitations of algorithmic bias (Dave, 2019). There has also been advocacy for stronger accountability mechanisms in the automated decision-making process (Pasquale, 2019). Some have called for a more balanced, objective discussion around the topic of AI within the sphere of politics (McQuillan, 2018). In a similar fashion, governance by AI is stressed over governance with AI in order to manipulate data and enhance the neutrality of AI itself. This is exercised to underpin opposing narratives that ultimately serve to strengthen the dominance and power of the state (Kuziemski & Miscuraca, 2020; Scheel & Ustek-Spilda, 2018).

Among a broad spectrum of other states, Canada is leading the way in adopting AI technologies (Akhmetova & Harris, 2021). Working closely with educational institutions and the private sector, it has made major investments in the field (Aguis, 2019; Vendeville, 2019; Natural Sciences & Engineering Research Council of Canada [NSERC], 2018; Social Sciences & Humanities Research Council [SSHRC], 2018). However, some consider certain aspects of these developments to infringe on human rights (Rodrigues, 2020; Molnar, 2019; Latonero, 2018; Raso et al., 2018). This is due to the insufficient regulations in place (Akhmetova & Harris, 2021). It is also because they are implemented in opaque environments with limited oversight (Nalbandian, 2022; Akhmetova & Harris, 2021). These advancements are commonly framed as unbiased technical solutions established to maximize the efficiency of policies and institutions without fully addressing the gravity of the ramifications that mirror them (Ahmad, 2020; Bither & Ziebarth, 2021; Kuziemski & Misuraca, 2020).

In light of these developments and by drawing from a range of qualitative research and conducting an in-depth study of the literature, this paper addresses the following research

question: *How does relying on AI-driven migration management affect human rights in Canada?* It explores the relevant literature and thematizes major findings into various categories. It also examines the limitations, gaps, and commonalities present in the literature and uncovers patterns pertaining to underlying biases or inequalities embedded in such technologies.

The central thesis is that the implementation of AI in this context mandates a rigorous investigation into its governance. This is due to the consequences AI produces for human rights. Despite its numerous potential benefits, a lack of scrutiny and transparency in its deployment poses risks to protecting fundamental rights. Through the lenses of algorithmic governmentality, technosolutionism, and critical data studies, the paper dissects the partialities and liabilities built into AI-related systems and brings to light the power structures they reinforce. This study ultimately calls for a balanced approach that champions individual rights amidst technological evolution. This is to ensure that AI functions as a catalyst for societal progress, not as an instrument to radically boost state dominance and power.

In terms of the structure of this paper, the following section, *methodology*, provides insights into the systematic approach employed for collecting and analyzing the research data. The subsequent *theoretical framework* segment details three fundamental components that collectively play a bifunctional role when it comes to informing and shaping the course of the research. In the ensuing *literature review* part, the paper discusses foundational concepts and explores the quest for technological hegemony, the functionality of AI frameworks, and the fusion of the shifting power landscape and security challenges. It also examines the underlying partialities and limitations of automated systems to understand the intersection of AI with human rights and the private sector's influence.

The next section, *future pathways*, charts the impending trajectory of such technologies and the prospect for regulatory measures. This is to forge a route directed toward informed governance. Next up is the *key takeaways* piece, where a critical overview of the most prominent issues and recommendations is laid out to help grasp the overarching implications of the findings. These takeaways not only outline major gaps in existing practices but also draw a roadmap for future research. Lastly, the concluding section offers a brief summary of the paper and includes a discussion of the gaps and limitations associated with the research.

Methodology

This study used systematic literature-based review as a research methodology and employed a qualitative, thematic model to conduct a comprehensive review of the research topic. Most of the literature between 2010 and 2023 was targeted for this review. This criterion was established to incorporate the latest and most relevant developments in the field. This timeframe also corresponds to the advent of *algorithmic governmentality,* which underscores a substantial evolution in AI discourse.

The review consisted of organized searches in Google Scholar, the Toronto Metropolitan University Library online database, ProQuest, JSTORE, the Scholars Portal Database, the International Migration Review, AI & Society, Ethics and Information Technology, and Sage Journals to find pertinent published articles and reports. It also relied on relevant gray literature and key publications from various institutions.

Within the research question, a range of focal concepts were identified, and a diverse combination of the following keywords was run in the databases mentioned above: artificial intelligence, AI, machine learning, algorithms, migration management, Canada, governmentality, algorithmic governmentality, human rights, technosolutionism, critical data studies, CDS, accountability, and transparency. 298 results were screened in total, and over 80 studies were retained by discarding sources before 2010.

Theoretical Framework

The paper draws on the following to establish a theoretical foundation for this research: *algorithmic governmentality, technosolutionism*, and *critical data studies*. This framework was integral to exploring the apparent and underlying implications associated with AI technologies. It also helped scrutinize the degree to which their implementation, as a presupposed means of state power, integrates structural partialities, undermines transparency, and shapes human rights outcomes. The research sought to use these lenses to unravel the divergence between AI's envisioned advantages and the actual consequences of its implementation.

1. Algorithmic Governmentality

It is important to discuss *government* and *governmentality* by Michel Foucault before diving into *algorithmic governmentality*. Foucault interpreted *government* as "an activity that undertakes to conduct individuals throughout their lives by placing them under the authority of a guide responsible for what they do and for what happens to them" (Foucault et al., 1997, p. 67). This interpretation is tied to his much-deliberated theory of *governmentality*, which demonstrates the fusion of *governance* and *mentality* and is essentially "the ensemble formed by the institutions, procedures, analyses and reflections, the calculations and tactics that allow the exercise of this very specific albeit complex form of power" (Foucault, 1991, p.102). It fundamentally implies a departure from conventional modes of governance, which are centralized and hierarchical, to slightly more subtle, sophisticated instruments of control.

Governmentality is composed of three factors. *The state,* also referred to as the *rationalities of government* (Foucault et al., 2007; Foucault, 1991); *the governed subject,* or *the art of governance* (Foucault, 1991; Foucault, 1982); and *the techniques of governance,* also known as *the technologies of government.* The latter discusses different strategies employed by the state to govern and influence its people (Foucault, 1991; Foucault & Gordon, 1980). Now, how can we connect *governmentality*, especially *the technologies of government,* with AI, human rights, and migration? Why is it important to bring *algorithmic governmentality* into the discussion as an offshoot of the above theory?

The premise that AI and algorithms affect our lives is undisputed and has been chronicled extensively in the literature (Akhmetova & Harris, 2021; Ahmad, 2020; Kuziemski & Misuraca, 2020; Molnar & Gill, 2018; Noble, 2018a; Rosenblat, 2018). Governing has shifted and evolved into an algorithmic process. Algorithms—including AI by extension—now rule (Henman, 2020). They constitute a form of power and represent a modern-day embodiment of *the technologies of government* (Foucault, 1991). They not only govern and anticipate behaviors (Kitchin, 2017), but also track movement, assist in decision-making, predict trends, and implement governing patterns in favor of those in power.

In light of this, the theory of *algorithmic governmentality* offers an interesting prism to examine the implications associated with the deployment of AI technologies. This theory was initially coined by Rouvroy and Berns (2013). They characterized it as "a certain type of (a)normative or (a)political rationality founded on the automated collection, aggregation and analysis of big data so as to model, anticipate and pre-emptively affect possible behaviors" (2013, p.10). This theory helps us understand the dynamic role of algorithmic systems in directing, influencing, and governing our conduct, choices, and overall presence in society. Rouvroy and Berns (2013) assert that *algorithmic governmentality* has evolved in a world that is heavily centered around data. In it, algorithms possess the central power to form decisions and regulate outcomes. This signals a paradigm shift in the system of governance, from processes managed by humans to data-powered infrastructures.

This theory, in essence, explicates the intricate means through which power is formed, justified, and preserved. It also demonstrates how states exert dominance over their citizens

within this sophisticated matrix composed of power dynamics, technologies, and practices. My grasp from the above discussion is that AI, including algorithms, as instruments of *governmentality*, or *technologies of government*, have the power to not only facilitate and empower but also restrict and impede our actions.

2. Technosolutionism

Technosolutionism is commonly used in the discourse surrounding information systems and digital technologies, including AI (Brey, 2012). It explains the outlook that all societal dilemmas or challenges can be remedied with technology and its advancement. Technology is presented as the force that instigates positive transformation in nuanced social complexities. But this concept often neglects the heterogeneous nature of those complexities and disregards the potential limitations that may hamper the results yielded by such solutions (Morozov, 2013).

Morozov (2013), a prominent critic of *technosolutionism,* championed the popularization of this concept. He asserts that such a mindset leads to reducing or oversimplifying the subtleties of complex societal phenomena. This is done by approaching them as nothing but simple or solvable issues that can be addressed and rectified with technological instruments. He further argues that such societal problems mandate sophisticated assessments and judgments on values, choices, and priorities (Morozov, 2013). In lieu of that, he puts forward the argument that various societal problems are indeed chronic variables or dilemmas that demand ongoing oversight, management, and negotiation (Morozov, 2013).

A major critique of the concept lies in its tendency to treat multifaceted societal challenges as nothing but technical ones. *Technology*, regardless of how ground-breaking and monumental it may actually be, is considered not to be equipped to entirely grapple with issues that are firmly grounded in political, social, and economic frameworks (Brey, 2017). Plus, resorting to technology as *the solution* can add to the problem and even contribute to new dilemmas*.* It may lead to privacy concerns, data security issues, and unanticipated inequalities (Brey, 2017). This position refutes the misguided notion that *technology* is a fair, natural, and nonpartisan instrument despite the fact that it is inherently fused with societal frameworks and power hierarchies (Bimber, 1990).

This viewpoint also sheds light on the adverse effects of decoupling politics from societal issues by characterizing them as entirely *technical* matters. Their solutions are depicted as lying at the hands of experts or specialists instead of *a political process* that is subject to democratic deliberation and decision-making processes (Winner, 1980). In line with this line of thinking, one major point that proponents of *technosolutionism* often overlook is that the blueprint and maturation of *technology* are deeply rooted in principles such as beliefs, predispositions, and premises that can greatly determine outcomes for society (Winner, 1980). This can be better grasped in the framework where the presence of *algorithms* in the process of decision-making may unintentionally produce biased outcomes, even though the ultimate goal is always to either completely remove or reduce human biases and assumptions from the process (O'Neil, 2016).

Furthermore, politics is ingrained in *artifacts,* which means *technology* and *politics* are inseparable and that the former possesses the ability to shape and be shaped in a uniquely reciprocal manner (Winner, 1980). A semi-parallel perspective is articulated by Selinger and Whyte (2011), who critique the technosolutionist stance that overlooks and negates the relevance of human autonomy, social fabrics, and decision formation in directing the outcomes of technology. Another skeptic of the notion, Jathan Sadowski, offers a critical perspective. He argues that technology is capable of reallocating focus and resources away from more consequential yet technologically less inclined solutions. With this, he points to the negative outcomes of thoughtlessly adopting *it,* which may result in an unrealistic type of techno-idealism. He maintains that it would essentially mask the flaws and disadvantages of technology from our view (2020).

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3. *Critical Data Studies (CDS)*

Critical Data Studies examines data-centered technological solutions and practices from a political, moral, and social standpoint (Dalton & Thatcher, 2014). This field explores the production, utilization, and interpretation of data and seeks to dive into abstract concepts such as power, justice, and fairness and their relation to data (Dalton & Thatcher, 2014). In essence, it scrutinizes the societal implications of the sudden surge in data collection and its incorporation into decision-making processes, thus opening up avenues for a critical reflection on algorithmic data processing.

Incorporating the groundwork laid by academics such as Kitchin (2014), CDS conceptualizes *data* as a derivative of interwoven technical and social interactions. They are not inherently without manipulation or subjectivity and are perpetually conditioned by prior interpretations and human ethical standards. A similar stance is taken by Gitelman (2013), who asserts that we should not presume *data* to be naturally evident or free from partiality. Instead, we should treat them as systematically organized artifacts or pieces. The above points lead to the understanding that *data* depicts the real world. They also play an active role in its formation, constructing a distinct reality rather than simply copying or reflecting the current one (Boyd & Crawford, 2012).

This field also probes the power dynamics that are profoundly embedded within data practices. In accordance with the arguments put forward by D'Ignazio and Klein (2020), the distribution of data is not equitable among populations, resulting in what the scholars characterize as "data gaps" (p.99). This refers to the sidelining of specific populations throughout the data collection process, the categorization of information as valuable for collection, and the assessment of data through certain approaches--all ultimately manifesting potential power hierarchies and societal advantages (D'Ignazio & Klein, 2020).

Furthermore, CDS reflects on the ethical repercussions of data utilization. It involves the assessment of privacy considerations, consent, and the potentially detrimental outcomes that could result from the misutilization and wrongful manipulation of data. It also deals with the uncertainties stemming from the transformation of personal data into commodities purely for profit by corporations and government bodies, especially when it comes to gathering and using data (Boyd & Crawford, 2012). CDS also aims to pave the way for increased accountability, visibility, and inclusiveness in data processes and practices. It is done by fostering equitable access to data, supporting necessary rights for data, and crafting approaches for algorithmic governance and oversight (Benthall & Haynes, 2019; Eubanks, 2018).

Moreover, this field underscores the power structures rooted in data practices (Dencik et al., 2016; Dalton & Thatcher, 2014). It essentially looks into who possesses data and investigates who benefits from them, or who might be adversely impacted, or who exercises ownership of the data and uses it to inform decision-making. The answers to these questions can direct us towards realizing who ultimately wields control and how such dominance or power might be leveraged or exploited. Another essential characteristic of this *field* is the ethical dimension of data handling or application, which encompasses a wide range of issues such as consent, privacy, and risks (Boyd & Crawford, 2012). This encompasses exploring how data are gathered, retained, preserved, and utilized, and whether or not data privacy is being upheld and protected.

Literature Review

This segment provides an extensive and structured analysis of the pertinent literature. It starts off with *definitions* and offers foundational insight into key concepts such as AI, machine learning,

algorithms, black box, and predictive analytics. This part sets the stage for what follows, *Themes and Analyses,* which essentially engages in pivotal discussions and thematic analyses. The paper here explores international competition and investments in AI, analyzes the frameworks and functionality of migration management systems, discusses power and securitization in the context of AI applications, and probes into the key issues of partialities and vulnerabilities. This section also caters to concerns regarding the role of the private sector and concludes with a comprehensive analysis of the established AI frameworks in Canada. This approach ensured a detailed, nuanced exploration of each theme and provided perspectives on the intricate relationship among AI, migration management, and human rights.

1. Definitions

a. Artificial Intelligence

There is no globally agreed-upon definition of AI (Ahmad, 2020; McAuliffe et al., 2021). The genesis of the concept can be attributed to the field of computer science during the 1950s (Schmidt & Stephens, 2019). Prior studies acknowledge it as a multifaceted field that draws upon perspectives, approaches, and methods from multiple fundamental disciplines, including engineering, linguistics, mathematics, and natural science (Ahmad, 2020; McLaughlin & Quan, 2019).

AI, in essence, involves training a computer to execute tasks using statistical models (Calo, 2017). It also includes programming it to imitate human thought processes and emulate behaviors (Faggella, 2018). A primary objective of AI is to regiment insight and algorithmize reasoning and logical thinking across all realms of human engagement and to offer a more hassle-free approach to utilizing computers (Tecuci, 2012).

The Government of Canada has defined AI as "information technology that performs tasks that would ordinarily require biological brainpower to accomplish, such as making sense of spoken language, learning behaviors, or solving problems" (Secretariat, 2021, para. 62). It also clearly defines automated decision systems as "any technology that either assists or replaces the judgement of human decision makers" (para. 63). AI, automated decision-making, machine learning, and predictive modeling are all concepts that are used interchangeably (Kuziemski & Miscuraca, 2020).

b. Machine Learning

Machine Learning is an AI-oriented system and a collection of approaches that are not only capable of autonomously extracting patterns within datasets but also able to apply the recognized patterns to generate predictions about future data or undertake alternative decision-making approaches to navigate uncertainty (Murphy, 2012). The breakthroughs within this system, which mainly stem from significant improvements in both data and processing power, ultimately allow ML to garner knowledge and insights from data, detect complex patterns, form assumptions, make determinations, and boost performance incrementally (Kelleher & Tierney, 2018; Goodfellow et al., 2016; Jordan & Mitchel, 2015; Alpaydin, 2014).

Understanding the algorithms adopted by a machine is crucial to comprehending its learning mechanism. In this context, it includes *supervised* and *unsupervised, learning* categories (Murphy, 2012), which fall under the relevant machine learning areas being analyzed. The first type is *supervised learning.* It involves cases where the model acquires

knowledge and begins to learn from the given input-output mappings or correlations (Lecun et al., 2015; Murphy, 2012). This type is basically learning through guided instruction, in which the model is exposed to and supplied with numerous examples where the outcome is already known or that come with pre-existing answers. For instance, in order to educate a model on identifying and distinguishing *dogs*, it must be fed with an extensive collection of dog images (or *the answers).* It would not only help it derive knowledge from them but also eventually be able to differentiate between a dog and another object when shown an entirely new picture (Chollet, 2017).

The second type is called *unsupervised learning*, and this approach involves the model identifying patterns in a dataset without relying on any labeled information (Murphy, 2012). As a substitute, it uncovers structures, trends, patterns, and connections within the input data (Goodfellow et al., 2016). It basically uses *unlabeled* data, meaning the model does not receive the exact answers, and it is left on its own to unravel the underlying patterns in the data by learning directly from data properties in an unsupervised fashion (Goodfellow et al., 2016; Hinton & Salakhutdinov, 2006). For instance, the model would independently, without any instruction, organize various fruits or dogs —as input—into classes or groups determined based on their shape, color, and size, despite lacking the correct answer (Chollet, 2017).

c. Algorithms

Algorithms represent an assortment of computer instructions at their core and are used to scrutinize data, ascertain patterns, infer conclusions, and foresee behavior, all while operating at a level and pace that substantially surpasses human capabilities (LeCun et al., 2015). In other words, they are tailored instructions or a progressive series of steps formulated to accomplish a particular task or tackle a distinct issue, in which each step is clearly defined (Cormen et al., 2009). Algorithms utilized within the machine learning framework are frequently trained using colossal sets of data already available, allowing the model to extend its predictions beyond the training datasets (Domingos, 2012). They are seen as the fundamental building blocks that enable AI and ML to operate with efficacy.

Algorithms have drawn criticism for earning the reputation of *black boxes* because intellectual property laws and confidentiality measures allow them to shield information related to their training data, inputs, or source code from public access and scrutiny (Pasquale, 2015). The hidden complexity of machine learning processes pushes the boundaries of inputs and programming. It directly impacts internal decision-making mechanisms since the way it learns and the paths it takes to form connections, make predictions, and exercise judgments regularly operate in an opaque fashion (Presser et al., 2021; Pasquale, 2015).

d. Black Box

The term *black box* characterizes systems within the domain of AI in which the internal operations and processes are not completely clear or understood (Castelvecchi, 2016). What this means is that although the input data and the subsequent output are clearly visible, the exact process within the model, especially when we want to understand why and how it reached a conclusion, is ambiguous (Castelvecchi, 2016). Think of the *black box* as a complex network of interlocking pathways, a labyrinth or maze. In it, you will find that the *input* is fed in from one side and the *output* is produced at the opposite end, but

the route and protocols that guide the conversion of the input into the output within this *labyrinth* are unknown, hidden, and inexplicable (Doshi-Velez & Kim, 2017).

This issue remains a great challenge. Despite the fact that such models have the potential to generate predictions with an amazingly high level of accuracy, the issue of opacity and a lack of transparency embedded in their process can pose accountability risks (Doshi-Velez & Kim, 2017). Such models could possibly complicate the process of challenging decisions or holding the system responsible when mistakes happen. Imagine asking the model to provide concrete justification for approving or rejecting an application while knowing that the underlying process through which the model forms a conclusion or decision is ambiguous, unspecified, and blurred (Doshi-Velez & Kim, 2017).

e. Predictive Analytics

Predictive analytics is a fundamental component of AI. It incorporates a vast selection of techniques, including ML, statistical data modeling and analysis, and computational neural networks, to examine archived data and predict future happenings, behaviors, and patterns (IBM, 2023). This sophisticated instrument not only makes predictions but also brings forth obscured patterns and linkages from extensive quantities of data, offering a critical foundation for strategic planning and decision-making processes (Wang et al., 2018; Shmueli & Koppius, 2011).

AI-driven predictive modeling draws upon advanced ML algorithms that can derive learning from the available data and consistently develop, update, and evolve as time elapses (Alpaydin, 2014). Investors in the financial sector use this system to analyze past price data and market dynamics to predict stock prices, as exemplified by Wang et al. (2018). This process guides them to make informed decisions by providing key insights into future market trends.

As for its implications for migration management in Canada, this powerful tool could be utilized to anticipate prospective migration trends, decide on resource distribution, or facilitate policy formulation. These objectives could be achieved by studying patterns that emerge from historical data, such as the influx of applicants applying or coming from diverse nations, as well as the rate of positive outcomes and acceptance for these applications. However, without a rigorous assessment of its ethical functionality, it can generate undesirable outcomes for migrants (Molnar & Gill, 2018).

2. Themes & Analyses

a. Competition and Investments

International competition is fierce in the field of AI, and the dynamics between AI and geopolitics have become a consequential issue. AI has been acclaimed as the "fastest moving technology" (Brown, 2020). Governments prioritize investments in the AI industry to remain competitive in the global AI market. Its worldwide market is predicted to exceed USD $407 billion by 2027, growing at a staggering compound annual growth rate of 36.2% within the expected timeline (MarketsandMarkets, 2023). Based on the prediction of PricewaterhouseCoopers (2017), the financial impact of AI is estimated to pass $16 trillion USD by 2030. This projection is expected to escalate the already intense competition among world economies for AI dominance. According to some sources, this figure is even projected to reach $90 trillion within the upcoming seven years (Bhade, 2023).

In line with global trends, Canada is also vying to become a frontrunner in the field of AI. Prime Minister Justin Trudeau characterized AI in a broader and more inclusive way as a *digital tool* (Government of Canada, 2019c). The development and application of AI are claimed to be in line with the government's aim of promoting innovation-driven digital economics for long-term growth. The government revealed

> An investment of $1.4 billion in support for 11 large-scale research initiatives in strategic areas, through the Canada First Research Excellence Fund (CFREF). This investment will allow researchers at Canadian institutions to capitalize on the strengths of their respective research areas, and attract capital and world-class talent…The funded initiatives will foster community, provincial, national and international partnerships across the academic, private and not-for-profit sectors, to deliver research leading to important social and economic benefits for Canadians (Government of Canada, 2023b, para. 3-4; Science|Business, 2023, para. 2-3).

In the third round of the CFREF competition, a total of 33 institutions took part and submitted their letter of intent with a total funding application that reached $3.5 billion (Government of Canada, 2023f). Ultimately, 26 institutions were requested to submit a full proposal. They went through a thorough review and selection process. 11 higher educational institutions were approved for the 2022 CFREF competition at the end.

The large-scale investments and resource allocations for AI infrastructure are designated as the *superclusters.* It promises to contribute to the formation of 16,000 employment opportunities and stimulate an economic expansion of $16 billion in Canada by the year 2030 (Cision, 2018). As reported by Innovation, Science, and Development Canada (ISED), the ecosystem of AI four years ago consisted of "more than 800 start-up companies, 60 public research labs, 75 incubators and accelerators, and 60 groups of investors" (Government of Canada, 2019a, para. 11). They all concentrated in various locations across the country, such as Vancouver, Montreal, Edmonton, Waterloo, and Toronto (Government of Canada, 2019a).

Keeping pace with these developments, the government is now a member of and actively taking a leading role in *Digital Nations*, an international forum that brings together influential digital governments (Digital Nations, n.d.). The forum features a dedicated working group for AI-related issues. Canada is guiding the efforts to "support Members in the fulfilment of the Shared Approach for the Responsible Use of AI by Governments" that member states unanimously endorsed and embraced five years ago (Digital Nations, n.d., para.1). The *Shared Approach* places a strong emphasis on the principles of accountability, fairness, accessibility, and disclosure (Digital Nations, n.d.).

Moreover, Canada was the first to develop the *Pan-Canadian Artificial Intelligence Strategy* worth $125 million to foster excellence and innovation and enhance its global standing (Kuziemski et al., 2020). Rolled out in 2017, the strategy is a visionary, pioneering national undertaking. It aimed to strengthen Canada's leading position in research and innovation centered on AI technology (Brandusescu, 2021; Canadian Institute for Advanced Research [CIFAR], 2017; Digital Trade and Data Governance Hub [DTDGH], n.d.).

It is guided by four fundamental components. The first part focuses on incentivizing the pursuit of AI research and nurturing highly competent graduates in Canada. The second component concentrates on bolstering the country's global position and reputation as a key AI powerhouse. Similarly, the third piece aims to promote the expansion of a vibrant domestic AI research network. And the last component seeks to facilitate joint research initiatives among various institutes throughout the nation (Brandusescu, 2021; CIFAR, 2017).

This initiative has catalyzed the formation of three distinguished AI research establishments in Montreal, Toronto, and Edmonton, enriching the AI foundations with a diverse network of experienced practitioners (CIFAR, 2017; Nature Portfolio, n.d.). Last year, the federal government allocated a total of "$443 million in the second phase of the Pan-Canadian Artificial Intelligence Strategy" (Barker, 2022, para.1) across a period of ten years, starting from 2021-2022 (Vector Institute, 2021).

b. Frameworks and Functionality

In this subsection, the paper explores the complex operational and structural elements that guide the management of migration in Canada. It critically examines the integration of automated decision-making tools and offers perspectives on the implementation of advanced data analytics at IRCC. Another key element discussed here is the Directive on *Automated Decision-Making (DADM).* It refers to a policy framework that directs AI technology application in administrative and service provision streams. DADM also ensures compliance with the ethical and procedural standards of Canada. This segment also scrutinizes the *Algorithmic Impact Assessment (AIA)* and delves into *Chinook,* a software used by the IRCC for handling immigration applications.

- *Immigration, Refugees and Citizenship Canada (IRCC)*

Previously referred to as *Citizenship and Immigration Canada (CIC),* this federal government agency is responsible for managing immigration in different key areas. It includes controlling the influx of migrants and refugees and facilitating the successful settlement and integration of newcomers. It also entails awarding Canadian citizenship (IRCC, 2023b). Through this department, Canada provides multiple immigration avenues for anyone seeking to settle in or relocate to the country. Some examples are the express entry system, family sponsorship, provincial nominee program, and designated streams for caregivers, entrepreneurs, and self-employed individuals (IRCC, 2023c).

The government has also established certain initiatives in targeted areas, such as Quebec, the Atlantic provinces, non-urban regions, and the farming and food production sectors (IRCC, 2023c). In addition to the refugee program, the francophone immigration initiative, the economic mobility pathways pilot program, and procedures put in place to appeal immigration decisions are some of the other streams. There are also options and routes for temporary residents who are already residing in the country to become permanent residents in the long run (IRCC, 2023c).

- *AI-Powered Migration*

Previous studies show that Canada's immigration and refugee systems have utilized some form of automated decision-making tools to improve efficiency and productivity since 2014 (Molnar & Muscati, 2018; Keung, 2017). One contributing factor is Canada's goal of accepting thousands of new permanent residents in the coming years. There were also speculations that Canada was soliciting input from the business community on a model project for an *Artificial Intelligence Solution* for

decision-making and evaluations in the immigration sector. It also included pre-removal risk assessments and humanitarian and compassionate applications (Molnar & Gill, 2018).

Some claims were also made regarding the government's employment of algorithms in its immigration decision-making system. This was done to not only assess the thoroughness of an application but also to evaluate risks and credibility, ascertain the authenticity of marriages, and validate the legality of child and parent relationships (Molnar & Gill, 2018). There have also been some speculations about Calgary and Toronto making use of facial identification technology since 2018, and other areas like Halifax and Montreal have neither admitted nor disputed implementing surveillance systems enhanced by AI technology (Lee-Shanok, 2019).

Furthermore, the Canadian government announced two pilot projects in 2018 that deployed AI-related technology to handle visa applications from China and India for temporary residence in the country (Kuziemski & Misuraca, 2020; Wright, 2018). It also concluded a pilot program in which automated algorithms using predictive analytics prioritized, screened, and accepted online visa applications with a low-risk outlook (Meurrens, 2021a). The applications were sorted into three levels: low risk for automatic approval, and medium and high risks for the assessment of an officer.

The purpose was for AI to validate and approve low-risk applications autonomously, with officers exclusively assessing applications that were tagged and singled out as medium- to high-risk (Nalbandian, 2021). In relation to this, IRCC declared that it does not incorporate *black box* algorithms, the outcome of which is extremely difficult to predict, rationalize, or automate judgments in any shape or form for asylum, humanitarian, or compassionate applications (McEvenue, 2020).

Revisiting the origins almost a decade from now, the government made amendments to IRPA. The purpose was to grant the Minister of Citizenship and Immigration the authority to leverage technology in the implementation of immigration programs in the country (Immigration and Refugee Protection Act [IRPA], 2021). As subsequently published in the official record of the Canada Gazette, "these legislative changes were developed to support the expanding use of electronic tools in the immigration system to manage the ever-increasing volume of immigration applications being processed." (Canada Gazette, 2019, para. 9).

Similarly, the deployment and integration of digital solutions to optimize service delivery across various divisions, in particular to review and assess immigration applications, is a prevalent theme in the departmental plan of the IRCC (Government of Canada, 2022d). The Minister of Immigration also reaffirms and emphasizes the *Digital Platform Modernization* undertaking, which articulates the roadmap for digitalization at the department, including the reconfiguration and modernization of the case processing system (Government of Canada, 2022a, 2022d).

The introduction and application of AI and *advanced data analytics* (as discussed in the ensuing section) for automating the assessment of routine or standard applications is an integral part of these digitalization efforts (IRCC, 2022c). As echoed by Minister Sean Fraser, these new developments have yielded positive outcomes in shortening the time required for application processing (Raycraft, 2023). For example, these measures have been instrumental in processing almost 98 percent of Temporary Resident Visa (TRV) spousal

immigration applications within a compressed 30-day processing timeframe (Robitaille, 2023). The rate of successful approvals for applications assessed utilizing the revamped system is reported to be roughly above the 98 percent threshold (Raycraft, 2023).

Moreover, the recent spike in applications has resulted in over 550,000 temporary residency applications in March and a 13 percent surge in comparison to the corresponding month in 2022 (Better Dwelling, 2023). With the major source of applications coming from China, Ukraine, and India, the cumulative applications for the first quarter of this year surpassed 1.43 million, representing a roughly 50 percent boost in contrast to the exact same period or quarter in 2022 (Better Dwelling, 2023).

▪ *Advanced Data Analytics*

IRCC characterizes *advanced data analytics* as statistical tools that employ data to sort and organize applications in accordance with the level of complexity they manifest. They also include machine learning applications in which an algorithm evolves and undergoes learning over the course of time as a reaction to the primary set of training data and newly provided inputs (IRCC, 2022c). By optimizing the productivity and efficiency of department operations, this tool is expected to shorten the duration of processing. This is achieved by spotting non-complex applications that can be handled efficiently, typically associated with clients who have a successful visit history in Canada within the past ten years (Government of Canada, 2022a). This system carries a considerable volume of clerical and repetitive responsibilities that were conventionally tied to the categorization and arrangement of applications. It facilitates department officers' ability to direct their attention and energy to the pivotal facets of reviewing applications and forming decisions (Government of Canada, 2022a).

The following categories encapsulate how the department uses *advanced data analytics* in migration management:

Automating positive eligibility determinations; distributing applications between officers based on the characteristics of the application; identifying applications that may require additional verification; workload distribution; creating "annotations" that summarize basic information on each client to reduce officer searches in our Global Case Management System; triaging client emails to enable faster replies, and responding to client enquiries by providing publicly available information; [and] assessing biometrics (IRCC, 2022a, para.3).

While AI has generated reservations regarding the issue of partiality and the absence of clarity in the decision-making process, IRCC maintains its adherence to the core principles of accountability, legality, and procedural equity. This is clearly articulated in the framework of the Canadian Charter of Human Rights and Freedom (Robitaille, 2023). As expressed by the Minister firsthand, in spite of these technological strides, the final decisions fall under the purview of officers and will ultimately remain their duty (Raycraft, 2023), thereby demonstrating that the system lacks the power to reject applications (Government of Canada, 2022a).

The system has been in place since 2018 and is used for categorizing, prioritizing, and making affirmative eligibility assessments on TRV applications

submitted from India and China, which are widely recognized for their large number of applications. In the case of a simple or non-complex application, the system establishes the eligibility of applicants, which is then passed on to an officer for a comprehensive review involving screening and background security checks (Government of Canada, 2022a).

It is also subject to rigorous legal, confidentiality, and impartiality assessments by specialists to establish conformity with laws, guidelines, and recommended protocols, thus minimizing the potential vulnerability to biases. To safeguard the integrity of the system, a randomized subset of applications selected by the system is thoroughly reviewed by an officer as a feedback mechanism to ensure operations are carried out in a just, fair, and equitable manner (Government of Canada, 2022a).

The department has also introduced similar technology for organizing client emails through text recognition technology since 2020 (IRCC, 2022a). Though some parts of it make use of more advanced, sophisticated *black-box* algorithms, they ultimately do not decide or offer recommendations on applications submitted by clients (IRCC, 2022a). In its pursuit of improving the Privately Sponsored Refugee program and in close consultation with key stakeholders, IRCC is putting great effort into the creation of models that would automate or systematize certain favorable eligibility determinations. This would also include guaranteeing the accountable application of the technology (IRCC, 2022a).

Moreover, the system operates based on the Treasury Board Directive on Automated Decision-Making (DADM). It stipulates that the federal government is responsible for providing clear reasoning behind administrative resolutions. It also presents a coherent rationale for those whose applications were denied (Robitaille, 2023). That is one of the reasons behind the formulation of internal policies by the department. In fact, it is among the pioneering departments to release *Algorithmic Impact Assessments (AIA)* in compliance with the Treasury Board *Directive on Automated Decision-Making (DADM)* (IRCC, 2022a, 2022c). It has also created an oversight committee and devised extensive guidelines, such as a *Policy Playbook on Automated Decision Support,* which serves to examine the ethical, result-oriented, and optimized application of such technologies (IRCC, 2022a).

- *Directive on Automated Decision-Making (DADM)*

This directive or policy sets forth a roadmap for the application of AI technologies in service provisions and administrative decision-making processes (Treasury Board of Canada Secretariat [TBCS], 2019). It became operational on April 1, 2019, and covers all automated decision-making model tools that were either created or purchased after April 1, 2020 (TBCS, 2019). Its primary objective is to make sure that the implementation of these technologies respects and aligns with Canadian ethical and procedural standards (TBCS, 2019).

This policy compels federal institutions to curb unfavorable outcomes by carefully evaluating the implications of algorithms (TBCS, 2019). Not only does it demand revealing important information to ensure transparency throughout the process, but it also clearly states that all systems of automated decision-making must be scrutinized for potential discriminatory biases (TBCS, 2019). It also focuses on the importance of why the data employed and produced by these

systems must be trackable, safeguarded, and in accordance with the *Privacy Act* and the *Policy on Service and Digital* (TBCS, 2019).

Furthermore, the directive prioritizes the presence of the human element or engagement in the process. It highlights the importance of potential alternatives for clients if they wish to dispute or appeal the validity of the decisions (TBCS, 2019). The directive is reviewed and evaluated every two years, as prescribed by the Chief Information Officer of Canada. It is obligated to go through the *Algorithmic Impact Assessment* at the pre-production phase (TBCS, 2019). However, despite all these internal policies and regulations established for governmental departments, the *private sector* functions without a similar directive.

- *Algorithmic Impact Assessment (AIA)*

The key challenges mentioned earlier require a thorough mechanism for managing risks. This is where the *Algorithmic Impact Assessment (AIA)* comes into play. Established in accordance with the Canadian Directive on Automated Decision-Making (DADM), AIA is essentially a tool used for assessing risk. It is put together by the government for the purpose of overseeing and regulating algorithm-driven decision-making systems (Government of Canada, 2023a; 2022b).

When it comes to the domain of migration, this tool could play an important role in examining any AI-powered system employed for immigration application assessments or making predictions on the basis of previous immigration data. You can think of it as a questionnaire made up of various risk and mitigation questions designed to determine the effects of such systems on rights, economy, health, etc. (Government of Canada, 2023a; 2022b). This tool adheres to the requirements outlined in the DADM, and considerable priority is placed on its structure, design, algorithms, datasets, and overall impact (Government of Canada, 2023a).

The structure of the tool is segmented into risk and mitigation categories, and each part contains questions with associated grading and scoring models that are measured depending on the degree of either risk or mitigation they come with (Government of Canada, 2023a; 2022b; Secretariat, 2022). As an example, it has the capability to assess factors posing risks when it comes to the types of decisions made by the system. This includes determining eligibility for visas or prioritizing applications, while also attempting to understand the various effects these outcomes may have on migrants' financial interests, rights, and wellbeing (Government of Canada, 2023a). Besides, the AIA process includes a careful assessment of the data utilized by the system, which in the migration context would mean its category, origin, data collection approach, and security level (Government of Canada, 2023a; 2022b; Secretariat, 2022).

The outcomes generated by this tool (AIA) calculate a risk assessment index or score and categorize the system into the following range of scales: *Level I* (marginal impact) to *Level IV* (profound impact) (Government of Canada, 2023a). These levels determine the sort of mitigation measures that would be relevant and necessary. The levels can be adjusted, but it would require completing an entirely new AIA and providing the tool with newly available information that was not provided previously (Government of Canada, 2023a).

This tool is required to be used both at the onset of the design phase and also before the production stage in order to ensure the principles outlined in the directive are adhered to (Government of Canada, 2023; 2022b; Secretariat, 2022).

All in all, this tool provides a systematic approach for gauging the consequences of using AI in migration as well as helping government authorities abide by legal, ethical, and state-developed policy mandates.

▪ *Chinook*

When compared to the advanced data analytics systems and machine learning applications that are utilized in triaging immigration applications, the *Chinook* software is comparably unsophisticated, rudimentary, and primitive in nature (Government of Canada, 2022c; IRCC, 2022a; SCCI, 2022a). Put together by IRCC, it is basically a tool created in Microsoft Excel to manage incoming temporary resident, work, or study permit applications with the purpose of increasing efficiency in the system (Government of Canada, 2022c).

Its main function is to present information and data about clients that are saved in the Global Case Management System (GCMS) in a manner that is easy for users so that officers are able to process a greater number of cases (Steinman & Barandereka, 2023). The tool is claimed to have a greater impact in areas with inadequate network speed as it helps save time transferring and reviewing data across a range of GCMS screens (Government of Canada, 2022c). In addition, an 18 to 30 percent boost in efficiency was reported as a result of introducing this tool because it fostered productivity and had a direct impact on reducing time spent reviewing applications (Government of Canada, 2022c).

It is imperative to highlight that Chinook, in any capacity, is not capable of incorporating AI, algorithms, or any other advanced systems for forming decisions on applications, as those decisions are made by an officer (Government of Canada, 2022c; IRCC, 2022a). It is also restricted from saving any information related to clients in order to meet privacy standards and not become a hub where client data is stored separately (Government of Canada, 2022c).

Records pertaining to decisions on applications must still be preserved in the official GCMS as the mandated documentation system. However, there are concerns over how transparent the tool is because notes generated by users when reviewing applications are not stored permanently after each session in GCMS (Steinman & Barandereka, 2023).

Due to the lack of substantial data, it is extremely difficult to gauge the overall implications of Chinook on various immigration applications and populations. According to the Standing Committee on Citizenship and Immigration (2022b), IRCC has not been as strict in terms of implementing quality assurance measures on the tool as they are with advanced analytics systems. Some have even established a link between the increasing rejection rate of study permits throughout the past five years and the deployment of this tool in the immigration process (Arlene Ruiz, as cited in SCCI, 2022a).

In accordance with the information submitted by the department to the Committee, IRCC processed seven percent of work permits, 20 percent of TRVs, and 14 percent of study permits with Chinook in 2021 (SCCI, 2022a). Looking at the variation in refusal rates of these applications with the averages from 2021, Chinook-processed applications yielded a greater frequency of denials (SCCI, 2022a).

Furthermore, it has been criticized for relying heavily on Excel as an application that comes with multiple limitations, such as data storage or infrastructure capacity, as well as incompatibility issues surrounding its various

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versions (Government of Canada, 2022c; IRCC, 2022a). Also, this application lacks collaborative features. What this means is that any revisions or edits made by one user or officer are not displayed to others in an automatic manner, resulting in communication breakdowns.

This tool faces a significant critique regarding its inability to incorporate AI-related features. This handicap results in the tool's failure to detect patterns or conduct predictive analyses, providing a disadvantage for those that rely on these capabilities. Moreover, the effectiveness of this tool is entirely contingent upon the training and preparation officers receive in this process. Faulty handling or misinterpretation of its capabilities poses a risk of introducing inconsistencies and flaws in the system (Government of Canada, 2022c).

There are also some concerns over the absence of legal oversight. Many have fears about inaccurate summarizing of lengthy documents and inconsistencies between the justification presented for application rejection and supporting documents presented by applicants (Steinman & Barandereka, 2023). These concerns are justified in light of the rise in the rejection rate of study permits right after deploying Chinook, especially for those applying from African states with French as their main language (Steinman & Barandereka, 2023).

In response, the government maintains that the final decisions rest with the officers. It maintains that Chinook is only used as a method of compiling and presenting immigration-related data in a more efficient and easy-to-understand manner (Steinman & Barandereka, 2023). The government continues to claim that the visa rejection and approval rates have always shown year-to-year fluctuations and that it is incumbent upon and on the onus of applicants to satisfy the established criteria set by the department (Steinman & Barandereka, 2023).

c. Power and Securitization

States use the pretense of national security or even humanitarian efforts to advance their capabilities. They include tracking, monitoring, and understanding the populace, especially the migrant population. This has become an important justification for deploying new technologies and collecting information from various channels. States seek to establish dominance over migration. They do this by bringing the issue of national security into the discussion. It is also achieved by shifting the narrative towards the criminalization of migration. This is envisioned in an effort to create oversight gaps for the creation and implementation of new technologies that could be tested on vulnerable groups such as migrants, who face inadequate opportunities for redress (Presser et al., 2021; Molnar, 2019a).

Looking at the use of migration management technologies from a domestic perspective, asymmetric power relations continue to be prevalent. They are more dominant between applicants pursuing immigration status and the autonomy and capability of the state to utilize obscure, non-transparent technologies that are relatively challenging to examine (Presser et al., 2021). In spite of Canada's efforts to test and pilot diverse applications of automated decision-making in its migration process (Molnar & Gill, 2018), there are no existing legal proceedings disputing their legality.

As previously discussed, automated technologies heavily depend on large volumes of data for learning and development purposes. Data collection in this context is subject to political dynamics (Presser et al., 2021). Amidst a prevailing tide of anti-immigrant narrative and sentiment worldwide, the migration data collected has also been skewed. They have been manipulated for political motives to promote rigid policies in

opposition to immigration and control the allocation of humanitarian funds and resources (Nature, 2017).

In Canada, a small number of provinces and a select few entities derive the most benefits from AI investments. The concentration of technologies, data, and resources is mainly present in a small number of universities, partner non-profit research organizations, start-up firms, and major global tech players (Brandusescu, 2021). Through grants and contributions, the government has allocated a total of $196 million in funding to Ontario, $361 million to British Columbia, and $474 million to Quebec, respectively (Brandusescu, 2021). This is a foreseeable outcome given the extensive investment these three provinces have dedicated to AI-powered services and solutions.

Thus far, neither has the federal government provided grants or contribution awards to any of the territories, nor are there any companies established and in operation in those regions (Brandusescu, 2021). We can safely assume that the funding allocated for AI investments by the federal government cannot be deemed a pan-Canadian initiative because most of the AI suppliers come from Ontario, the breeding ground for AI start-ups (Brandusescu, 2021). This is a classic example of how the boundaries between private and public interests merge and grow fuzzy (Alfonsi, 2019), further serving the private sector's interests and adding to their power and influence (Tyllstrom, 2021).

Looking at the above issue through the lens of securitization, we can see a robust connection between the refugee and immigration laws and Canada's framework governing its national security. The Canadian Security Intelligence Service Act (CSIS Act) possesses significant power that extends to signing bilateral agreements with other states. It has the ability to carry out security screenings and compile evidence, often by "gathering and analyzing information from a broad international database" in line with state interests outlined in IRPA (RSC, 1985; Reliability Screening, n.d.).

The intelligence service agency, CSIS, went through some major revisions in light of Bill C-59, an Act pertaining to national security challenges (Bill C-59, 2019). The bill included contentious adjustments pertaining to the collection, utilization, and declaration of private data. Despite incorporating some critical reforms, it failed to fully prevent CSIS and other related agencies from engaging in debatable surveillance practices that entailed gathering and processing large volumes of digital data (Parsons et al., 2017).

To delve deeper into the theme, understanding the RCMP's former involvement in spreading ethnic and religious prejudice against migrants at Roxham Road is paramount. Roxham Road formerly served as an unsanctioned inspection boundary between the US and Canada (Peritz & Leblanc, 2017), but has been closed now. The RCMP was deeply criticized for having roughly 5,000 asylum-seekers fill out a questionnaire without providing any justification. Deliberately aimed at immigrants of the Islamic faith, the survey came with questions heavily influenced by Islamophobic prejudices, mainly dealing with political inclinations, social aspirations, and religious beliefs and practices (Peritz & Leblanc, 2017).

Some of the questions specifically sought to gauge asylum seekers' perceptions of the Islamic State and the Taliban and to get a sense of how they perceived the practice of *hijab,* or religious head covering for women (BBC, 2017). The RCMP was eventually forced to put an end to such an unethical practice and dispose of almost 5,438 files following an autonomous investigation led by the Toronto Star in 2017.

However, these measures were not enough to stop it from recording all the tallied or compiled data from the questionnaire in its data repository, which potentially could have been distributed to CBSA and other related entities (Shephard, 2017). There remain serious concerns over the collection and preservation of such data and to what extent it may have been conveyed to other agencies (Molnar & Gill, 2018).

Moreover, CBSA started taking advantage of the *Scenario-Based Targeting (SBT)* system. It is used to detect and predict potential dangers by utilizing algorithms to analyze substantial volumes of personal data (Office of the Privacy Commissioner of Canada, 2017). SBT uses predictive risk indicators to gauge the extent of risk associated with travelers, including various forms of smuggling, immigration-based frauds, orchestrated criminal acts, and activities associated with terrorism (Office of the Privacy Commissioner of Canada, 2017). It was perceived as being incompatible with fundamental human rights because not only did it operate in a systemic and automated manner, but it also produced multiple errors by flagging many people who demonstrated no risk whatsoever (Court of Justice of European Union, 2017).

This is in addition to the Canada Border Services Agency's testing of an AI-solution system called AVATAR (Automated Virtual Agent for Truth Assessments in Real Time). It was initially funded by the US Department of Homeland Security and later tested on volunteer migrants at the border between the US and Mexico. This "robot-like [lie-detecting] kiosk that uses a virtual agent to ask travelers a series of questions" has also been tested by Canada and the European Union (Daniels, 2018). There were also efforts made towards compiling the biometrics of foreign citizens (Harris, 2018; Keung, 2018). It also included institutionalizing a structure similar to the *Known Traveler Digital Identity* model. The goal was to offer assistance in pre-emptive risk assessment and security protocols, including risk-centered migration routes (World Economic Forum, 2018).

Furthermore, Canada is a member of the *Five Country Conference*, also recognized as the *Five Eyes*. It involves sharing strategic intelligence information among these five main participants (Ellis et al., 2021). Through the *High Value Data Sharing Protocol*, members actively share data related to immigration, national security, borders, etc. They also exchange personal information and biometric data that are specifically collected with the purpose of either partially restricting or fully blocking the movement of asylum seekers (Ellis et al., 2021). With the implementation of such new AI systems, the extent of uncertainty begins to increase, particularly after learning that a large sum of $656 million was awarded in funding to the CBSA from the fiscal year 2021 federal budget (Liew & Molnar, 2021).

Some even consider AI aiding those in power to bar certain individuals or groups from entering Canada. For example, the government recently introduced *Project Quantum,* which is used for managing border affairs by the CBSA. Essentially, it uses AI to carry out advance assessments of passengers flying to Canada, tagging individuals it deems a possible risk or threat (Keung, 2023). Since its implementation in 2019 until the conclusion of 2022, *Project Quantum* barred many from boarding planes headed to Canada by flagging a total of 13,863 travelers and dispensing a *no-board* suggestion to almost 6,182 passengers (Keung, 2023).

d. Biases and Vulnerabilities

Algorithms are prone to facing the common challenges encountered by humans in the decision-making process. They include the absence of proper supervision, failure to safeguard accountability, errors, and biases (Tufekci, 2015). In fact, technologies like AI have raised many concerns related to discrimination in their current state (Noble, 2018b; O'Neil, 2016). Despite striving for neutrality, there is always a chance that they could produce results that are misleading or skewed, which may perpetuate discrimination (Molar & Gill, 2018).

Findings from previous research demonstrate that the way algorithms are designed could potentially cause unintentional discrimination or counterproductive

reinforcement loops that sustain and escalate pre-existing inequalities (Angwin et al., 2016). In the case of a bias being incorporated into the system, it carries the potential to increase, resulting in discriminatory outcomes that further replicate and aggravate prevailing biased behaviors. It can also manifest and create unique discriminatory patterns (Akhmetova & Harris, 2021).

Algorithms are capable of adapting and expanding almost semi-autonomously by detecting various forms of patterns in the dataset and evaluating preceding applications and their associated consequences (Keung, 2017). Therefore, the vague attributes attached to decision-making processes related to migrants, especially refugees, further increase and promote the development of algorithmic biases. When it comes to forming judgement, or validating the authenticity of life accounts shared by a refugee, or determining the legality of the marital status of an immigrant, they are made on a case-by-case basis. They also commonly depend on the discretion and verdict of a human officer (Satzewich, 2014).

Individual biases in creating an automated system or picking the data that influences it, along with flaws in the raw data itself, can combine to mass-produce outputs that not only reproduce but also intensify discriminatory tendencies (Raub, 2018; Tufekci, 2015). This may stem from the designers' own prejudices or prevailing social biases and inadvertently convey ideals they didn't intend. The most effective way to lower such prejudices is by promoting diversity within the tech industry (McCarroll 2020).

Unfortunately, this algorithm has been widely criticized for disproportionately referring individuals from disadvantaged and racialized groups for correctional pre-sentences in comparison to white criminals (Courtland, 2018). Likewise, the Canada Border Services Agency in 2018 resorted to using DNA lineage services like Familytreedna.com and Ancestry.com to identify deportees' nationality and identity (Bircan & Korkmaz, 2021; Khandaker, 2018). This approach was criticized for infringing on privacy rights since genetic makeup does not necessarily determine one's place of birth or nationality (Molnar and Gill, 2018). Although authorities have discontinued this practice, it is unknown what new data they can collect from DNA samples in the future (Akhmetova & Harris, 2021).

When it comes to the risk of bias in the Canadian framework, IRCC mandates that all of its advanced data analytics systems go through rigorous quality control. It involves the mandatory algorithmic impact assessment of systems used for the triage of overseas temporary resident visa applications (SCCI, 2022b). Officers are currently responsible for closely overseeing the results produced by these systems (SCCI, 2022a). In spite of instituting these measures, the Standing Committee on Citizenship and Immigration was informed of the overreliance of the system on data generated by former visa officers and that the risk of replicating biased and racist judgments is a present-day possibility (SCCI, 2022a).

What this means is that the biased, discriminatory decisions of the past can potentially resurface in the form of structured algorithms or machine learning models today (Siham Rayale, as cited in SCCI, 2022a; Nalbandian, 2020; Gracia-Soraino, 2018). This is better articulated by Gideon Christian, who stated that:

> [T]he problem is that, historically, you have been collecting data that seems to be biased against a particular group of people or a particular continent. When you use that data to train an AI algorithm, what the AI algorithm does is simply regurgitate those biases. This time it's even more difficult because it becomes more difficult to be able to identify this problem (Gideon Christian, as quoted in SCCI, 2022a, p. 48).

Moreover, it is an extremely challenging task for lawyers and applicants to not only gain a good grasp of but also challenge the responses produced by algorithms. It is

because none of those individuals are entitled to or hold the power to access the code or the information that influences it (Mario Bellissimo, as cited in SCCI, 2022a). It is also argued that the population affected by such systems will have a tough time making sense of the decisions. They will also not have the capacity to respond, as not everyone will be equipped with the relevant knowledge or receive access to the right resources (Beba Svigir, as cited in SCCI, 2022a).

Such advanced data analytics systems are also employed to transform the implementation of the *Express Entry System* into a digital format. It involves the comprehensive ranking system (CRS). It is used in the Federal Skilled Trades Program, the Canadian Experience Class, the Federal Skilled Worker Program, and a segment of the Provincial Nominee Program (Dumont, 2019). Applications are assessed through CRS; they go through preliminary screening, and candidates demonstrating the highest potential for labour market success become finalists for permanent residency (Nalbandian, 2020). Considering that this system relies on self-reported data, profiles of candidates or the *input variable* can be prone to biases or errors. They could have either negative or positive effects on their eligibility in the process (Jakovlevski, 2015).

e. Ratification and Human Rights

Canada has accepted a number of international and domestic agreements, treaties, and legal mechanisms with the aim of shielding fundamental rights and reducing discrimination. With its intent to deploy and implement AI technologies or automated decision-making tools, the potential risk of undermining these rights is much greater now. For example, we have the right to assemble and associate ourselves. We exercise these rights in the absence of any sort of intervention from the government. This is exercised on the basis of Article 22 of the International Covenant on Civil and Political Rights (United Nations, General Assembly, 1966).

However, people may hesitate to engage with others publicly due to being linked with groups that are susceptible to secondary screening or being identified as high-risk by Canada's immigration system's automated algorithm (Molnar & Gill, 2018). By this extension, religious liberty and privacy rights are similarly endangered when algorithms substitute or supplement procedures related to forming decisions in the country's immigration system (Molnar & Gill, 2018). This is even though privacy is a human right based on democratic ideals of freedom and rights (Austin, 2018).

Canada has signed agreements with a number of overseas entities that involve exchanging information internationally. In light of that, excessive data collection is justified as a necessary measure for training and evaluation purposes. This sharing of information at a global level may expose the privacy of those who are disadvantaged or helpless, like refugees. This becomes problematic when authoritarian regimes in their respective countries of origin use the data to further exploit them and put their welfare at risk (Molnar & Gill, 2018).

When it comes to rights such as the right to reason, the right to an explanation, and transparency, they are put in place to safeguard applicants' ability to comprehend and contest administrative decisions made by decision-makers (Baker vs. Canada, 1999). However, algorithms pose a unique challenge to these protections because they cannot articulate their reasoning in the same manner as humans. For example, using voice recognition algorithms for English proficiency tests required for work visas and residency applications in Australia has been criticized due to concerns that they pass judgments without justification (Davey 2017). There have even been instances of proficient speakers

failing these exams with no clear clarification on how the algorithm reached its conclusions.

Fundamental human rights that are supported across the world have close ties to migration issues. These rights have been violated by various experiments conducted with technology. The placement of migrants in detention centers at the US-Mexico borderline and refusing them the right to freedom is an important case to examine (Rosenberg & Levinson, 2018). Intentionally using and manipulating algorithms to validate more incarceration of immigrants under the banner of protecting and securing borders demonstrates that states are certainly capable of achieving this objective, even at the expense of violating basic human rights (Silverman & Molnar, 2016).

In light of the troubling historical patterns of racial and gender bias connected with such technologies, there is a strong possibility of similar issues surfacing in migration as well. Discriminatory markers or variables, such as country of birth, may generate discriminatory results via inaccurate deductions and inferences (Presser et al., 2021). As previously discussed, the decision-making challenges that affect humans (e.g., bias, mistakes, and transparency) can certainly extend to and apply to algorithms as well (Tufekci, 2015).

The non-transparent practices within the domain of migration and decision-making set the stage and create conditions for algorithmic bias to thrive. Whether it is gauging the truthfulness of a claim submitted by a refugee or judging the authenticity of an applicant's marriage, decisions in this context entail a high degree of discretion and commonly rely on evaluating someone's credibility (Tufekci, 2015). For example, using AI-enabled lie detectors at European airports (Gallagher & Jona, 2019) raises many questions. For example, what elements add to truthfulness, or how will variances and gaps in multicultural communication be mitigated so that inaccurate inferences are prevented from getting incorporated and perpetuated by the system? In other words, the intricate facets of migration should not be reduced to a mere algorithm.

Another good case to examine is the *Extreme Vetting Initiative* by the US government. It is used to categorize applicants based on various levels of risk associated with national security. They go through and assess the contents of their social media, such as travel history, country of birth, and many other identifying markers that are used to justify increased scrutiny and refusing entry (Glaser, 2017). In this context, relying on such content for decision-making purposes can result in flawed conclusions when evaluated by an automated system (Lapperuque, 2018).

Similarly, when it comes to data-driven, algorithmic policing, the possibility of revealing the influence of politicized and biased factors in decision-making could entirely get lost behind the rhetoric of using machines to improve efficiency and accountability (Root, 2018). Not only that, it also takes a toll on applicants' freedom of speech. This is because they will have no option but to impose self-censorship in order to avoid unnecessary scrutiny (Root, 2018). It is done on top of restricting their freedom to associate, worship, and move by spending less time in religious settings (Presser et al., 2021).

In the context of administrative legal frameworks concerning decision-making on refugees and immigrants, an individual affected by administrative procedures is legally entitled to a just, impartial, and objective decision-maker. He has the right to understand the basis for a decision and seek compensation for an unfair decision (Molnar & Gill, 2018). Now it is not yet clear how the algorithms will be incorporated into the system of administrative law and whether it is even possible to entirely replace humans in decision-making processes, making the line that separates humans from machines extremely dim (Presser et al., 2021).

It is also important to think deeply about the review and appeal process when an individual seeks to dispute a decision made by an algorithm or advanced automated system. Numerous sources have documented the disproportionate reliance placed on algorithmic decision-making (Koliska & Diakopoulos, 2019). Assessing the effects of such technologies on human rights that are enshrined in international declarations offers a structured framework to formalize violations and reflect on mechanisms for redress (McGregor et al., 2019).

f.   Private Sector and Infringements

The funding for AI by the government in Canada is primarily allocated to the private sector and academic institutions. Academia most commonly serves as a liaison connecting the government with the AI industry. They function with a main focus on facilitating the expansion of AI research skills within the private sector and equipping students with the necessary skills and capabilities required in the job market and sought by employers (Brandusescu, 2021). In fact, "more academics are being aligned with big tech, pushing for innovation, without thinking about human rights impact and governance… [which is] the same in Canada too, not just in Silicon Valley." (Brandusescu, 2021, p.37).

Element AI's latest report on the Canadian AI ecosystem (McLaughlin & Quan, 2019) reveals that the number of significant transnational corporations with an AI-related focus in Canada has increased by 150 percent over the previous year to reach 50 in total. This trend indicates that more global AI enterprises are recognizing Canada as a valuable investment destination. This growing public-private partnership offers an important perspective on the various AI investment and funding processes, which leads us to "consider how private industry choices are, in fact, public policy decisions." (Benjamin, 2019, p. 12). As such, it is critical to consider how private- interest funding decisions affect the formulation of public policy on AI.

The existing rhetoric displays public-private partnerships and investments as significant means to implement AI initiatives for the greater good of the public. This is done despite the fact that the feedback from the public pertaining to the funding allocations is taken into consideration only once the decision-making process has concluded (Montreal International, 2023). And when the public is provided a chance to offer their input during the public consultation phases, the entire discussion takes place within privately operated buildings (Brandusescu, 2021). Also, the presence and participation of public interest supporters, communities, and digital rights organizations in the entire process are restricted, positioning them at the very edges of influence (Brandusescu, 2021).

Moreover, there are no strict mechanisms in place that would prevent private companies from forming partnerships with the government. Especially when they have a history of horrible human rights violations. A good example of this is the government's engagement with *Palantir Technologies Inc.,* where it listed the company as one of the pre-qualified vendors of AI despite knowing that it has a horrible history of human rights abuses (Brandusescu, 2021). This company has developed a number of software programs for the various US government agencies to help them "identify, share information about, investigate, and track migrants and asylum-seekers to effect arrests and workplace raids. There is a high risk that Palantir contributed to human rights harms through the ways the company's technology facilitated the ICE operations." (Amnesty USA, 2020, p. 6).

The company has partnered with the Canadian Department of National Defence to provide a global data analytics solution for the Command of Special Operations and the Calgary Police Department. This enables them to merge their databases, creating a more

cohesive platform (Braga, 2017). Palantir is profiting from similar technologies used by government agencies unaudited by ethical bodies (Greene, 2019). Meanwhile, DarkMatter, a cybersecurity firm based in the UAE that operates in Toronto (Darkmatter, 2016), is under scrutiny for surveillance activities and detention of foreign nationals by the US Federal Bureau of Investigation (Mazzetti et al., 2019). Also, according to a CCIRC report in 2014 on cybersecurity incidents related to a foreign corporation handling large amounts of personal information about Canadian residents during such an incident, the reasons were unclear (Ling, 2015).

This leads to the realization that only relying on responsible AI instruments is inadequate for ensuring accountability within such companies. This is because companies are not legally obliged to abide by the various government policies, including algorithmic impact assessment, as it is unenforceable (Brandusescu, 2021). Since 2020, in the list of pre-qualified suppliers representing 89 different companies, only less than half of them have committed to the policy, including *Palantir,* due to its loyalty to its own internal ethical guidelines (Brandusescu, 2021).

Now, does its compliance with AIA really make a difference, knowing that such companies constantly amend their guidelines? In light of the existing domestic frameworks, the government's partnership with *Palantir,* for example, must be challenged. This is critical because "human rights safeguards and accountability are not expressly written into the contracts a company signs with a government; even if it offers its services as a donation, there is room for abuse, especially when collecting personal data." (Pinto, 2020, p. 17).

If Canada seeks to paint a positive image of AI technologies among the masses, public awareness is critical, and the establishment of an independent AIA group should also be taken into consideration (Munro, 2019). When utilizing innovative scientific techniques, it's critical to ensure that qualified public servants who understand and can analyze and oversee these advancements are involved. Failing to do so is technically unsound, violates regulatory standards, and may not align with accepted moral principles (Molnar & Gill, 2018).

g. Frameworks Analysis

The *Directive on Automated Decision-Making (DADM)* and *Algorithmic Impact Assessment (AIA)* contains several content-related and consequential issues that require further examination. They experience limitations when it comes to their scope because they are only applicable to systems that are in the production stage and have no authority over those that were created or obtained before April of 2020 (Treasury Board of Canada Secretariat [TBCS], 2019b).

Therefore, the mandate on disclosure as outlined in the DADM policy can only help detect the use of algorithms in government departments post-2020. If all government departments are not made liable against the DADM principles, especially when it comes to revealing the use of algorithms in decision-making, it would be absolutely impossible to gauge who and to what degree these systems are employed.

In order to promote robust algorithmic accountability measures, it is highly important to focus on the requirements outlined in the policy, especially transparency, which is listed as one of the central mandates. The presence of transparency as an oversight measure would make sure that a detailed notice and a clear justification are offered before and after a decision is formed using the advanced automated systems (TBCS, 2019b). This particular component would also facilitate the disclosure of information related to the source code maintained by the government. It also ensures all

necessary details of decisions made by these systems are clearly recorded. In addition to transparency, quality control is another key requirement. It focuses on adequate testing and monitoring of systems prior to reaching the production stage.

This is done with the intent of identifying any potential problems related to the use of a system at the very beginning in order to have ample time for their mitigation (TBCS, 2019b). Another requirement outlined in the policy deals with the idea of recourse. It is included to make the systems more accountable whenever there is an error or clients decide to dispute a decision made by such systems (TBCS, 2019b).

There are other main requirements mentioned in the policy as well, such as establishing a peer-based evaluation process for the systems. It also includes employing correct and accurate dates and providing extensive training to authorized individuals on the system's design. There is also the matter of devising contingency systems and ensuring they adhere to the key laws and regulations. Also, it involves facilitating human involvement when necessary (TBCS, 2019b).

When it comes to the human element, the policy acknowledges the significance of having human supervision when the systems are used in public administration efforts. But this does not mean an unrestricted privilege for a human presence in the process. It would otherwise go against and contradict the initial goal of the government to use evolving technologies for service delivery improvement (TBCS, 2019b). As per the policy, the role of human input and involvement in this context is not completely eliminated, but it is restructured and made contingent upon the particular decision at hand and the scope of its consequences. Also, the assessments of systems conducted by AIA are completed based on the impact assessment level, which ranges from I to IV.

The former represents a decision with marginal to no impact, whereas the latter demonstrates a decision with far-reaching implications (TBCS, 2019b). If a decision formed by the system gets assigned an impact level of III or IV after undergoing AIA, the directive clearly calls for human intervention, and no decision can be finalized at that time. Similarly, if we have a decision with an impact score of I or II, the policy does not require human input (TBCS, 2019).

Incorporating a peer-review model into the process facilitates the opportunity to engage with specialists. It also helps use their expertise to ensure the operations of the system meet the standards. Also, training employees on how the system functions, its design, and its execution is crucial for monitoring and control purposes. This function of training internal employees can also come in handy when there is a request to explain the decisions (TBCS, 2019).

Furthermore, the policy requires that any automated decision-making system be comprehensible. It mandates an explanation for all decisions made by such systems, ensuring accountability and justification, which can aid in a better understanding and analysis of the process behind those decisions (TBCS, 2019). However, the policy does not explicitly state any sort of requirement on the degree and extent of complexity needed.

Moreover, the algorithmic accountability derives from the central standards and guidelines. It includes grasping and gauging the implications of AI. It also involves remaining open in revealing how and when such technology is utilized and offering thorough, justified clarifications on decisions made by the technology. It also extends to facilitating opportunities for dispute resolution and making necessary information public. In the meantime, it covers safeguarding data integrity and security and focusing on adequate training for those involved in the process (Government of Canada, 2023d).

In addition, the continuous practices of testing and closely assessing the end results can have a tremendous contribution, not only in terms of increasing transparency in these systems but also reducing biases in their design and implementation outcomes. There is a need for a mechanism to check information and data for biases before such

systems are transferred to the production stage. This would also include conducting regular check-ups of the outcomes against the relevant guidelines and policies.

Future Pathways

In this segment, the paper presents the following seven recommendations to help chart a route for ethical and accountable AI application in migration systems. The first recommendation suggests institutionalizing a hybrid model. It calls for combining human oversight with AI to ensure human rights are safeguarded throughout the process. The subsequent recommendations focus on partnerships among stakeholders as well as training and security measures to avoid overreliance on the systems. The study also proposes the establishment of independent oversight bodies to closely assess the impact of these technologies.

Further recommendations include the incorporation of core principles such as fairness, impartiality, diversity, transparency, and accountability into AI models to prevent potential biases and help build confidence. Towards the end, the paper advocates integrating diverse and inclusive data to ensure accurate outcomes. These recommendations will allow for AI technologies to be developed and implemented in a fashion that not only adds efficiency to the migration system but also protects human rights.

1. Hybrid Model

It cannot be stressed enough that human oversight and AI systems should go hand in hand and must function in a more synchronized manner. When it comes to pronouncing judgments and forming decisions that may affect lives and outcomes, automation cannot be used as a substitute for human judgment (Cath et al., 2018). Efforts must therefore be made to ensure human rights are safeguarded. It is also imperative that they are prioritized when designing and implementing AI tools.

This becomes exceptionally important when considering the various human rights at stake as well as how migrants can often be perceived merely as threats to security as opposed to individuals with fundamental rights and values (Bircan & Korkmaz, 2021). In order to foster human agency and guarantee oversight in such systems, end-users must acquire and carry the required knowledge, experience, and level of competence to successfully navigate through this process (Article 29 Data Protection Working Party, 2018). This can certainly be materialized by adopting a more collaborative method that would entail involving end-users in the entire planning, testing, and production stages. Such a user-centred design framework ensures that the system fulfills end-users' requirements while revealing pertinent knowledge about its usage.

2. Collaboration

In identifying all potential legal and ethical risks associated with these systems, collaboration is a critical component among public and private stakeholders. The involvement of those directly or indirectly affected is equally important to ensure a comprehensive evaluation (Bircan & Korkmaz, 2021). What this means is inviting and engaging migrants in the discourse (Molnar, 2019a), as it paves the way for a participatory mechanism that could not only offer contextual knowledge but also cultural awareness for those involved in the development process (Pizzi et al., 202).

Raising awareness about key characteristics of migration pathways or their country of departure can certainly aid in increasing some level of fairness. For instance, this sort of approach enables developers to recognize underrepresentation in a dataset, thus reducing the possibility of latent biases (Pizzi et al., 2021).

3. Training and Security

On top of that, offering necessary training for end-users on the functionalities, capabilities, and limitations of AI predictive tools in order to improve oversight and human agency should also be explored. Such measures help prevent overconfidence or overreliance on these instruments (Skitka et al., 2000). In addition, AI tools must be able to fulfill particular standards so that their safety and reliability can be determined and ensured. They necessitate technical vigour and resilience to avoid any kind of harm, either deliberate or unintended.

What this reveals is that any form of risk associated with security should be carefully examined throughout the planning, production, and implementation stages (Guillen & Teodoro, 2023). Failing to meet the desired standards and consequently producing inaccurate results will have grave consequences, especially when human lives are concerned (High-Level Expert Group on Artificial Intelligence, 2019).

Moreover, strong mechanisms that would ensure the protection and privacy of data are absolutely necessary (Zuboff, 2019). AI tools can produce serious risks and negatively affect our rights by processing and analyzing our personal data. To avoid this, the information gathered should go through a process of anonymization and be utilized with stringent measures in place to prevent any form of data misutilization (Humanitarian Data Science and Ethics Group, 2020).

When it comes to the humanitarian sector, issues related to consent must also be taken into account when it involves marginalized, vulnerable groups of the population. Similarly, overconfidence or too much reliance on the current datasets can produce issues related to inequality, which has been extensively discussed in the previous section. Therefore, it is imperative to incorporate oversight mechanisms to avoid biases and establish methods for ensuring data integrity in these systems (Beduschi, 2021).

4. Independent Oversight

Another recommendation includes the establishment of independent, accountable agencies that would assume the responsibility of closely monitoring and assessing the deployment and implementation of AI technologies in the public domain of migration. As an example, the Law Commission of Ontario has expressed their interest and put forward the idea of forming an autonomous supervision and coordination unit for any sort of automated decision-making system in the country (Law Commission of Ontario, 2021).

The Ontario Human Rights Commission (OHRC) is also among the supporters of this recommendation and has suggested the idea of "[establishing] in the legislation a mechanism for independent monitoring by an oversight body that ensures publicly reported impact assessments and audits of AI systems for bias and discrimination are conducted on an ongoing basis, with jurisdiction to address systemic issues and hold governments accountable." (Hartley, 2021, para. 23).

5. Fairness, Impartiality, and Diversity

Furthermore, to ensure fairness and avoid discrimination, accurate AI models and unbiased data are necessary for system developers. They should be void of any potential bias factors, mainly those dealing with age demographics, gender identity, racial background, country of origin, religion, etc. If these precautions are not taken, biased algorithms could contribute to discriminatory patterns (Beduschi, 2022).

In addition to this lack of impartiality (Pasquale, 2015), transparency is another issue with AI tools, leading to the presence and incorporation of bias in the system (Skitka et al., 2000). This, in turn, would create a major shift in power dynamics among those who make decisions and the migrant population, which would need addressing (Beduschi 2021). To achieve diversity, non-discrimination, and fairness in the datasets at the planning and production phases, certain effective mechanisms specifically for oversight can be put into practice. These mechanisms will identify, examine, address, and test biases present in the datasets. It is essential to ensure that the datasets used are not incomplete or outdated while implementing oversight mechanisms.

To enhance diversity and fairness, stakeholders with diverse backgrounds must be included during the design, development, and deployment phases (Access Now, 2018). Stakeholders, who represent different backgrounds and hold distinct perspectives, can collaborate and closely work together at various phases of the development, and this would in turn result in reduced discrimination and inequalities (Molnar, 2019b; Bircan & Korkmaz, 2021). Representatives of non-profit organizations, advocates, human rights proponents, and key members of the migrant population can all become part of this process and increase fairness in these systems. This is particularly important for those involved in the development of these technologies. They can get a better understanding of the context by working closely with end-users and the aforementioned actors (Pizzi et al., 2021; Veale et al., 2018).

Such a knowledge-sharing mechanism would ensure there is a robust awareness of possible unintended biases that could find their way into the systems (Boddington, 2017). To further enhance and promote fairness in the process, creating a reporting system for end-users can be quite valuable. This would allow them to identify blunders and bring any form of biased result to the attention of developers. By incorporating or adding these characteristics into the process, stakeholders, in particular end-users, will develop more trust and are most likely to engage with and benefit from these tools.

6. Transparency and Accountability

Meanwhile, AI tools or systems should give utmost importance to enhancing transparency. This can be achieved by carefully documenting and providing a clear explanation behind the decision-making processes in order to avoid any form of misutilization (Burrell, 2016). It is also closely tied to the notion of accountability. There is a need for measures that could increase accountability. This is to create opportunities to make the system transparent. It could include implementing technical reporting mechanisms and developing multiple avenues for remedies should the result of decision-making include any form of biased elements (Guillen & Teodoro, 2023).

This can be coupled with various sorts of effective auditing practices that would help stakeholders evaluate steps taken for designing the systems, understand the intricate details of models and datasets used, and scrutinize the outcomes generated at the end (Guillen & Teodoro, 2023). To make systems more accountable, continuous, rigorous impact assessments must be conducted in order to ensure the end results comply with the directives and requirements outlined in the policies discussed earlier. On top of that, any sort of prediction made by these systems must be explainable, and the steps in the background taken to arrive at a conclusion must be easy to understand so that they can be challenged, questioned, and scrutinized by those affected (Guillen & Teodoro, 2023).

7. Inclusivity

In addition to the above recommendations, this paper proposes the integration and incorporation of diverse and inclusive data into the core functionalities of such technologies. Such criteria would

ensure biased tendencies are prevented when they are being developed and implemented. This is because such qualities in datasets tend to have a direct impact on the concluding results generated by the systems. Thus, the paper finds it imperative that any data that is fed to these systems be of good quality. This can be further reinforced by frequent audits to detect any patterns of biased practices or discriminatory outcomes (Barocas & Selbst, 2016). In the event a biased result or prediction is identified, the mitigation measures would entail refeeding the model or system with accurate, neutral data and updating the algorithms.

Key Takeaways

This section offers a brief overview of the key issues identified in the literature and prescribes remedies that not only mitigate current gaps but also recommend avenues for future research.

Internal Frameworks	
Issue 1	**Critique and Solution**
The *Directive on Automated Decision-Making* and *Algorithmic Impact Assessment* have limitations in terms of scope because they only apply to systems developed after April 2020. This implies that they are not applicable to older systems, creating challenges in fully grasping how algorithms are used in government agencies and departments.	- It is imperative to amend the scope of these regulations in order to include systems that were created or purchased before the April 2020 cut-off date. This ensures every algorithmic system employed in government is accounted for. - The amendment should include a transitional period so that older systems could go through an *Algorithmic Impact Assessment* within a specific timeframe. This would give us a good picture of how and to what extent these systems are used.
Power	
Issue 2	**Critique and Solution**
States use national security and humanitarian efforts to advance their capabilities, establish dominance over migration, and shift the narrative towards the criminalization of migrants to create oversight gaps for technologies. Since automated technologies heavily depend on large volumes of data for learning and development purposes, data collection in this context is subject to political dynamics and has been and can be manipulated to support anti-immigrant agendas and eventually control funding decisions.	- Policymaking should include different stakeholders, including human rights organizations, to ensure that AI tech and data collection methods do not exploit individual freedoms and the rights of migrants. - There is also a need for strict regulations that clearly outline the ethical and legal boundaries of technology use for national security in order to prevent unjust targeting of specific groups. - Oversight committees could be put together to regularly audit and monitor the actions of the state and make sure they do not negatively affect vulnerable groups. - On top of that, a separate group of experts in data science, social science, and ethics could be established to validate the collection and usage of migration-related data. They would come together and publish methodologies and findings, ensuring political biases do not affect the data itself. This group

	would also create robust guidelines for the ethical collection and interpretation of data related to migration.
Issue 3 Unequal power relations are quite dominant between applicants, on the one hand, pursuing immigration status, and the autonomy and powers of the state, on the other hand, to use non-transparent technologies like AI that are relatively challenging to examine, especially considering that there is currently not a single legal proceeding that disputes the legality of such technologies in Canada.	**Critique and Solution** - It is crucial to establish legal frameworks to subject AI techs to binding ethical and technical inspections. This can be achieved by bringing in third-party audits to help identify and mitigate biases and other systemic inequalities. - Making the decision-making algorithms and processes understandable to applicants is equally important, as they have the right to know how decisions about their immigration status are made. - There also must be a legal way for applicants to challenge decisions, which should be supported by a system that ensures timely, unbiased review. - By adopting these measures, the state can reduce power imbalances and add credibility to the Canadian immigration management system.
Issue 4 AI investments in Canada primarily benefit a small number of provinces, universities, research organizations, start-ups, and major tech companies. And limited federal funding goes to territories, and there are no operational companies there, which shows an imbalanced distribution of funding and reveals that there is truly no pan-Canadian AI framework.	**Critique and Solution** - The government should amend its national strategy to make sure a certain percentage of AI investment is directed towards underrepresented provinces and territories. - This can be achieved by including grants, subsidies, and tax incentives for AI start-ups and research organizations to operate in those regions. - There could also be partnerships between leading institutions in AI-rich provinces like Ontario and educational institutions in other areas. This would increase domestic collaboration and capabilities.
Securitization	
Issue 5 The CBSA uses the Scenario-Based Targeting (SBT) system, which employs algorithms to analyze personal data for predicting potential risks related to travelers and immigrants, but its systemic and automated operation raises compatibility concerns with human rights because of frequent errors in flagging low-risk migrants.	**Critique and Solution** - To reduce errors that result in false positives, the algorithms in this system should be regularly refined and audited by independent third parties. They must have a strong background in data science and ethics. - These audits will be responsible for identifying possible biases that could unfairly target specific demographics or groups. - There should also be a transparent mechanism for migrants to challenge the decision of the system for incorrectly flagging them. This would definitely add a

	layer of human oversight to such an automated system.
Issue 6 Canada is a member of the *Five Country Conference* or 5-Eyes, through which it actively shares strategic intelligence data related to immigration, borders, and national security through a certain protocol. This includes the exchange of biometric data with the purpose of either partially restricting or entirely blocking the movement of migrants and asylum seekers. This also exposes the privacy of those who are disadvantaged, like refugees.	**Critique and Solution** - There needs to be a critical review of the *High Value Data Sharing Protocol* in accordance with international laws and human rights norms. - Canada needs to make sure that such data is anonymized or encrypted to some degree. This needs to be developed in collaboration with legal experts and human rights organizations in the country. - Regularly publishing transparency reports is another great solution. It would outline what type of data is being shared and for what specific purposes. This would ensure that the data shared does not go against human rights principles. - There is also a need for independent oversight bodies to monitor the data sharing practices and ensure that information related to asylum seekers is not used in a manner that goes against the 1951 Refugee Convention.
Biases and Vulnerabilities	
Issue 7 There is always a chance that algorithms produce results that are misleading, which may spread biases because they are capable of adapting and expanding almost semi-autonomously by detecting different patterns in the dataset and using historical data. This issue creates multi-layered challenges when it comes to decision-making processes for migrations, especially refugees.	**Critique and Solution** - It is imperative to diversify the tech industry because bringing different perspectives into the algorithmic-development process can reduce the likelihood of unconscious biases. - It is equally critical to conduct ongoing audits of both the algorithms and the datasets they are trained on in order to detect and mitigate biases. - Opening up algorithms for public inspection and discourse can also help to sort of uncover some of the subtle biases.
Issue 8 Advanced data analytics systems for processing temporary resident visa applications undergo strict quality control and algorithmic assessments, but there's a concern that historical biases from previous visa officers' data could still persist in today's algorithmic decisions.	**Critique and Solution** - The training data for algorithms must be cleaned and refined to remove any systemic biases. It is a big process and should be open to independent, third-party audits. - Such systems producing sensitive or potentially biased outcomes should be reviewed by a diverse committee of officers trained in identifying partialities. - Input from marginalized communities should also be incorporated in order to identify the blind spots or

	areas that would normally be overlooked or missed by tech developers or policymakers.
Private Sector and Infringements	
Issue 9 When it comes to public-private partnerships and investments in this context, the feedback from the public related to the funding allocations is received after the decision's been made. And when the public is provided a chance to offer input in the consultation phases, the entire discussion takes place within privately operated buildings. And the involvement of public-interest supporters and digital rights groups is limited as well.	**Critique and Solution** - Public consultations must be done in the early stages. - These consultations should be organized in publicly accessible spaces, both in-person and online, to ensure greater community participation. - There should also be dedicated seats at the decision-making table for public interest advocates, digital rights organizations, and community representatives to provide fair, inclusive, and balanced perspectives.
Issue 10 There are no clearly strict mechanisms in place that would prevent private companies with a bad history of human rights violations from forming partnerships with the government.	**Critique and Solution** - Canada needs to introduce new legislation to specifically make *Algorithmic Impact Assessments* mandatory and legally binding on the private sector. It should also set tough penalties for non-compliance or violations. - Also, independent ethical bodies should be established. They would be responsible for auditing these partnerships and ensuring that the technologies are not employed in a manner that violates human rights.

Conclusion

This research paper conducted an in-depth study of the literature to explore the implications associated with deploying AI technologies in the realm of migration management for human rights in Canada. It utilized a systematic literature-based review as a research methodology and used a qualitative, thematic model to carry out a thorough review of the research topic. The study employed the theory of algorithmic governmentality, the concept of technosolutionism, and the field of critical data studies to formulate a theoretical foundation for this research. They were integrated as an approach to assess the apparent and underlying complications associated with AI when it comes to migration and human rights without undermining its prospective advantages. They were selected because of their strength in dictating the direction of this research as well as evaluating whether or not the application of AI, as a manifestation of state control, reinforces intended or unintended biases, clouds transparency, and compromises human rights outcomes.

The paper argued that the deployment of AI in the context of migration management mandates a thorough investigation into its governance. This is due to the consequences AI creates for individual rights. In spite of its numerous potential advantages, a lack of scrutiny and transparency in its implementation could pose risks to protecting fundamental rights. Through the aforementioned theoretical foundation, the paper dissected the baies and vulnerabilities built into AI-related systems and brought to light the power structures they reinforce. It called for an

equitable approach that champions human rights amidst technological evolution. This was to ensure that AI functions as a catalyst for societal progress, not as an instrument to radically boost state dominance and power. The research findings ultimately challenged pre-existing paradigms and contributed to a more balanced discourse, highlighting the intricate link between AI, migration, and human rights.

This research started off with an introduction followed by *methodology*, where insights were provided into the systemic approach employed for collecting and analyzing the research data. The following *theoretical framework* section detailed three fundamental components: algorithmic governmentality, technosolutionism, and critical data studies. They collectively played a bifunctional role when it came to informing and shaping the course of the research. In the ensuing *literature review* part, the paper discussed foundational concepts and explored the pursuit of technological hegemony, the functionality of AI frameworks, and the synthesis of the shifting power landscape and security challenges in the context of AI advances. Furthermore, it examined the underlying partialities and limitations of automated systems with the aim of understanding the intersection of AI with human rights and private sector influence.

The next section, *future pathways*, charted the future trajectory of such technologies and the prospect for regulatory measures. This was to forge a path directed toward data-driven and informed governance. Next up was the *key takeaways* piece, where a critical overview of the most prominent issues and recommendations was laid out to help grasp the overarching ramifications of the findings in this paper. These takeaways not only outlined major gaps in existing practices but also drew a roadmap for future research and policymaking. This was mainly to ensure that the integration of AI in the domain of migration management supported and promoted human rights.

In terms of **gaps and limitations** associated with the research, the literature explored in this study entailed an extensive array of topics and employed a cross-disciplinary approach. However, there remain certain gaps that require further investigation and analysis. Among them is the availability of sufficient and unrestricted primary/empirical research largely focusing on the implications of AI technologies on the migrant populations in the country. Such a major gap limits our ability to extract quality insights for future research. It also prevents us from gaining a robust grasp of the intricate interplay between these technologies, human rights, and migration management in the country.

Canada is leading the way in adopting and implementing AI technologies (Akhmetova & Harris, 2021). It is more evident when it comes to the application of advanced data analytics (IRCC, 2022c). It is also becoming the first to develop the pan-Canadian Artificial Intelligence Strategy worth $125 million (Kuziemski et al., 2020). It has invested "1.4 billion in support for 11 large-scale research initiatives in strategic areas" (Government of Canada, 2023b). But there is still no large-scale research that would elucidate the actual impacts of these technologies on migrants' human rights.

The existing literature offers tremendous insights in terms of learning about various theoretical approaches. It is helpful in gauging the implications of relevant policies in this regard. But they collectively do not demonstrate a clear picture of the various complexities that emerge from the deeply embedded interplay of migrant experiences and human rights effects caused by such technologies or systems. There is a need for more empirical research. It would not only capture these intricate dynamics, but also provide a different perspective on the issue.

For instance, future research could focus more on some other societal aspects. It could range from understanding the economic and social implications to psychological and health-related impacts. By incorporating dynamic theoretical frameworks and distinct research methodologies, we can enrich the existing literature with fresh perspectives. They could include individualized interviews, focus groups, or more time spent on the field. This would help us identify gaps in the literature. It would also pave the way for more focused and evidence-based research approaches.

In addition, the outcomes of these technologies explored through the existing literature review under this paper tend to carry a negative connotation and portray a murky image of artificial intelligence and some of its key instruments, as discussed previously. More focus and concentration have been allocated to their disadvantages, and the discourse appears to be inclined more towards revealing the negative sides of such technologies as opposed to highlighting the transformative potential they may carry. This alludes to possible inherent biases against the technology that may be present among the research community.

Therefore, this paper recommends a more balanced and impartial approach that is essential to grappling with this highly complex issue. Similarly, there is a lack of insight and data to completely understand to what extent these emerging technologies create opportunities for increased accountability and whether or not their deployment and application have further aggravated prevailing disparities in various domains. Further empirical research and investigation are required to address such questions.

Considering the complexities involved in this process, this paper suggests that more research is needed to explore the currently expanding relationships between the public and private sectors. It is imperative to reveal how much these actors influence one another in this context and who actually benefits more in terms of accumulating and expanding power, resources, and accessibility. As revealed in Element AI's latest report on the Canadian AI ecosystem (McLaughlin & Quan, 2019), the number of significant transnational corporations with an AI-related focus in Canada has increased by 150 percent over the previous year to reach 50 in total.

This trend indicates that more global AI enterprises are recognizing Canada as a valuable investment destination. This growing public-private partnership offers an important perspective about the various AI investment and funding processes, which leads us to "consider how private industry choices are, in fact, public policy decisions." (Benjamin, 2019, p. 12). As such, it is critical to consider how private interests shape funding decisions and the formulation of public policy on AI. Given their expertise and tremendous involvement in developing such technologies, not much is known about them or their role in shaping policies or even outcomes. The discourse is primarily surrounded by issues pertaining to international entities and domestic and global state actors. It includes a limited focus on the consequences produced by private entities in this process.

Furthermore, the accountability measures for such entities are highly unsophisticated. They are also quite dissimilar from the sort of checks and balances that state actors would normally be scrutinized against. This carries heavy weight because, despite all those internal policies and regulations established for governmental departments, the private sector functions without any specific directive. It makes it extremely difficult to assess their involvement in the misutilization or malfunctions of these technologies. It also becomes problematic when there are limited oversight mechanisms.

In a similar fashion, the role of non-profit organizations has not been fully examined. They are considered the proponents and well-wishers of migrant communities. Especially those who are involved in providing various forms of settlement and integration services in the country. It is also unclear to what extent they contribute to or dictate the course of migration policies. The ambiguities surrounding their roles tend to amplify when the topic of AI and automated decision-making systems is brought into the discussion. All in all, the interplay between public and private institutions offers a critical space for extensive empirical research.

When it comes to limitations, this research paper utilized a literature-based review as a research methodology. It employed a qualitative, thematic model to conduct a comprehensive review of the research topic. The literature-based review as a methodology was well-suited to the research. It is because the topic of my research happens to be multifaceted in nature. It involves a complex array of fields, including AI, migration, and human rights. Each of these disciplines comes with its own literature foundation that presents valuable knowledge that helps untangle parts of the research question.

The methodology employed by this paper was effective in synthesizing different viewpoints and developing a deeper understanding of the topic (Jesson et al., 2011). It also proved useful in detecting gaps in the literature and grasping the presupposed power structures rooted in AI and the implications of data-centric approaches in contexts as delicate as migration and human rights (Pasquale, 2015). But it could only rely on existing, available sources, and no primary research with a high level of originality was incorporated. The paper could only rely on inferences from the literature on the research topic.

Another factor was the timeframe specified for this research. It primarily focused on literature from the last ten years and may have potentially missed some important research. The scope of my study was also limited to Canada, even though it covered certain aspects of relevant developments across the world.

Lastly, in the interest of time and allocated space, it was quite challenging to dive deep into each and every component of artificial intelligence (e.g., automated decision-making models, machine learning, predictive analytics). It was because they all come with their own set of advantages, ramifications, and challenges. This particular issue served as another major limitation attached to this study.

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