ARTIFICIAL INTELLIGENCE FOR SOCIETY AND PEOPLE

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Abstract
Artificial Intelligence has permeated virtually every aspect of contemporary life, spanning entertainment, commerce, healthcare, and the internal functioning of organizations. Platforms like Netflix, Amazon, and Google can anticipate user preferences in movies, shopping habits, and search queries. This wealth of information can be harnessed to develop detailed personal profiles that hold potential not only for behavior analysis and targeted marketing but also for predicting economic patterns, political shifts, and public attitudes toward various subjects. There is a growing optimism that AI may bring about substantial advancements across all facets of life. It can play a pivotal role in streamlining the inner workings of public administration institutions, as well as driving urban development and transformation. In this paper, the author examines both of these aspects as equally significant to citizens, outlining a range of political, economic, and administrative advantages in employing AI solutions within public organizations at local, regional, or national levels. The discussion section delves into several ethical concerns about AI usage and its potential implications for the current job market.

Keywords
ethical considerations; labor market impact; public administration; smart cities; technological trends; urban development.

Introduction

Contemporary scholarship concerning intelligent systems traces its origins back to Alan Turing's seminal work, 'Computing Machinery and Intelligence' (Turing, 1950). Advancements in computing have evolved exponentially since Turing's time, so it is challenging to identify live events that do not involve some form of machine assistance. The realms of Machine Learning (ML), Natural Language Processing (NLP), and Robotics have moved beyond the boundaries of academia, significantly influencing commercial sectors. Dominant technology entities, such as Amazon, Apple, Meta, and Google, now incorporate Artificial Intelligence (AI) extensively in their operations, and its application is likewise pervasive among businesses beyond the tech industry, enhancing production cycles and streamlining management processes (Galloway, 2017; McKinsey, 2019).

Public sector organizations have recently adopted Robotic Process Automation software to manage repetitive tasks, minimize human errors, and improve compliance (AI Multiple, 2021). Computer vision and video use for behavioral monitoring and traffic control has also become increasingly prevalent (Chaudhary et al., 2017). In addition, deploying sensors and Internet of Things (IoT) devices for data collection has

become widespread in cities (Vrabie & Dumitrascu, 2018), with AI software functioning as the operational fulcrum behind these initiatives.

With rising demands for public services and labor shortages becoming commonplace in cities (Macijauskiene & Stankeviciute, 2021), public organizations are grappling with meeting the escalating expectations of their clientele promptly and effectively, akin to how technology juggernauts like Amazon and Apple respond (Vasile et al., 2020; Vrabie, 2016). Technological advancements in wireless technology and smartphones have facilitated on-demand services via a myriad of applications and platforms, enabling remote interactions that are accessible anytime, anywhere (BTIC, 2021; Business Review, 2021). These services are beneficial as they reduce expenditure and avoid unnecessary costs.

The broader ecosystem has acknowledged the crucial role of AI-powered tools in enabling smart cities and government technology (Saniuta & Filip, 2021; Vrabie, 2022). AI is envisaged as a tool that can enhance every aspect of internal operations and service delivery, with the cost savings associated with AI applications in the public sector serving as a significant incentive for their implementation (Sjödin et al., 2021; Vrabie. 2019; Vrabie, 2023). The transition from a reactive to a proactive approach in delivering public services is currently underway.

This article's research question explores AI's potential value for society and people. The paper will commence by reviewing AI tools as they are presented in scholarly literature and various research initiatives, subsequently proposing potential AI solutions for public institutions and cities based on the benefits identified. It should be noted that as these technologies are nascent within the domain of Public Administration, and some have not yet been implemented, the discussion around each of them is likely. Despite demonstrating technical and economic benefits in private environments, the proposed solutions have yet to be tested in public sectors. This article does not seek to validate the effectiveness of the proposed solutions but rather to present them to readers, potentially policymakers, to broaden their perspectives and possibly incorporate them into strategic city or institutional development plans.

Artificial Intelligence technologies

Over the past decade, there have been significant advancements in the fields of Artificial Intelligence (AI) and data science. While research into various AI applications has a substantial historical lineage, the current surge of interest in AI is unparalleled. The swift evolution of AI tools and technologies relevant to public sector organizations, cities, and governments has been facilitated by a combination of enhanced computational processing power, expanding data repositories, and a burgeoning talent pool with AI expertise. This combination has catalyzed a marked shift in AI technology's acceptance and societal influence.

Several data and computational technologies have evolved at an exponential pace. A prominent illustration of this is Moore's Law (Moore, 1965), which describes the exponential improvement in the performance of computer processors. Numerous consumer-centric applications have mirrored this rapid progression by offering low-cost services. The digitization of public data may precipitate a comparable developmental pattern within public organizations, cities, and governments as data

computation becomes increasingly affordable and electronic data collection platforms more prevalent. While these aspects of public life might initially appear insignificant, they are poised for exponential development. Humans have a propensity to overestimate the impact of technology in the short term (e.g., one year) and underestimate it in the long term (e.g., ten years) (FS, 2019).

Prominent enterprises in this field include IBM Watson (IBM, 2022), Google's Deep Mind (Google, 2022), and newly released ChatGPT from OpenAI (OpenAI, 2022). These organizations have demonstrated that AI can surpass human performance in various tasks and activities, such as chess, Go, and other games. The capabilities of IBM Watson and Google's Deep Mind could be harnessed for numerous smart city applications.

Academic research thus far has delineated three primary domains within the field of Artificial Intelligence (AI) (Malone, 2021):

Machine Learning (ML): This branch of AI pertains to the development of algorithms that equip computer programs with the ability to learn from experience and consequently predict, model, or interpret data (Goodfellow et al., 2016). Notable techniques under ML include:

- Unsupervised learning, whereby computers acquire knowledge autonomously through exposure to data (Ng, 2011).
- Supervised learning, a process wherein human intervention expedites the machine's learning (Lecun et al., 2000).
- Reinforcement learning, a scenario in which computers execute tasks that alter the natural or real-world environment and subsequently receive rewards or penalties based on the measured output (Mnih et al., 2013).

Natural Language Processing (NLP): This subfield of AI concentrates on enabling computers to comprehend and generate unrestricted natural languages with fluency and flexibility (Jurafsky & Martin, 2023).

Robotics and Robotic/Intelligent Process Automation (RPA): The utilization of RPA and its extension, Intelligent Process Automation (IPA), facilitates the automation of repetitive tasks in both back-office and front-office operations that necessitate human intervention (Bruemmer & Swinson, 2022). The term 'intelligence' in this context denotes the capability of computers to not only automate tasks but also understand the content, thereby adjusting actions accordingly.

AI for society and public institutions

Petitioning

Inextricably intertwined with the principles of free expression, thought, and political accountability, the right to petition represents a fundamental component of local democracies (Bryson, 2013; Kaufman et al., 2014). As municipalities endeavor to foster a more participatory and open relationship with their citizens, they increasingly incorporate internet-based interaction platforms. One such tool currently utilized globally at both local and central government levels is e-petitioning. It is evident that numerous public organizations currently employ social media networks to facilitate

communication with their communities, with citizens and legal entities frequently lodging complaints, comments, or suggestions via platforms such as Twitter and Facebook. AI can provide succinct responses or alert authorities to incoming communication. However, social media-based discourse in many jurisdictions often carries no legal weight in administrative courts. For instance, a complaint lodged via social media may not be regarded as official, unlike a formal petition. Hence, official petitioning emerges as a potential problem-solving application (Barnhart, 2019; Dabhade, 2021; Jindal & Aron, 2021).

In the contemporary era, citizens expect their public authorities to exhibit promptness, strive for excellence, and demonstrate effectiveness. As trust in governments and their services continues to wane globally (Silva, 2020), there are growing calls for improved infrastructure, higher-quality services, and adaptable leadership. With public needs on the rise and public budgets under significant strain, the literature on public management suggests that protracted delays in delivering effective solutions, underqualified personnel, and generally subpar administrative capacities might expedite integrating AI applications to foster and maintain good governance.

Specifically, in the case of e-petitioning, AI could assist in the triage process, provide systematic and automated responses to specific queries, and identify which petitions warrant further analysis from specialized departments. AI could support decision-making by supplying relevant evidence for comprehensive responses in compliance with existing national or international regulations upon request (Gil, Levy, & Morde, 2018; Vrabie, 2023). AI can screen petitions to determine their eligibility (for instance, if they have been properly formulated and directed at the appropriate authority), compare subjects or frequencies, and evaluate organizational efficiency (manifested in the time and resources allocated to resolving different queries). In executing these tasks, AI conserves time, energy, and resources. The 'compare and comply' functions can simplify navigation through regulations that might be pertinent for delivering an accurate and comprehensive official response (Selig, 2022; Stanger, 2019), thereby curtailing redundancy and time wastage. By conducting sentiment analysis, AI can identify urgent matters in the text of petitions, potentially eliciting swift responses from the government and consequently enhancing public confidence in public authorities (Kejriwal & Zhou, 2020). The facets of learning and reasoning should also be considered in this context (Iemhoff & Klein, n.d.).

Identity documents renewal

The expedited nature of modern online transactions is self-evident: securing tickets for a favorite artist's show typically requires no more than three minutes, including seat selection time. Scheduling a doctor's appointment online should be achievable within five minutes, even when factoring in the necessary input of medical history and coordinating suitable dates and times. Suppose an existing grocery list is absent within an application. In that case, online grocery shopping should not surpass 15 minutes, even when comparing various products for optimal price and quality balance. Given this prevailing expectation of efficiency, it is unsurprising that the public anticipates quick and straightforward retrieval of a one-page identity document from an official governmental portal, ideally within five minutes (Porumbescu et al., 2013).

However, the renewal of identity documents in several European states continues to be a cumbersome process, often necessitating face-to-face interaction with at least one civil servant and taking an average of 10 days. This inefficiency may be attributed to the absence of digital solutions or redundancy compromising the effectiveness of existing online platforms. Robotic Process Automation (RPA) could potentially address and minimize redundancies by scrutinizing submissions, verifying and authenticating personal data, and approving or redirecting applications for further review (Automation 360, 2021). RPA could, therefore assist, but is not exclusively confined to, tasks such as driver's license applications and renewals, passport applications and renewals, and national ID applications and renewals.

Public procurement

In the current dynamic era, as "wicked problems" (Pollitt & Bouckaert, 2017; Iancu, 2013; Iancu & Ungureanu, 2010) increasingly demand government intervention, it becomes paramount to minimize the squandering of time and resources devoted to elementary, routine functions. E-procurement systems stand to significantly benefit from Robotic Process Automation/Intelligent Process Automation (RPA/IPA) systems. Upon their implementation, public servants would only be tasked with populating a form with particulars about the requisite products/services, with the system executing the subsequent necessary steps, managing deadlines, and navigating prevailing regulations. Consequently, procurement specialists could dedicate their efforts to nurturing vendor relationships, anticipating interventions, and deliberating over strategic alternatives.

Parking permits renewal

Residential sectors could significantly benefit from the application of Robotic Process Automation (RPA) systems. For instance, citizens could utilize a dedicated application to renew their parking permits, potentially extending their annual validity. The system would be designed to identify modifications (such as changes in address, license plate numbers, or vehicle type) and, if required, undertake the necessary queries, input the updated or missing information, or redirect the submission to an operator for further scrutiny.

Report generation

Over the past several decades, reducing bureaucratic inefficiency has been a principal objective of public reforms globally. Artificial Intelligence (AI) applications can contribute to this endeavor by providing solutions for generating reports on aspects such as budgets, expenditures, operations, citizen requests, grants, and other specific tasks. This could lead to administrative simplification and enhanced accountability for the public sector. The data for these reports are procured from the organizations' legacy systems. Robotic Process Automation (RPA) bots employ Optical Character Recognition (OCR) features to interpret a text in images and documents, extract pertinent data, and generate reports (Hammond, 2012).

Reception "officers"

In situations of crisis or day-to-day scenarios, hardware robots like Pepper or Relay can be deployed by public organizations, both at local and national levels (such as city halls, Ombudsman Offices, etc.), to aid citizens in navigating to the appropriate departments for their inquiries or to address certain grievances expediently. These automated reception assistants could be programmed with computer vision capabilities (including face recognition) and directed to pose specific questions to providehe most suitable guidance (Savioke, 2022; Humanizing technologies, 2022).

Public sentiment analysis

Within a cultural context still reliant on New Public Management (NPM) discourse, characterized by an emphasis on entrepreneurial strategies and market-oriented instruments to enhance public efficiency, Robotic Process Automation (RPA) bots can be employed to collect data from internet platforms concerning public perceptions of diverse governmental entities, services, or officials. These bots can extract comments or ratings provided by the public regarding government services and facilities, thereby enabling an analysis of the public sentiment and facilitating corresponding service improvements (Barnhart, 2019; Dabhade, 2021; Jindal & Aron, 2021).

AI for society and (smart) cities

Traffic management

Urban mobility plays a crucial role in cities worldwide. As urbanization trends intensify, various efforts are undertaken to mitigate traffic congestion: individuals adapt their schedules, transportation services provide incentives to utilize their offerings outside peak hours, public institutions modify their operational hours to meet community needs, and automobile manufacturers, along with other service providers strive to enhance the experience of traffic-bound drivers (Vrabie & Dumitrascu, 2018; Ion, 2017).

Artificial Intelligence can play a transformative role in this context. By collecting and analyzing data from various drivers, AI has the potential to predict behaviors, thereby optimizing traffic flow and enhancing the overall commuting experience. One might contend that applications such as Waze and Google Maps already implement such features, rendering AI superfluous. However, such a view overlooks that these applications typically provide short-term traffic forecasts (Petreanu, 2020; Lau, 2020). AI, by contrast, could gather traffic data over more extended periods (e.g., a year or more), accommodating seasonal variations and thus enabling prediction of driver behaviors under diverse conditions, such as weather variations, time of day, holidays, school calendars, and so forth, subsequently suggesting the most efficient routes.

AI can interact with drivers utilizing Natural Language Processing (NLP) techniques, processing vocal inputs (Appen, 2021) and generating textual data (Hammond, 2012), which can be read out (Google, 2022) to provide drivers with detailed information regarding their planned routes.

Fixed traffic sensors (cameras) can supplement this data, monitoring road activity and contributing additional data points to the system. This is particularly pertinent for public utility and emergency vehicles, which rely heavily on this network of sensors/cameras to circumvent potential hacking, such as the incident in Berlin where an artist manipulated Google's traffic alert system using 99 phones (Weckert, 2020).

The next stage would be to integrate this data with the traffic light system and utilizing Internet of Things (IoT) devices, manage the transition of traffic lights and direct drivers towards less congested routes. Anticipating traffic densities based on time, day, or specific events, the system could suggest optimal routes, provide time estimates, and predict potential collision risks due to traffic, weather, or other variables, thereby redirecting drivers either via their mobile apps or traffic light signals.

Moreover, for certain scenarios, the data may need to be conveyed in narrative reports. In such instances, stakeholders, including public organizations, can leverage NLP techniques (Hammond, 2012) to transform the data into comprehensible narratives. This process could prove critical for media communications, legal requirements (e.g., explaining a system failure), and similar purposes. These ancillary implications of implementing AI in a traffic management system should be duly considered.

Parking management

Artificial Intelligence could also contribute significantly to optimizing the use of parking spaces, considered here as resources, by applying Machine Learning (ML) techniques to data accumulated over time (Townsend, 2013). The system could direct drivers towards available parking spaces and potentially reserve them on the drivers' behalf in the vicinity of their desired location. Assuming parking spaces are primarily private, with owners expecting availability upon return, the system could predict the accessibility of each space based on past data and relay this information to drivers. If, by any chance, the owner requires their space earlier than anticipated based on statistical data, the system could notify the current user and suggest alternate parking options nearby (Mahdavinejad et al., 2018).

The primary beneficiary of such an implementation would undeniably be the individual citizen, who would experience reduced time in traffic, lower fuel consumption, and decreased stress levels. However, the advantages would also extend to public organizations and communities at large. Reduced pollution and stress levels would contribute to a healthier population, while fewer traffic congestions could alleviate the pressure on law enforcement agencies typically burdened with traffic management. The system would likely reduce the rate of vehicle incidents, indirectly benefiting the healthcare system by lowering accident-related cases. Furthermore, implementing this system could also have a notable impact on the automobile insurance industry.

Waste management

Artificial Intelligence also holds the potential for optimizing waste management services. For instance, trash bins equipped with sensors could signal the waste collection company once they are 80% filled (Nord Sense, 2022; Wen, 2021). By applying reinforcement learning techniques, the system could optimize the routes of

waste collection vehicles to maximize efficiency and prevent bin overflow. Bergen, the second-largest city in Norway, provides a prime example of advanced waste management. Their system capably manages household waste using only airflow, channeled through an underground pipe system, eliminating the need for on-street waste containers (Infrastructure Intelligence, 2016), although pedestrian usage of conventional bins continues.

Autonomous vehicles

The deployment of Level 4 autonomous vehicles (SAE, 2018), initially on dedicated routes for school-going children (utilizing minibusses such as Olli, which are equipped with robotic navigation technologies (Marineterrein Amsterdam, 2019)) and subsequently expanded to other public transportation routes, represents a significant stride towards enhancing urban governance. Olli, which is easily identifiable by other drivers in traffic, adheres strictly to its assigned routes and continuously transmits data to the broader system, interfacing with drivers' mobile devices in its proximity. This approach ensures a secure transportation experience for children.

In line with this advancement, companies like Cruise and Waymo have also developed sophisticated apps that have further amplified the efficacy of autonomous vehicles in urban governance.

The Cruise app facilitates the management of self-driving cars by providing a user-friendly interface to its consumers. It includes functionalities that allow users to hail an autonomous vehicle and specify their pick-up and drop-off locations, similar to traditional ridesharing apps. The app continuously updates users with real-time data concerning their rides, such as the vehicle's current location and estimated arrival time (ETA). What sets the Cruise app apart is how it uses machine learning algorithms to predict and address potential roadblocks or traffic issues, improving the overall safety and efficiency of autonomous rides (Cruise, 2023).

On the other hand, the Waymo app takes a slightly different approach to enhance the passenger's experience with autonomous vehicles. The app also enables users to hail an autonomous car, but it provides more personalized ride experiences. For instance, the Waymo app allows users to set preferred travel conditions, like the interior temperature or audio settings of the autonomous vehicle, before they even enter the car. It also uses advanced algorithms that can identify the safest and most efficient routes, considering factors such as real-time traffic conditions and roadwork (Waymo One, 2023).

Furthermore, both Cruise and Waymo apps have integrated safety measures that allow passengers to contact human support in case of any discomfort or emergency, providing an additional layer of reassurance. These apps also allow the companies to collect valuable feedback and data from riders, which can be used to continuously improve the system's AI and enhance the user's experience.

By integrating technology with urban transport in this way, Cruise and Waymo are not only making commutes more convenient but are also contributing to sustainable urban development by reducing congestion and lowering carbon emissions.

Discussion and conclusions

Labor shortage concerns

The development and operation of Artificial Intelligence systems require substantial expertise. The successful implementation of such systems necessitates teams of engineers and specialized personnel for regular maintenance operations, both on-site (to manage IoT devices and cameras) and at the data center level. Given the complexity of these processes, it is likely that public organizations and municipalities will need to delegate some tasks to companies with specific technological expertise (Olsegun & Abdulquadir, 2022).

Nonetheless, it is also crucial for governments to train and deploy their dedicated personnel (Virtosu & Li, 2022). A specialized workforce should supervise the system to enhance its learning capabilities. For example, in the context of traffic management, when congestion is identified, possibly resulting from a collision or the introduction of construction site information, these trained individuals need to facilitate the application's learning ability to redirect traffic by adjusting relevant parameters.

Similarly, for parking management, if personnel observe that certain parking areas, such as residential zones, typically vacate during morning work hours, they can train the system to incorporate this pattern. Their inputs are invaluable, mainly when supervised and active learning are applied. To maintain and continuously improve the system, considerable investment in this workforce is necessary.

Outsourcing involves bringing multiple stakeholders together. IT companies will be required to manage software needs and updates, while transport and service companies will be needed for hardware maintenance. Furthermore, a review and update of current traffic legislation may be necessary, necessitating various public institutions' involvement and expertise.

Trust and ethical concerns

Governmental entities must espouse a data strategy that clearly emphasizes artificial intelligence. Public institutions must comprehend the collected data, derive valuable insights from it, and consequently deliver tangible value to their citizenry (Schachtner, 2022; Porter, 1980). However, it's crucial to acknowledge that technology is imperfect, and systems can err. The predominant risk herein lies in users' potential loss of trust, prompting them to discontinue utilizing AI-based solutions. This issue could be mitigated by acknowledging these errors and, where appropriate, compensating those adversely affected.

Another deterrent that might dissuade users from engaging with AI solutions pertains to privacy concerns: AI systems invariably identify users; hence, in traffic management, they can track their GPS location. Given certain personal ideologies and beliefs, this may be deemed sensitive. To assuage these concerns, government officials can guarantee that the collected data is fully anonymized and utilized solely to enhance traffic management systems.

AI-literacy

To comprehensively discern the advantages that artificial intelligence can confer upon our everyday existence and the holistic well-being of our communities, it is imperative to establish avenues for lifelong learning. Enhancing awareness regarding the nature and capabilities of AI could be beneficial not only for younger societal members but also for older demographics. As I perceive it, one of the primary challenges necessitates swift progression towards AI literacy.

Historically, introducing new technologies has invariably sparked apprehensions among those potentially affected. This phenomenon was observed during the shift from traditional methods to digital platforms in various industries. As the transition proved to deliver increased efficiency and productivity, a universal reluctance emerged to revert to obsolete practices. Rodney Brooks, researcher, academic, and entrepreneur, recognizes AI as another significant development along this path (IEEE Spectrum, 2023). According to Brooks, workers across industries who have embraced and integrated technological advancements into their practice, such as digital tools, automated systems, and voice recognition technology, have consistently outperformed their more resistant counterparts. Crucially, he maintains that AI technology is neither inherently good nor bad, and any unfavorable reactions are misplaced, as the ultimate applications and outcomes are determined by human usage. The question remains how the symbiosis between humans and AI will unfold in the labor sector, a query only time can answer.

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