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Risks and Benefits of AI for Governments**

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Introduction to the Issue on Artificial Intelligence in the Public Sector: Risks and Benefits of AI for Governments

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Artificial Intelligence (AI) is increasingly adopted by public sector organizations to provide better public services and to transform their internal processes. AI is now considered a key enabler for digital innovation and transformation in the public sector. However, AI is still relatively a new research area in the field of digital government. The term, AI, captures a wide range of technologies, techniques, and tools such as machine/deep learning, natural language processing, robotics, computer vision, and more recently Generative AI. While these AI technologies afford different applications and benefits in the government context, they also create social, ethical, and legal challenges. These challenges require solutions combining both technical (e.g., data and algorithmic solutions to minimize bias) and institutional (e.g., governance structures and processes) mechanisms. The special issue is a collection of articles that contribute to a better understanding of the issues associated with AI deployment in different areas of government operations. They cover AI applications in the areas of emergency response, policy analysis, public bids, and citizen participation. The contributions also address the challenge of realizing a legal transparency regime for AI in government and the effect of AI in bureaucratic decision-making.

CCS Concepts: • **Applied computing** → **E-government**;

Additional Key Words and Phrases: Artificial intelligence, risks, benefits, e-government

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1 INTRODUCTION

There is a steady increase in the adoption and use of Artificial Intelligence (AI) technologies by the public sector globally. AI systems have been deployed by governments for predictive policing [1], cyber-defense, and regulatory enforcement [2], adjudication of government benefits and privileges [3], and as chatbots [4, 5] for answering citizen questions, and for filling out, searching, and drafting documents [6, 7]. With the rapidly growing adoption of Generative AI (Gen AI) tools among the wider public, governments have begun experimenting and providing guidelines on how it could be used by public agencies. Gen AI in particular offers tremendous opportunities for

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government organizations not only in how they interact with citizens but also in how they integrate and exploit their internal knowledge assets [8].

By AI, we mean any machine or algorithm that is capable of observing its environment, learning, and based on knowledge and experience gained, taking intelligent actions or proposing decisions [9]. AI is a broad area and different AI should not be treated in the same way. **Artificial intelligence (AI)** can be seen as a set of five areas [10]: Search, pattern recognition, Learning, Planning, and Induction. Different problems are amenable to each of these areas, and they require different organizational arrangements.

Governments are interested in AI in two different ways: (1) How can AI be used to improve government functioning and services?; (2) More generally, how to mitigate risks associated with AI and ensure that it is only used for the “public good” in society? Based on these interests, the objectives of this special issue are to better inform about the use of AI in governments and to open for future research directions in this area.

2 ARTIFICIAL INTELLIGENCE IN THE PUBLIC SECTOR

AI deals with the design of systems and programs capable of problem-solving, learning, perception, understanding, reasoning, and awareness of surroundings [12]. AI is based on data with a general model of six steps [11]: data identification, data processing, identification of the learning set, selection of the algorithm, training, and evaluation of the training. This data is generally of high volume and related to situations different in complexity and context [14]. As part of these contexts, the public sector is one of them where it can be used in different domains such as healthcare, education, sustainable development, or transportation among others.

AI stands as a pivotal strategic element in the roadmaps of governments [12]. We start observing that public administrations are trying to embrace the power of AI to better serve their citizens. It presents new possibilities for the public sector [15–17]. AI offers a new potential for the public sector to transform its services and policies [6, 18, 19] by providing new capacities to empower civil servants with new supports for decision-making processes [18]. It serves as a “catalyst” for innovative services for citizens, government, and business [13]. By adopting AI, governments foster new benefits including improved service quality, increased productivity, and cost-effective service excellence [20].

The adoption varies from one context to another and includes data analytics for complex decision-making, fraud detection, risk management, mobility planning, healthcare, environment, and automation of some administrative tasks. Table 1 gives an overview of the risks and benefits of AI derived from the authors’ experience and the articles in the special issue. We position these at the macro level (political/economical) and micro level (Policy Making and Decision Making).

3 OVERVIEW OF THE SPECIAL ISSUE ARTICLES

This special issue has eight articles and one commentary article. The articles focused on different ranges of the application of AI in the public sector by looking at both technical and non-technical issues and solutions. Among other things the articles looked at legal issues of AI, the use of natural language techniques in different areas, and on the role of AI in promoting transparency.

The commentary article entitled “*Challenges in AI-Supported Process Analysis in the Italian Judicial System: What after Digitalization?*” focuses on the use of AI in the judicial system. It outlines research challenges and possible directions for the potential applications of AI in the judicial domain that are: information extraction from legacy information systems and analysis of legal documents, process modeling, real-time process monitoring, conformance and compliance checking, predictive techniques for accurate predictions, and analysis of the judges’ workload. The article recommends the use of methods and tools for data identification and collection, innovative approaches to process modeling, reactive techniques for real-time monitoring, conformance checking with explainability, language models adapted to specific domains, and the identification of suitable indicators for the analysis of case handling efficiency and case classification.

Table 1. Overview of Potential Risks and Benefits of AI in the Public Sector

Application Categories	Benefits	Risks
Political and economical	Growth of productivity Automating repetitive jobs Augmenting tasks Digital assistance Enhancing creativity by creating new contents such as texts, images, etc. Real time process monitoring	Unemployment, replacing jobs Energy consumptions due to required computing capacities Creating misinformation and fake news High costs Loss of human expertise and knowledge Reducing experience and emotion (fun) Lack of capacity to think out-of-the-box Not recognizing failures and trends in time (e.g., financial crises) Less accountable and transparent government Replacing (creativity) industries (artists)-
Policy-making and decision-making	Evidence-based decisions and policies Faster decisions and policy-making Better information extraction from different sources Fewer mistakes and reduction in human error Inclusive decision-making Solving complex problems Predict Generate new contexts Automation of tasks Doing more at the same time Faster response More rational decisions 24h7d availability Summarizing high quantity of information	Bias in training data Replication of human errors Bias in decisions if trained on biased data Reinforcement loops resulting in more prediction mistakes and failures Systemic discrimination Not being able to detect bias, discrimination, no inclusion etc. Unfair decisions and policies Less inclusion Invading privacy Less transparency Non-explainable decisions Lack of trust in decisions and policies Lack of explainability Governance of data and of the technology

The second article is “*The Right to Transparency in Public Governance – Freedom of Information and the Use of Artificial Intelligence by Public Agencies. What Information Should and Can be Transparent for Artificial Intelligence (AI) Algorithms?*” This article combines both legal aspects and socio-technical perspectives of transparency related to decisions made by algorithms. Mainly, the article looked at the application of **Freedom of Information (FOI)** to access algorithms. The results show that FOI generally only grants access to existing documents and that access to AI algorithms and to AI algorithms documentation can be denied on the basis of the wide proprietary.

The third article is “*The Adoption of Artificial Intelligence in Bureaucratic Decision-Making: A Weberian Perspective. How the Weberian ideals of Hierarchy, Legal Certainty, Accountability and Due Process in Bureaucracy Invite a Careful Consideration of the Integration of Artificial Intelligence into Bureaucratic Decision-Making?*” This work questions AI’s role in bureaucratic decision-making. It identifies issues related to AI that are, for example, lack of transparency, attempts to shift accountability from humans to technology, the exacerbation of bias, and the potential for systemic discrimination. The article proposes Weberian prescriptions to help public administration

make careful decisions about the adoption of AI and the consequences of its implementation. The article asserts that AI decision-making is a political necessity as it entails exercising power over citizens.

The fourth article is: “*The End of the Policy Analyst? Testing the Capability of Artificial Intelligence to Generate Plausible, Persuasive, and Useful Policy Analysis*”. This article illustrates the use of AI to synthesize a body of knowledge that can be used as decision support documents commonly called briefing notes. This article tested whether contemporary **Natural Language Processing (NLP)** technology can produce relevant public policy briefing notes that expert evaluators consider useful. While the findings indicate that contemporary NLP tools were not able to generate useful policy briefings on their own results indicate that automatically generated briefing notes might serve as a useful supplement to the work of human policy analysts.

The fifth article is: “*PLUS: A Semi-Automated Pipeline for Fraud Detection in Public Bids*”. This article proposes PLUS, a semi-automated pipeline for fraud detection in public bids, a new AI approach to collect, process, and organize public bidding documents. The analysis of these documents is relevant since they allow people more access to public decisions and expenditures, increase transparency in the public sector, and give citizens a greater sense of responsibility. Results show that the use of PLUS helps to reduce specialists’ work for searching irregularities in public bids.

This sixth article is: “*Designing a Human-Centered AI Tool for Proactive Incident Detection using Crowdsourced Data Sources to Support Emergency Response*”. This article focuses on non-traditional data sources to detect incidents proactively. To this end, this article presents a novel human-centered AI tool that extends an existing framework named CROME. The CROME framework is used to train and select the best incident-detection models, based on parameters suited for deployment. The human-centered AI tool presents various measures to analyze the models for the practitioner’s needs which could help the practitioner select the best model for the situation. The experiments demonstrate that the proposed CNN-based incident detection method can detect incidents significantly better than the baselines.

The seventh article is: “*Making Sense of Citizens’ Input through Artificial Intelligence: A Review of Methods for Computational Text Analysis to Support the Evaluation of Contributions in Public Participation*”. This article focuses on evaluating citizens’ contributions in citizens consultation. This article identifies three generic tasks in the evaluation process that could benefit from **natural language processing (NLP)**. These tasks can help to group data thematically and to detect arguments and opinions. However, this article shows that there remain important challenges that need to be addressed to correctly evaluate the contributions made by citizens, such as the quality of results, the applicability to non-English language corpora and making algorithmic models available to practitioners through software.

The eighth article is: “*An Enterprise View for Artificial Intelligence Capability and Governance: A System Dynamics Approach*”. This article investigates the issue of the governance of technology and data to support AI applications. This issue is a difficult task. This article provides working definitions of both enterprise data governance and a systems approach to management. The results show that an emphasis on governance of IT may create a strong foundation for the development of AI capability.

The final article is: “*Unsupervised Learning-Based Approach for Contextual Understanding of Web Material around a New Domain of Algorithmic Government*”. This article proposes clustering techniques to analyze web documents. More precisely, the proposed approach should help the government to better understand and respond to the needs and concerns of their citizens by deriving better data insights quickly, and to make more informed, evidence-based decisions, that are sensitive to the needs and values of different communities and stakeholders. The approach is based on text embedding using bag-of-words technique and *k*-means clustering.

4 A RESEARCH AGENDA ON AI RISKS AND BENEFITS FOR GOVERNMENTS

The different articles show that AI is not limited to technical issues but also encompasses non-technical issues. In addition, the articles shed the light on the complexity to implement AI since there does not exist a single

solution to deal with the same problem. For example, the articles show that it does not exist a single technique to analyze textual data. The acceleration of AI adoption in the public sector, thus, will continue with diverse areas as illustrated by the contributed articles, but the contributions in this special issue also point to different areas for further scholarly inquiries:

- Effect on civil servants: The work of civil servants will likely change. Also new kinds of capabilities and knowledge are needed.
- Transparency and accountability: Governments need to be transparent and accountable to society. This should be reflected in their adoption of AI.
- Trustworthy AI: AI influences many public values and many aspects, which should result in trustworthy outcomes.
- Factors influencing AI: Several factors influence AI adoption, but it is not well-known which factors are relevant and should be considered.
- AI-based decision-making: How can the benefits of AI be reaped and the risks avoided?
- Implementing AI: AI projects become easier, but there is limited knowledge about how to make them successful and how to avoid common pitfalls. Cross-comparative studies are needed.
- AI regulation and governance: There is much discussion about regulations and governance frameworks. Countries are taking different approaches. What kinds of regulations are needed and how can different regulatory approaches be aligned across different regions?
- AI-enabled transformation: AI is transformative and will change government, but in what ways?

REFERENCES

- [1] Meijer L. Lorenz and M. Wessels. 2021. Algorithmization of bureaucratic organizations: Using a practice lens to study how context shapes predictive policing systems. *Public Adm. Rev* 81, 5 (2021), 837–846. DOI: <https://doi.org/10.1111/puar.13391>
- [2] P. Henman. 2020. Improving public services using artificial intelligence: Possibilities, pitfalls, governance. *Asia Pacific J. Public Adm* 42, 4 (2020), 209–221. DOI: <https://doi.org/10.1080/23276665.2020.1816188>
- [3] D. F. Engstrom, D. E. Ho, C. M. Sharkey, and M.-F. Cuéllar. 2020. Government by algorithm: Artificial intelligence in federal administrative agencies: Report submitted to the Administrative Conference of the United States. *NYU Sch. Law* 122 (2020), [Online]. Available: https://www.law.ox.ac.uk/sites/files/oxlaw/government_by_algorithm_acus_report.pdf
- [4] A. Ojo, F. A. Zeleti, and S. Mellouli. 2019. A realist perspective on AI-era public management. *ACM Int. Conf. Proceeding Ser* (2019), 159–170. DOI: <https://doi.org/10.1145/3325112.3325261>
- [5] C. Castelluccia and D. Le Métayer. 2019. Understanding algorithmic decision-making. Publications Office of the EU, no. March. 2019. [Online]. Available: <https://op.europa.eu/en/publication-detail/-/publication/ca808eed-90af-11e9-9369-01aa75ed71a1>
- [6] H. Mehr, 2017. Artificial Intelligence for Citizen Services and Government. [Online]. Available: https://ash.harvard.edu/files/ash/files/artificial_intelligence_for_citizen_services.pdf
- [7] P. Eggers, William D. Schatsky, and David Viechnicki. 2017. AI-Augmented government. 2017. [Online]. Available: https://www2.deloitte.com/content/dam/insights/us/articles/3832_AI-augmented-government/DUP_AI-augmented-government.pdf
- [8] P. Dunleavy and H. Margeos. 2023. Data science, artificial intelligence and the third wave of digital era governance. *Public Policy and Administration*, 0, 0 (2023), <https://doi.org/10.1177/09520767231198737>
- [9] M. Craglia, (Ed. A. Annoni, P. Benczur, P. Bertoldi, P. Delipetrev, G. De Prato, C. Feijoo, E. Fernandez-Macias, E. Gomez, M. Iglesias, H. M. L.-C. Junklewitz, B. Martens, S. Nascimento, S. Nativi, A. Polvora, I. Sanchez, S. Tolan, and I. Tuomi. 2018. European Commission: Joint Research Centre. *Artificial Intelligence: A European Perspective*.
- [10] M. Minsky. 1961. Steps toward artificial intelligence. *Proceedings of the IRE* 49, 1 (1961), 8–30.
- [11] S. B. Kotsiantis, I. Zaharakis, and P. Pintelas. 2007. Supervised machine learning: A review of classification techniques. *Emerging Artificial Intelligence Applications in Computer Engineering* 160 (2007), 3–24.
- [12] Y. K. Dwivedi, L. Hughes, E. Ismagilova, G. Aarts, C. Coombs, T. Crick, and M. D. Williams. 2021. Artificial intelligence (AI): Multi-disciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management* 57 (2021), 101994.
- [13] A. Kankanhalli, Y. Charalabidis, and S. Mellouli. 2019. IoT and AI for smart government: A research agenda. *Government Information Quarterly* 36, 2 (2019), 304–309.
- [14] F. Acerbi, D. A. Forterre, and M. Taisch. 2021. Role of artificial intelligence in circular manufacturing: A systematic literature review. *IFAC-ArticlesOnLine* 54, 1 (2021), 367–372.

- [15] P. G. R. de Almeida, C. D. dos Santos, and J. S. Farias. 2021. Artificial intelligence regulation: A framework for governance. *Ethics and Information Technology* 23, 3 (2021), 505–525.
- [16] J. Newman, M. Mintrom, and D. O’Neill. 2022. Digital technologies, artificial intelligence, and bureaucratic transformation. *Futures* 136 (2022), 102886.
- [17] B. W. Wirtz and W. M. Müller. 2019. An integrated artificial intelligence framework for public management. *Public Management Review* 21, 7 (2019), 1076–1100.
- [18] Y. Pan. 2016. Heading toward artificial intelligence 2.0. *Engineering* 2, 4 (2016), 409–413.
- [19] C. Van Noordt and G. Misuraca. 2022. Artificial intelligence for the public sector: Results of landscaping the use of AI in government across the european union. *Government Information Quarterly* 39, 3 (2022), 101714.
- [20] J. Wirtz. 2020. Organizational ambidexterity: Cost-effective service excellence, service robots, and artificial intelligence. *Organizational Dynamics* 49, 3 (2020), 1–9.

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