

Why to regulate AI? The impact of AI on Legality and Regularity:

<https://doi.org/10.69685/MCRY4168>

Seremeti Lamprini

Phd, Agricultural University of Athens,
lamprini.seremeti@gmail.com

Patropoulos Athanasios

University of Western Macedonia,
apatrop@gmail.com

Karachristos Christoforos

Hellenic Open University,
karachristos.x@gmail.com

Pantermali Maria

ENEEGIL Messologiou,
mpantermali@gmail.com

Papantoni Iliana

M.Sc., M.Ed., 3d Experimental Kindergarten of Thessaloniki (AUTH),
ipapantoni@sch.gr

Dragogiannis Konstantinos

M.Sc., M.Ed., Educational Consultant of Secondary Education West Thessaloniki,
kdragogiannis@sch.gr

Abstract

Unprecedented relationships are emerging in real world mainly due to cutting-edge technologies, like Artificial Intelligence (AI), pervasiveness. People trust the judgement of AI chatbots for their daily choices, businesses decision-making relies on AI tools suggestions, scientists swear to the AI capability to detect new phenomena, etc. What is their common ground? Complexity. This inherent complexity can be controlled only by Law. Besides, the main problem that Law tries to solve is managing the complex reality of societal settings. In that regard, this paper aims to provide insights into the complexities of AI embedding into society through the lenses of legality and regularity, that is, to identify current legal and ethical challenges in order to contribute to the debate on “why to regulate AI?”.

Keywords: Law, Artificial Intelligence, legality, regularity, ethical issues

Introduction

The main problem that Law tries to solve is managing the complex reality of societal nature. Dealing with complexity aims at ensuring the stability and continuity of society cohesion, or alternatively, governing the societal system’s ability to maintain its internal structural and functional balance, legally and regularly. Complexity is not a clear-cut notion and thus its deep understanding involves a set of indicators that are directly correlated to its reproduction. Artificial Intelligence (AI) integration in daily activities is an indicator of paramount importance that implies complexity in real-life settings, since it entails tricky situations that cannot be treated by Law on a cause-and-effect basis, as there is no single cause for an emerging behavior. For example, in the case of an accident caused by a self-driving vehicle, the civil and criminal liability of the manufacturer, the programmer or the user,

encounter difficulties in identifying the causes of the accident, as many factors, such as algorithms, operating models, confused data, etc. have contributed. Any such emerging behavior provokes a set of reactions in the socio-economic system, which seeks the appropriate regulatory framework in order to manage the complex reality. For analytical precision, we adopt the following working definitions: legality denotes full conformity with positive law as enacted by a competent authority, whereas regularity captures the orderly, predictable and consistent application of those rules in practice, including adherence to due-process guarantees and non-arbitrariness (Hildebrand, 2013). This conceptual clarity is essential if legal scholars are to translate philosophical insights into actionable policy.

This regulatory framework should be flexible enough in order to be adaptable to the rapid AI advancements, and in tandem, it should be established in such a way that the nexus between legality and regularity remains stable. The advent of AI has recently complicated the relationship between legality and regularity, which converge to the common ground of managing complexity in societal settings. In this paper, legality is used to refer to the laws and regulations ensuring social order, while regularity is used to denote actions, legal or not, which may not necessarily be ethical. Resolving inconsistencies in legal process and adherence to fundamental ethical values are complementary issues for maintaining social order and effectively managing social change during punctual challenges such as the AI full integration in society.

It is generally accepted that societal transformations are triggered by the invasion of AI into daily activities. Indeed, AI has the potential to revolutionize sectors such as healthcare (AI is being used to develop new drugs and treatments, diagnose diseases, create prosthetics, and provide personalized care) (Shalk et al., 2023; Ali et al., 2023), agriculture (AI is being used to develop autonomous crop management, monitor crop and soil, detect leaks or damage to irrigation systems, detect disease and pests, monitor livestock health) (Javaid et al., 2023; Akkem et al., 2023), education (AI is being used to facilitate administrative tasks, create smart content, personalize learning, develop virtual learning environments) (Chen et al., 2020; Alhumaid et al., 2023), finance (AI approaches are being used to detect fraud, manage risk, and provide investment advice) (Giuggioli and Pellegrini, 2022; Pallathadka et al., 2023; Peng et al., 2023), environment (AI is being used to reduce technology industry emissions, measure carbon footprints, collect and analyze real time data, help monitor pollution and wildlife conservation, and improve energy efficiency) (Ye et al., 2020; Isabelle and Westerlund, 2022), transportation (AI is being used to develop self-driving cars, optimize traffic flow, and predict demand) (Biggi and Stilgoe, 2021; Abduljabbar et al., 2019; Bharadiya, 2023), exercise of fundamental rights by individuals, altering the way of thinking and acting. The list of AI applications is not comprehensive. After all, in the period between writing and reading this paper, there will likely be emerged more advancements in the AI field. What is clear is how pervasive AI has become, thus complicating social settings. It is thus apparent that AI has become one of the main driving forces of modern industrial development as well as of the digital economy and now has a profound influence on the degree of complexity of societal formation, human communication, economic transactions, personal development and, thus, of most dimensions of human life (Pannu, 2015; Nayak and Dutta, 2017; Kamble and Shah, 2018; Khyani et al., 2022).

In this vein, AI affects human life in both positive and negative ways. By analyzing the key hurdles and dilemmas faced by AI legal governing, this paper aims to provide insights into the complexities of AI embedding into society through the lenses of legality and regularity, that is, to identify current legal and ethical challenges that lead to the answer of the critical question “why to regulate AI?” As this is a pressing global concern, the following sections seek to inform policy discussions surrounding the urgency for prompt and thorough response. Recent legislative milestones illustrate that leading jurisdictions are already operationalising this demand for flexible yet rights-preserving regulation. The European Union’s Artificial

Intelligence Act adopts a tiered risk-based model that bans certain AI uses (e.g., social scoring) and imposes strict obligations—risk management, transparency, human oversight—on high-risk systems. In parallel, the White House Blueprint for an AI Bill of Rights and the U.S. Executive Order on “Safe, Secure, and Trustworthy AI” articulate enforceable principles on safety, algorithmic discrimination protections, data privacy, and human fallback. These instruments signal a global momentum towards harmonising legality with ethical regularity.

The paper is organized as follows. Section 2 focuses on conceptualizing the nexus between legality and regularity. Next, quality requirements in AI related debates aiming at maximizing the positive impacts of AI innovations on society and minimize potential harms, are discussed in Section 3. In Section 4, an attempt to align legal process and ethical values to legality and regularity, accordingly. Concluding remarks are given the last Section.

The Impact of AI on Legality and Regularity

It is generally accepted that societal transformations are triggered by the invasion of AI into daily activities. AI is a manifold term, whose clear definition does not exist (Wang, 2019). It refers to many technologies, applications and contexts. Broadly speaking, it is a sub-field of computer science which encompasses many techniques, is applied to many contexts, displays specific human-like features (e.g., intelligence, autonomy) in different degrees, and takes tangible or intangible forms (e.g., a robot or a program run on network computers). It is an evolving technology used to simulate human intelligence, and thus, it has the potential to revolutionize all sectors or real-life, affecting humans in both positive and negative ways (Obrenovic et al., 2024; Sonko et al., 2024). For example, the AI-empowered Internet and social media have changed the way groups or individuals exercise their right to freedom of assembly and association, enumerated in Art. 20 of the Universal Declaration of Human Rights. It states that “Everyone has the right to freedom of peaceful assembly and association”. However, the digital potentials have posed a challenge to the extent of this right through its online expression. The online exercise of this right is beneficial for some social contexts where assembly and association may endanger lives or be banned and for vulnerable individuals who cannot afford to travel to protests. The alternative online manifestation of this right is compliant with legality, since it can be understood as the individuals’ right coming together or forming groups peacefully in a public or private virtual space for some purpose. But it is not in confront with regularity, since this online right may be restricted due to unpredictable content blocking, state-sponsored cyberattacks, internet shutdowns or disruptions and surveillance (Ashraf, 2020).

To the question of how society can ensure that the effects of AI will be beneficial to humans during social transformation, the trendy answer is through developing a flexible regulatory framework involving all stakeholders, from AI experts and industry leaders to social groups and regulatory authorities. But what does flexibility mean in the legal context? Legality and regularity are the defining features of a flexible regulatory framework.

Legality and regularity are interrelated concepts – there is no unanimous understanding of their semantic distinction. In a broad sense, legality refers to the normative nature of law, while regularity to the empirical one (Hildebrand, 2013) – that are frequently invoked and in connection with various disputes regarding the legitimization of specific actions. The purpose of examining the legality of actions taken by a social active entity is to determine whether it has acted lawfully, that is, under the Law, while the purpose of examining the regularity of actions taken is to clarify how the appropriate norms are being societally observed. Although, they are not clear-cut concepts, they have a substantial impact on the functioning of the societal reality, which aims at ensuring the stability and continuity of the legal order. Their in-depth investigation falls outside the scope of this study. Instead, this paper focuses on the debate on the current AI impact on sudden and violent societal transformations.

By analyzing the key hurdles and dilemmas faced by AI research, this paper aims to provide insights into the complexities of AI embedding into society through the lenses of legality and

regularity, that is, to identify current legal and ethical challenges that lead to the answer of the main question “why to regulate AI?” As this is a pressing global concern, the following sections seek to inform policy discussions surrounding the urgency for prompt and thorough response.

Quality requirements of legal and regular AI

Transparency, accountability, fairness, trustworthiness, safety and reliability are frequently used as quality requirements in AI related debates aiming at maximizing the positive impacts of AI innovations on society and minimize potential harms (Balasubramanian et al., 2023). Indeed, transparent, accountable, fair, trustworthy, safe and reliable AI development and deployment is of paramount importance in order to prevent unintended consequences and mitigate potential risks during societal transformations (Thiebes et al., 2021). These quality features of AI depict legal and ethical principles and values (Akinrinola et al., 2024).

Transparency, trustworthiness, accountability, fairness, safety, and reliability are intertwined terms that are often defined too imprecisely; their conceptual lines get blurred. This is due to their multifaceted nature, which is context-dependent, and their manifold manifestations. Within the AI field, they have a connotation of societal (understanding how AI affects the individual’s life and social reality), legal (ensuring that AI follows the Law), and ethical (making sure that AI behaves fairly and responsibly) implications. Although the number of publications in the field of AI combined with ethics, governance, and society have grown remarkably over the last 4 years, to understand the AI implications for the integrity of the society, it is important to analyze the above-mentioned terms from another perspective, by giving their key requirements, the goals they serve, as well as their interrelations.

When focusing on AI transparency, the literature often refers to explainability (the ability of an AI entity to provide understandable explanations for its decisions and actions), interpretability (human understanding about an AI entity’s operation and behavior), and accountability (ensuring AI entities are held for their actions or decisions) (Larsson and Heintz, 2020). Regarding AI accountability, it denotes the expectation that AI stakeholders comply with ethical and legal standards to ensure the proper functioning of AI entities. Accountability is narrowly defined in terms of answerability and through its goals of compliance with Law. It is conceived as the AI entities’ quality linked to liability and regulation consequences (Novelli et al., 2023). With regard to AI fairness, many publications refer to statistical/probabilistic measures ensuring that decision support systems prevent disparate harm or benefit to different groups. It includes a quantification of unwanted bias especially in training data that leads to discrimination according to sensitive attributes such as gender, race, religion, as well as other ostensibly non-sensitive attributes such as salary, family structure, ZIP code (Feuerriegel et al., 2020).

When focusing on AI reliability, it refers to an AI system performance without failure under given conditions. This quality requirement is an objective for the overall correctness of AI systems operation under the conditions of their expected use and over a given period of time (Silva et al., 2022). Regarding AI safety, it refers to the severity of potential risks caused by AI systems related with harms in human life, health, property, or environment. Employing safety consideration in the AI development and deployment can prevent failures or conditions that can render AI systems dangerous (Schneider et al. 2022).

Focusing on AI trustworthiness, the literature refers to an umbrella term that is synthesized by the special characteristics of fairness, accountability, reliability, safety, and transparency aiming at reducing the negative socio-economic consequences of AI use. Addressing AI trustworthiness does not mean considering every characteristic on its own. Simultaneously, rarely do all characteristics apply in every setting, since some of the characteristics may be

more or less important in any given situation. Thus, trustworthiness characteristics influence each other (Kaur et al., 2022).

All these terms play a very important role in the overall strive to societal transition, and they include addressing technical challenges in AI development, such as algorithmic bias, data privacy breaches and security vulnerabilities. Algorithmic bias refers to the inherent tendency of AI systems to reproduce existing biases in the training data or underlying assumptions made during algorithms development. This can lead to unfair or discriminatory outcomes, particularly in crucial domains like healthcare, hiring, and criminal justice (Islam, 2024; Kumar et al., 2024). Data privacy breaches refer to failure to adequately protect sensitive information stored and transmitted across various digital platforms, which may result in financial losses, reputation damage, and legal consequences for organizations, individuals, and governments alike (Farayola et al., 2024). Regarding security, due to their pervasive nature, AI-based systems like robots are prone to diverse attacks by actors that aim to exploit vulnerabilities in the underlying technologies to threaten the functionality, safety and reliability of systems. Security breaches can lead to accidents and property damage (Neupane et al., 2024).

The above-mentioned quality requirements and technical characteristics of AI systems represent the consensus views of academia, industry and governments about the AI challenges. Several studies have been published that discuss these challenges, by focusing either on more technical details or on specific sector (Sonko et al., 2024; Jan et al., 2023). However, a distinguishing aspect of this Section is that it has been written for an audience who may not possess expert knowledge in AI technologies.

AI affects legal processes and ethical values

The advent of AI has recently complicated the relationship between legality and regularity. In this paper, legality is used to refer to the laws and regulations ensuring social order, while regularity is used to denote actions, legal or not, which may not necessary be ethical. Resolving inconsistencies in legal process and adherence to fundamental ethical values are complementary issues for maintaining social order and effectively managing social change during punctual challenges such as the AI integration in society. Uncertainties in development of AI, unpredictability and unforeseen uses of AI systems can make it difficult to identify the AI impact in both the short – and long – term. There are a number of challenges related to AI that are discussed on a philosophical, technical, societal, and regulatory level. Ensuring transparency, fairness, safety, reliability, and accountability, protecting privacy, preventing bias and discrimination, mitigating the risks of AI systems, preventing violations of fundamental human rights, and promoting innovation, are some of these challenges that also reflect the reasons to urgently regulate the AI development and deployment. This Section presents a panoramic, non-exhaustive overview of these challenges by using the notions of legal processes and ethical values in order to emphasize to the dual nature of the same issue. In the AI field, legal processes and ethical values are occasionally used as they are interchangeable notions but a deeper insight may perceive they are indeed different (Nweke and Nweke, 2024).

Accepting that legal processes and ethical values exert rather different impulses on societal reality, their fundamental distinctions, from a philosophical aspect, may limited to the following: (a) Legal processes refer to the guidelines for conduct dictated by the current laws. Ethical values provide the principles and ideals upon which judgement is made of what is spatiotemporally more important. (b) Legal processes are based on a system of fundamental principles. Ethical values stimulate thinking. (c) Legal processes compel an entity to act in a predefined manner. Ethical values affect an entity's motivation. (d) Legal processes are consistent, affecting all equally. Ethical values may differ between human entities.

In summary, legal processes refer to constraints dictated by the laws, while ethical values motivate actors to define priorities in life. Both notions reflect the concern of the AI integration into social cohesion. Legal processes are concerned with the extrospective

judgement of decisions (Is the decision in alignment with the practice policies, procedures and guidelines? Is the decision acceptable under the applicable laws and regulations?), while ethical values are concerned with the introspective judgement of decisions (Does the decision conform to universal principles? Does the decision satisfy fairness?)

Extensive literature focuses on legal issues of AI, potential solutions, gaps and challenges, as well as affected human rights principles (Rodriguez, 2020). Indeed, legal issues related to AI risks and challenges has been discussed, from a legal perspective, in policy documents, academic literature, and media. Policy documents analyze how AI affects human rights (van Dijk et al., 2021; Khan and Mer, 2023; Yilma, 2023; Breczko et al., 2021; Huang et al., 2024). Academic literature mainly analyzes AI risks and challenges focusing on contexts with a high impact on social dynamics such as healthcare (Chikhaoui et al., 2022), defense (Molloy, 2021), transport (Taeihagh and Lim, 2021). Apart from the AI risks and challenges on specific domains, studies include issues related to intellectual property (Zakir et al., 2023), labor protection (De Stefano, 2020), algorithmic bias (Kordzadeh and Ghasemaghahi, 2021), discrimination (Heinrichs, 2022), unfairness (Pfeiffer et al., 2023), legal personality (Ziemianin, 2021), cybersecurity (Watney, 2020), accountability (Novelli et al., 2023), trustworthiness (Salloum, 2024), liability for harms (Yas et al., 2023), access to justice (Nowotko, 2021), transparency (Wulf and Seizov, 2020), surveillance (Saheb, 2023), democracy (Kan, 2024). The media coverage of AI legal issues investigates everyday incidents which reveal the urgent need of AI regulation in areas such as self-driving cars (Jelinski et al., 2021), autonomous weapon systems (Solovyeva and Hynek, 2018), algorithms creating art (Rani et al., 2023), etc.

According to the international literature, the issue of adherence to ethical values in ambient intelligence environments is examined in the light of three interrelated levels; institutional, social and individual (Khan et al., 2022; Ayinla et al., 2024). At the institutional level, the dominant issue is whether AI entities should be given legal personality. At the societal level, issues of safeguarding individual rights and security are addressed, given their essential characteristic of autonomy. At the individual level, issues of responsibility, accountability and trust in AI systems are analyzed. Given that ethical values are culture-specific, various conceptual considerations have been developed for the impact of AI on social transformation. Indeed, the European Union (EU), the United States (US), and China, recognizing the ethical challenges posed by the integration of AI applications in all areas of human activity, have begun to take steps to address them (Hine and Floridi, 2022; Dixon, 2022; Saheb, 2024). The difference among the approaches is that they focus on the same ethical challenges, but from a different aspect, due to their different socio-cultures. The Western world places greater emphasis on the protection of individual integrity, privacy and the responsible use of AI over the rule of law and respect for fundamental rights. In the East, the use of AI is more oriented towards the benefit to the state and the country as a whole, even if this implies sacrifices from the perspective of individuals. Of course, this difference lies in the fact that in the West there is a tradition of individualism and humanism that places greater value on personal autonomy and dignity, whereas in the East the priority is social harmony and collective responsibility. A further difference lies in the extent and depth of the government's role. In the West it is limited to supervision and control, whereas in the East the authorities play a more direct and active interventionist role with regard to AI. These variations in approaches to aligning the use of AI with ethical values are mainly due to the fact that there is no commonly accepted understanding of what the core ethical values are (What is ethical or not is always the result of a function of many individualized ideas about the value or worthlessness of a given instance).

In conclusion, the legal and ethical dilemmas regarding AI which are extensively studied in the literature demonstrate that what remains constant is the anthropocentric approach based on the need to preserve the universal principles that should govern any societal transition. The primary objectives are to improve human life, to ensure that AI does not lead to humans'

harm, to preserve human choices' autonomy, to safeguard that the development, use, and regulation of AI is based on the principles of Law.

Conclusions and Future Work

In this paper, the urgent and prompt need to answer the question “why to regulate AI”, is discussed, through the interplay between legality (legal norms) and regularity (ethical norms) that are the building Law-factors to prevent increasing divergences in societies from undermining their long-term stability.

Theoretically, this paper contributes to an enriched understanding of the pressing need for a flexible legal framework that can keep pace with AI transformative impact. Practically, it offers insights for all stakeholders to identify the quality requirements of legal and regular AI. Building on these recent regulatory experiments and documented AI failures, future work should prioritise the development of urisdiction-agnostic compliance toolkits—shared methodologies for risk classification, bias auditing, and post-deployment monitoring—capable of adaptation to diverse legal cultures while preserving functional equivalence in safeguarding human rights and societal regularity. The fulfilment of these requirements is essential for safeguarding ethical values while embracing AI progress, and ensuring AI development and deployment is both legally sound and ethically responsible.

References

- Abduljabbar, R., Dia, H., Liyanage, S. & Asadi Balgoee, S. (2019). Applications of artificial intelligence in transport: An overview. *Sustainability*, 11(189). <https://doi.org/10.3390/su11010189>
- Abi, K, Zakraoui, S. & Benahmed, A. (2021). Artificial Intelligence (AI). Marketing touchpoints. *International Journal of Economic Performance*, 4(03), 322-342.
- Afshar, M. S. (2022). Artificial intelligence and inventorship – Does the patent inventor have to be human? *Hastings Science and Technology Law Journal*, 13(1), 55-72.
- Akinrinola, O., Okoye, C.C., Ofodile, O.C. & Ugochukwu, C.E. (2024). Navigating and reviewing ethical dilemmas in AI development: Strategies for transparency, fairness, and accountability. *GSC Advanced Research and Reviews*, 18(3), 50-58. <https://doi.org/10.30574/gscarr.2024.18.3.0088>
- Akkem, Y., Kumar Biswas, S. & Varanassi, A. (2023). Smart farming using artificial intelligence: A review. *Engineering Applications of Artificial Intelligence*, 120, 105899. <https://doi.org/10.1016/j.engappai.2023.105899>
- Alhumaid, K., Al Naqbi, S., ElSORI, D. & Al Mansoori, M. (2023). The adoption of artificial intelligence applications in education. *International Journal of Data and Network Science*, 7(1), 457-466. <https://doi.org/10.5267/j.ijdns.2022.8.013>
- Ayinla, B.S., Amoo, O.O., Atadoga, A., Abrahams, T.O., Osasona, F. & Farayola, O.A. (2024). Ethical AI in practice: Balancing technological advancements with human values. *International Journal of Science and Research Archive*, 11(01), 1311-1326. <https://doi.org/10.30574/ijrsra.2024.11.1.0218>
- Balasubramaniam, N., Kouppinen, M., Rannisto, A., Hiekkanen, K. & Kujala, S. (2023). Transparency and explainability of AI systems: From ethical guidelines to requirements. *Information and Software Technology*, 159, 107197. <https://doi.org/10.1016/j.infsof.2023.107197>
- Bharadiya, I.P. (2023). Artificial intelligence in transportation systems: A critical review. *American Journal of Computing and Engineering*, 6(1), 35-45. <https://doi.org/10.47672/ajce.1487>
- Biggi, G. & Stilgoe, J. (2021). Artificial intelligence in self-driving cars research innovation: A scientometric and bibliometric analysis. <http://dx.doi.org/10.2139/ssrn.3829897>
- Breczko, A., Filipkowski, W. & Krasnicka, I. (2021). Ethics and the development of artificial intelligence: Challenges and dilemmas in the context of the 2030 United Nations agenda for

- sustainable development. In: Kury, H., Redo, S. (eds) *Crime Prevention and Justice in 2030*, 355-380. Springer, Cham. https://doi.org/10.1007/978-3-030-56227-4_17
- Chen, L., Chen, P. & Lin, Z. (2020). Artificial Intelligence in Education: A Review, *IEEE Access*, 8, 75264-75278. <https://doi.org/10.1109/ACCESS.2020.2988510>
- Chikhaoui, E., Alajmi, A. & Sainte, S.L.M. (2022). Artificial intelligence applications in healthcare sector: Ethical and legal challenges. *Emerging Science Journal*, 6(4), 717-738. <http://dx.doi.org/10.28991/ESJ-2022-06-04-05>
- De Stefano, V. (2020). Algorithmic bosses and what to do about them: Automation, artificial intelligence and labour protection. In: Marino, D., Monaca, M. (eds) *Economic and Policy Implications of Artificial Intelligence. Studies in Systems, Decision and Control*, 288, 65-86. Springer, Cham. https://doi.org/10.1007/978-3-030-45340-4_7
- Dixon, R.B.L. (2022). A principled governance for emerging AI regimes: Lessons from China, the European Union, and the United States. *AI and Ethics*, 3, 793-810. <https://doi.org/10.1007/s43681-022-00205-0>
- Farayola, O.A., Olorunfemi, O.L. & Shoetan, P.O. (2024). Data privacy and security in IT: A review of techniques and challenges. *Computer Science & IT Research Journal*, 5(3), 606-615. <https://doi.org/10.51594/csitrj.v5i3.909>
- Feuerriegel, S., Dolata, M. & Schwade, G. (2020). Fair AI: Challenges and opportunities. *Business Information System Engineering*, 62(4), 379-384. <https://doi.org/10.1007/s12599-020-00650-3>
- Giuggioli, G. & Pellegrini, M.M. (2022). Artificial intelligence as an enabler for entrepreneurs: A systematic literature review and an agenda for future research. *International Journal of Entrepreneurial Behavior & Research*, 29(4), 816-837.
- Heinrichs, B. (2022). Discrimination in the age of artificial intelligence. *AI & Society*, 37, 143-154. <https://doi.org/10.1007/s00146-021-01192-2>
- Hildebrand, T. (2013). Tooley's account of the necessary connection between law and regularity. *Philosophical Studies*, 166(1): 33- 43. <https://doi.org/10.1007/s11098-012-0023-4>
- Hine, E. & Floridi, L. (2022). Artificial intelligence with American values and Chinese characteristics: A comparative analysis of American and Chinese governmental AI policies. *AI & Society*, 39, 257-278. <https://doi.org/10.1007/s00146-022-01499-8>
- Huang, X., Yusoff, Z.M., Md Nor, M.Z. & Labanieh, M.F. (2024). The legal challenges and regulatory responses to artificial intelligence (AI) in China. *Proceedings of the 12th UUM International Legal Conference*, 335-347. https://doi.org/10.2991/978-94-6463-352-8_26
- Isabelle, D.A. & Westerlund, M. (2022). A review and categorization of artificial intelligence-based opportunities in wildlife, ocean and land conservation. *Sustainability*, 14(4). <https://doi.org/10.3390/su14041979>
- Islam, M. (2024). Exploring ethical dimensions in AI: Navigating bias and fairness in the field. *Journal of Artificial Intelligence General Science*, 1(1), 13-17. <https://doi.org/10.60087/jaigs.v1i1.p18>
- Jan, Z., Ahamed, F., Mayer, W., Patel, N., Grossmann, G., Stumptner, M. & Kuusk, A. (2023). Artificial intelligence for industry 4.0: Systematic review of applications, challenges, and opportunities. *Expert Systems with Applications*, 216, 119456. <https://doi.org/10.1016/j.eswa.2022.119456>
- Javaid, M., Haleem, A., Haleem, Khan, I. & Suman, R. (2023). Understanding the potential applications of artificial intelligence in agriculture sector. *Advanced Agrochem*, 2(1), 15-30. <https://doi.org/10.1016/j.aac.2022.10.001>
- Jelinski, L., Etzrodt, K. & Emgesser, S. (2021). Undifferentiated optimism and scandalized accidents: The media coverage of autonomous driving in Germany. *Journal of Science Communication*, 20(4), A02. <https://doi.org/10.22323/2.20040202>

- Kamble, R. & Shah, D. (2018). Applications of artificial intelligence in human life. *International Journal of Research – Granthaalayah*, 6(6), 178-188. <https://doi.org/10.29121/granthaalayah.v6.i6.2018.1363/>
- Kan, C.H. (2024). Artificial intelligence (AI) in the age of democracy and human rights: Normative challenges and regulatory perspectives. *International Journal of Eurasian Education and Culture*, 9(25), 145-166. <http://dx.doi.org/10.35826/ijoecc.1825>
- Kaur, D., Uslu, S., Rittichier, K.J. & Durresi, A. (2022). Trustworthy artificial intelligence: A review. *ACM Computing Surveys*, 55(2), 39, 1-38. <https://doi.org/10.1145/3491209>
- Khan, A.A., Badshah, S., Liang, P., Waseem, M., Khan, B., Ahmad, A., Fahmideh, M., Niazi, M. & Akber, M.A. (2022). Ethics of AI: A systematic literature review of principles and challenges. *Proceedings of the 26th International Conference on Evaluation and Assessment in Software Engineering*, 383-392. <https://doi.org/10.1145/3530019.3531329>
- Khan, F. & Mer, A. (2023). Embracing artificial intelligence technology: Legal implications with special reference to European Union initiatives of data protection. In: Sood, K., Balusamy, B., Grima, S. (eds) *Digital Transformation, Strategic Resilience, Cyber Security and Risk Management*, 111, 119-141. <https://doi.org/10.1108/S1569-37592023000111C007>
- Khyani, L. Rizvi, S.M. & Srivastava, A. (2022). Artificial intelligence and its applications in finance. *International Research Journal of Modernization in Engineering Technology and Science*, 4, 1208-1210.
- Kordzadeh, N. & Ghasemaghaei, M. (2021). Algorithmic bias: Review, synthesis, and future research directions. *European Journal of Information Systems*, 31(3), 388-409. <https://doi.org/10.1080/0960085X.2021.1927212>
- Kumar, R., Joshi, A., Sharan, H.O., Peng, S. & Dudhagara, C.R. (2024). The Ethical Frontier on AI and Data Analysis. *IGI Global Publishing*. <https://doi.org/10.4018/979-8-3693-2964-1>
- Larsson, S. & Heintz, F. (2020). Transparency in artificial intelligence. *Internet Policy Review*, 9(2). <https://doi.org/10.14763/2020.2.1469>
- Molloy, B.T. (2021). Project governance for defense applications of artificial intelligence: An ethics-based approach. *PRISM*, 9(3), 106-121. <https://www.jstor.org/stable/48640749>
- Nayak, A. & Dutta, K. (2017). Impacts on machine learning and artificial intelligence on mankind. *International Conference on Intelligent Computing and Control*, 1-3. <https://doi.org/10.1109/I2C2.2017.8321908/>
- Neupane, S., Mitra, S., Fernandez, I.A., Saha, S., Mittal, S., Chen, J., Pillai, N. & Rahimi, S. (2024). Security considerations in AI-robotics: A survey of current methods, challenges, and opportunities. *IEEE Access*, 12, 22072-22097. <https://doi.org/10.1109/ACCESS.2024.3363657>
- Novelli, C., Taddeo, M. & Floridi, L. (2023). Accountability in artificial intelligence: What it is and how it works. *AI & Society*. <https://doi.org/10.1007/s00146-023-01635-y>
- Nowotko, P.M. (2021). AI in judicial application of law and the right to a court. *Procedia Computer Science*, 192, 2220-2228. <https://doi.org/10.1016/j.procs.2021.08.235>
- Nweke, O.C. & Nweke, G.J. (2024). Legal and ethical conundrums in the AI era: A multidisciplinary analysis. *International Law Research*, 13(1). <https://orcid.org/0009-0009-6956-5345>
- Obrenovic, B., Gu, X., Wang, G., Godinic, D. & Jakhongirov, I. (2024). Generative AI and human-robot interaction: Implications and future agenda for business, society and ethics. *AI & Society*. <https://doi.org/10.1007/s00146-024-01889-0>
- Pallathadka, H., Ramirez-Asis, E.H., Loli-Poma, T.P., Kaliyaperumal, K., Magno Ventayen, R.J. & Naved, M. (2023). Applications of artificial intelligence in business management, e-commerce and finance. *Materials Today: Proceedings*, 80(3), 2610-2613. <https://doi.org/10.1016/j.matpr.2021.06.419>
- Pannu, A. (2015). Artificial intelligence and its application in different areas. *International Journal of Engineering and Innovative Technology*, 4(10), 79-84, ISSN: 2277-3754.

- Peng, X., Mousa, S., Sarfraz, M., Abdelmohsen, N. & Haffar, M. (2023). Improving mineral resource management by accurate financial management: Studying through artificial intelligence tools. *Resources Policy*, 81, 103323. <https://doi.org/10.1016/j.resourpol.2023.103323>
- Pfeiffer, J., Gutschow, J., Haas, C., Moslein, F., Maspfuhl, O., Borgers, F. & Alpsancar, S. (2023). Algorithmic fairness in AI. *Business & Information Systems Engineering*, 65, 209-222. <https://doi.org/10.1007/s12599-023-00787-x>
- Rani, S., Jining, D., Shah, D., Xaba, S. & Singh, P.R. (2023). The role of artificial intelligence in art: A comprehensive review of a generative adversarial network portrait painting. In: Vasant, P. et al. *Intelligent Computing and Optimization. Lecture Notes in Networks and Systems*, 852, 126-135. Springer, Cham. https://doi.org/10.1007/978-3-031-50330-6_13
- Rodriguez R. (2020). Legal and human rights issues of AI: Gaps, challenges and vulnerabilities. *Journal of Responsible Technology*, 4, 100005. <https://doi.org/10.1016/j.jrt.2020100005>
- Saheb, T. (2024). Mapping ethical artificial intelligence policy landscape: A mixed method analysis. *Science and Engineering Ethics*, 30(9). <https://doi.org/10.1007/s11948-024-00472-6>
- Salloum, S.A. (2024). Trustworthiness of the AI. In: Al-Marzouqi, A., Sallum, S.A., Al-Saidat, M., Aburayya, A. Gupta, B. (eds) *Artificial Intelligence in Education: The Power and Dangers of ChatGPT in the Classroom. Studies in Big Data*, 1441, 643-650. Springer, Cham. https://doi.org/10.1007/978-3-031-52280-2_41
- Schneider, J., Abraham, R., Meske, C. & Brocke, J.V. (2022). Artificial intelligence governance for businesses. *Information Systems Management*, 40(3), 229-249. <https://doi.org/10.1080/10580530.2022.2085825>
- Shalk, T., Tao, X., Higgins, N., Li, L., Gururajan, R., Zhou, X. & Acharya, R.U. (2023). Remote patient monitoring using artificial intelligence: Current state, applications, and challenges. *WIREs Data Mining and Knowledge Discovery*, 13(2). <https://doi.org/10.1002/widm.1485>
- Silva, A., Schrum, M., Hedlund-Botti, E., Gopalan, N. & Gombolay, M. (2022). Explainable artificial intelligence: Evaluating the objective and subjective impacts of xAI on human-agent interaction. *International Journal on Human-Computer Interaction*, 39(7), 1390-1404. <https://doi.org/10.1080/10447318.2022.2101698>
- Solovyeva, A. & Hynek, N. (2018). Going beyond the “killer robots” debate: Six dilemmas autonomous weapon systems raise. *Central European Journal of International and Security Studies*, 12(3), 166-208.
- Sonko, S., Adewusi, A.O., Obi, O.C., Onwusinkwue, S. & Atadoga, A. (2024). A critical review towards artificial general intelligence: Challenges, ethical considerations, and the path forward. *World Journal of Advanced Research and Reviews*, 21(03), 1262-1268. <https://doi.org/10.30574/wjarr.2024.21.3.0817>
- Taeihagn, A. & Lim, H.S.M. (2021). Towards autonomous vehicles in smart cities: Risks and risk governance. In: Hamid, U.Z.A., Al-Turjman, F. (eds) *Towards Connected and Autonomous Vehicle Highways*, 169-190. Springer, Cham. https://doi.org/10.1007/978-3-030-66042-0_7
- Thiebes, S., Lins, S. & Sunyaev, A. (2021). Trustworthy artificial intelligence. *Electron Markets*, 31, 447-464. <https://doi.org/10.1007/s12525-020-00441-4>
- van Dijk, N., Casiraghi, S. & Gutwirth, S. (2021). The “ethification” of ICT governance. Artificial intelligence and data protection in the European Union. *Computer Law & Security Review*, 43, 105597. <https://doi.org/10.1016/j.clsr.2021.105597>
- Wang, P. (2019). On defining artificial intelligence. *Journal of Artificial General Intelligence*, 10, 1-37. <https://doi.org/10.2478/jagi-2019-0002>
- Watney, M.M. (2020). Artificial intelligence and its’ legal risk to cybersecurity. *Proceedings of the ECCWS2020 19th European Conference on Cyber Warfare and Security*, 398-405.

Wulf, A.J. & Seizov, O. (2020). Artificial intelligence and transparency: A blueprint for improving the regulation of AI applications in the EU. *European Business Law Review*, 31(4), 611-640. <https://doi.org/10.54648/eulr2020024>

Yas, N., Qaruty, R.A., Hadi, S.A. & AlAdeedi, A. (2023). Civil liability and damage arising from artificial intelligence. *Migration Letters*, 20(5), 430-446. <https://doi.org/10.59670/ml.v20i5.3554>

Ye, Z., Yang, J., Zhong, N., Tu, X., Jio, J. & Wang, J. (2020). Tackling environmental challenges in pollution controls using artificial intelligence: A review. *Science of the Total Environment*, 699, 134279. <https://doi.org/10.1016/j.scitotenv.2019.134279>

Yilma, K. (2023). Emerging technologies and human rights at the United Nations. *IEEE Technology and Society Magazine*, 42(1), 54-64. <https://doi.org/10.1109/MTS.2023.3241297>

Zakir, M.H., Kham, S.H., Saeed, Z. & Sajida (2023). The impact of artificial intelligence on intellectual property rights. *International Journal of Human and Society*, 3(4), 312-319. <https://ijhs.com.pk/index.php/IJHS/article/view/330>

Ziemianin, K. (2021). Civil legal personality of artificial intelligence. Future or utopia? *Internet Policy Review*, 10(2), 1-22. <https://doi.org/10.14763/2021.2.1544>