

ETHICAL IMPACTS OF REGULATIONS ON MACHINE LEARNING

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By

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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OVERVIEW OF TECHNICAL AND STS TOPICS

In recent years, Artificial Intelligence (AI) has gained popularity among computer scientists and researchers as the next major technology, with an increasing number of university courses and more research efforts being focused toward the field. As the field has developed, competing Machine Learning models have been introduced, all aiming for the actual output of the model to align with the expected output, and for this to remain consistent even as the input changes. The reality, however, is that different models are best suited for different datasets and problems and choosing the correct algorithm to implement for a particular situation can be the most difficult step in reaching a solution. Thus, the technical project aims to answer how to develop a model that is both accurate and robust against the biases present in the data in the context of basketball, in which the data are inherently biased. The technical project is completed under Haiying Shen from the Department of Computer Science along with team member John Kim. As the number of potential applications for Machine Learning continues to increase, consumers have been raising data and privacy concerns regarding these technologies, and ethical issues such as algorithmic discrimination have become more prevalent. Kammerer, a law student at the University of Iowa, College of Law researching AI ethics, describes one such instance in the context of employment, where employers are using AI systems to screen resumes of applicants as well as their video interviews in the hope of removing human biases. The problem is that algorithms are learning the bias present in the data itself. Amazon used such an algorithm in their hiring process, and this resulted in the AI favoring white, male applicants over others (Kammerer, 2022, p. 828), introducing a bias into the process and harming applicants that were not favored by it. Despite situations such as these, the rules and regulations on Machine Learning are not clear cut, and the question as to the degree to which AI will be regulated remains

unknown, especially as it relates to privacy concerns and ethics, and how the regulations, or lack thereof, on artificially intelligent systems affect these concerns. The two topics are tightly coupled, since the goal of the technical project is to not only develop a well-performing model, but to develop one that has the least amount of bias possible. Bias is an ethical issue that may be made more apparent by the lack of regulations on a system, which the STS project explores with

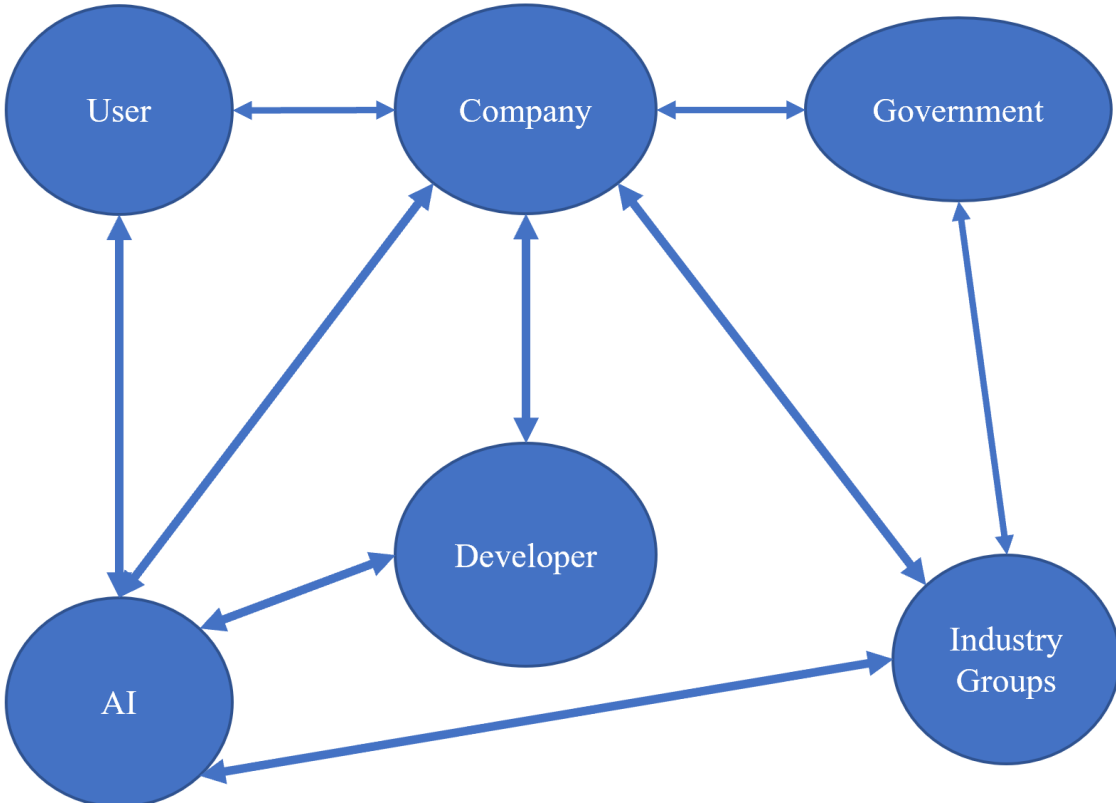


Figure 1: Actor-Network Theory. This figure shows how Actor-Network Theory can be applied to visualize the interconnectedness of various groups with respect to AI. (Mente, 2022).

the aid of the Actor-Network Theory framework (Latour, 2005, p. 7). The interactions between the main actors that may influence regulations are visualized in Figure 1 below.

CURRENT STATE OF ETHICS IN AI

With the increase in prevalence of AI algorithms and technologies incorporating them, the ethical issues surrounding the field have also been growing. Journalist Anadiotis (2022) explains how some of the harmful effects of AI are not due to the technology itself, but human factors controlling the use of it. Humans are encapsulating the technology with other software infrastructure, creating a product or service with AI at the core. In this way, the AI model is hidden from the user and there is a lack of transparency regarding how the model is making choices and affecting the user. This lends to the issue of privacy and how AI is able to pick up information from the users to such an extent that the users themselves do not know how their data is being used and monitored. A ubiquitous example of this is in online shopping. Walch (2020) claims that many brands track customer data across sites including their browsing history through cookies, shopping preferences, email opening rates, and click through history. Companies explain that all of this is done to enhance the user experience. While some may argue that this is true, there exists the deeper issue of how ethical it is for corporations to access this data without explicit user consent and whether the enhancements users experience is desirable enough to outweigh these concerns. This issue is exacerbated by the lack of regulations on AI technologies, since there are few rules on how companies can track and retain customer information and behavior.

Due to the issues present in AI, many entities are looking favorably upon regulating the field to maintain positive ethics in engineering. One such entity is industry groups, which are pushing for the Food and Drug administration to focus on data quality to regulate the emerging technology, since AI models are only as powerful as the quality of the data they are trained on. The industry groups identified another issue similar to that identified by Anadiotis, which is data

transparency requirements. Tahir (2019), an eHealth reporter, voices the concerns of these groups that software that learns from data might not explain its outputs in a way that enables humans to understand its logic. For this reason, some level of disclosure about how software formulates its recommendations is appropriate, but he cautions against disclosing too much about the algorithms.

The sociotechnical discussion paper aims to present research on the current regulations on AI in addition to proposed legislature to further control its use. This is analyzed from the views of the consumers, corporations, and lawmakers, to identify the most detrimental effects of the insufficient regulations and will propose the areas in which regulations should be tightened or loosened.

DIFFERING VIEWS OF AI AND ETHICS

The current view of ethics in AI is different for varying groups and the discrepancies in defining what is ethical, as opposed to what is not with regards to AI is resulting in an ill-defined common definition and code of ethics for regulating such technologies. Eynon and Young (2020) support this view, by explaining how each of academia, industry, and the government view AI itself and the ethical issues it presents. Their findings show that those in academia with a technical background view AI as a methodology by which lifelong learning can be implemented more effectively. Those in industry with little knowledge of AI technologies view AI as legend, and use AI terminology to suggest that since it has gained and maintained popularity it might be profitable to integrate it into their products without regard to consumer safety and privacy in order to appeal to the public. Those in government use AI as rhetoric to appeal to and convince their constituents that the use of this technology will help solve unemployment and improve lifelong learning and modernize education in their country, without understanding the harmful

effects and biases the technology may learn (Eynon & Young, 2020, p. 184). This is a cause for concern because governments only use AI for rhetoric and as a rallying point for their citizens without having any guidelines for implementations or regulations on their use to protect the consumers and end users or to enforce ethical development of the technologies, which is demonstrative of a lack of knowledge of their shortcomings. As lawmakers and government officials are responsible for writing legislation on the regulation of artificially intelligent systems, their lack of understanding of the implications of issues such as data privacy and tracking consumer information, and instead promoting the technologies to their constituents is likely a direct cause for the lack of regulations on Artificial Intelligence. This issue was discussed during the World Government Summit in 2019, which is an annual event hosted by the organization of the same name, attended by the governments of many different countries all of which are interested in discussing processes and policies with regards to common issues including technological innovation and futurism. The report made by the organization states that governments often view AI technologies as human extensions and tools for optimizing intelligence and decision-making processes. They contend that this is a flawed way of thinking, since AI currently does not have the capability to behave as a human would with a conscience or as an autonomous moral agent, and as such this understanding must be corrected in order to implement proper regulations on these tools (World Government Summit, 2019, p. 15).

In addition to groups having diverging views on what is acceptable with regards to AI ethics, the AI principles considered by each group can also contrast. Those in academia often approach ethics from a philosophical standpoint and value “social consciousness” (Kazim & Koshiyama, 2021, p. 318) and understanding how society will adapt to and be affected by the AI. These scholars consider moral frameworks and theories such as Utilitarianism, which is the idea

that an action is correct if it benefits the majority, and rights ethics, which is the idea that human rights are fundamental and of more importance than a positive outcome that benefits many members of society, but does not respect all of their rights. These frameworks are alluded to by those in academia to justify and analyze the approaches of different groups towards AI ethics. For example, current methods of prenatal genetic testing are inaccurate and unreliable, often resulting in false positives for genetic disorders (Bhatia & Kliff, 2022). A scientist may argue from a Utilitarian point of view that implementing Artificial Intelligence into prenatal genetic testing will be beneficial even though it retains information about the DNA of all mothers who undergo testing, because the information will be used to improve the algorithm and help other mothers. Considering the Rights ethicist's viewpoint, one may argue that the retainment of personal information violates each person's right to privacy and this risk outweighs the benefits the algorithm may provide. By considering this case, it is apparent that there are many ways to view the same ethical problem and support different arguments, and that each of them should be considered when making a final decision on the degree of regulation to impose on a technology.

Kazim and Koshiyama (2021) consider the viewpoint of lawmakers and contend that to ensure that the technologies are developed and deployed in a lawful manner is the most direct way in which to approach AI ethics, suggesting that legal compliance is the standard they value (p. 319). From the perspective of the customer, the principle they value most is safety (Kazim & Koshiyama, 2021, p. 321). With the advent of autonomous and semi-autonomous systems employing Artificial Intelligence, consumers are becoming increasingly concerned about the safety of such technologies and are hesitant to rely solely on the technology without any human interference. For example, in the case of self-driving cars, a study by the Massachusetts Institute of Technology shows that in 2017, almost 48 percent of participants stated that they would never

purchase a self-driving car due to a mistrust of the technology (Enwemeka, 2017). This shows that existing technologies are not sufficiently safe in the views of consumer, so more efforts must be made to ensure consumer and user safety. This is applicable to not only autonomous vehicles, but also all other AI technologies.

These differing views have led to few concrete regulations being placed on AI, however with consumer groups pushing for the safety and privacy of customers and large technology corporations getting involved in cases of AI bias and discrimination, it is evident that AI regulations should be implemented in the near future. The different views of these groups are analyzed in a sociotechnical method as visualized in Figure 2 below (Kazim & Koshiyama, 2021, p. 325).

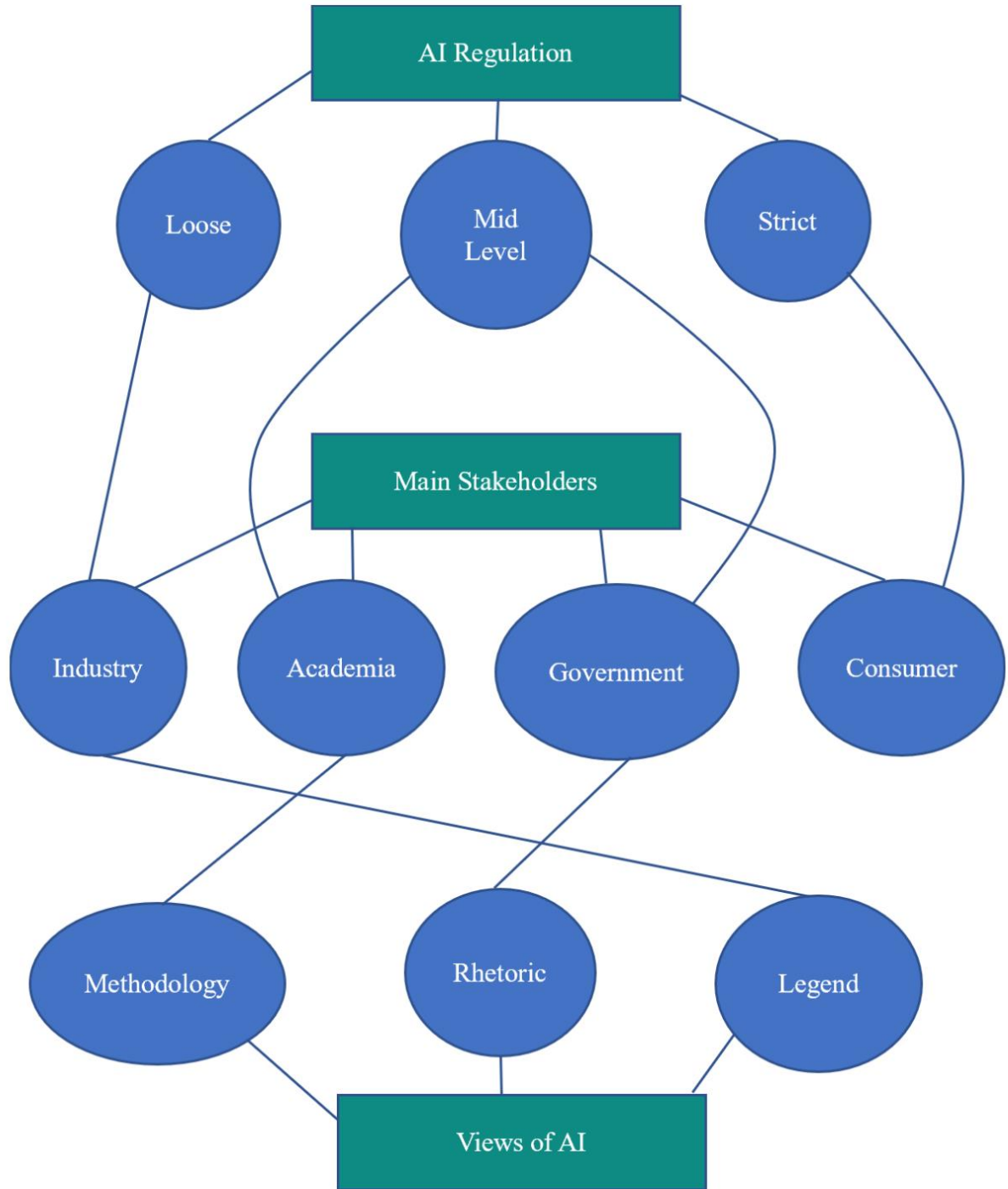


Figure 2: Views of AI. This figure shows how each group views AI and the emphasis they place on its regulation. (Mente, 2022).

CURRENT AND PROPOSED REGULATIONS ON AI

Although the fact that AI technologies are biased and have many ethical and consumer safety issues is widely known and has been for years, there are currently no formal regulations on Artificial Intelligence in the United States. As there have been more instances of discriminatory bias, such as the situation with Amazon described earlier, a shift in consumer and government attitude towards regulation has occurred and more people are willing to place strict regulations on AI. Fournier-Tombs (2021), a Professor of Civil Law at the University of Ottawa, takes a strong stance on this matter, explaining that many international projects using AI are collaborative projects between the United States and other nations and that these projects happen without any regulatory oversight. She recounts a situation in 2014, when Palantir, a software company based in the United States specializing in big data analytics, was tasked with tracking undocumented immigrants in the United States using Artificial Intelligence. As a result, many activist groups and watchdogs raised human rights violation concerns. She further claims that citizens' trust in AI is hard to encourage, especially since the United Nations work affects vulnerable populations as in the case described. It has largely been data scientists' responsibility to ensure that their models are ethical and dependable; however, this places a significant amount of pressure on them and not their company or organization to verify that models are both powerful and not biased, which is difficult for the developer to do when examining their own algorithms and models. Because of this, it is imperative that the United Nations enacts regulatory legislature for these technologies. Having a regulatory framework would allow for data scientists and the organizations they are employed by to adhere to the rules in the framework, resulting in built-in accountability for the performance of the technology and ensuring safer AI technologies.

Whereas the United Nations has yet to indicate that they will be regulating AI, the Trump administration implemented a light form of AI regulation in 2020, unwilling to discourage innovation in AI by restricting the development of the technology. The guidelines encourage companies developing AI technologies, namely manufacturers of cars with autonomous driving capabilities to submit safety self-assessments (Delcker & Snyder, 2020). However, they are purely voluntary and self-assessed, rendering the guidelines ineffective and not a true regulatory measure. Representatives of the administration claim that the federal government believes state governments should not place excessive restrictions on technologies using AI, since these rules would discourage the development of innovative AI technologies. They instead favor a more centralized approach that places loose guidelines on AI to mitigate the risk of malicious technologies using AI and to ensure that the United States remains one of the main sources of new AI technologies. Delcker & Snyder explain that industry groups recognize this and are calling for general and loose federal regulations to be in place (2020) so that they can market their products using AI and conduct viable business, since AI laws vary from state to state. Corroborating with the views of Eynon & Young discussed previously, industry groups do not appear to be truly interested in the regulation of AI and push for looser restrictions to allow them a standard to which to adhere and introduce their product to the general public, to appeal to their customers, but not out of a genuine concern for their safety.

In contrast to the laissez-faire approach to AI regulation the Trump administration took, the Biden administration is taking a stricter approach toward the issue, and there have been several pieces of legislature proposed in Congress in the United States that suggests that AI regulation may be near. One of the most important bills that has been proposed is one that aims to regulate large technology companies to prevent them from using AI models to advertise their

products over those of their competitors. The bill was first introduced by Senator Amy Klobuchar and Senator Charles E. Grassley, and if passed, it will prohibit these practices, protecting both the consumer and the free market (Kang & McCabe, 2022). Consumers will benefit from the bill, due to the improved ability to choose from alternative apps, products, and services, instead of participating in a market monopolized by technology giants. Unsurprisingly, the main critics of the bill are those it is intended to regulate, and technology companies and Silicon Valley lobbyists have been vocal about their view of regulations as detrimental to their businesses. Sundar Pichai, Chief Executive Officer of Alphabet, and Tim Cook, Chief Executive Officer of Apple, have publicly opposed the bill and called on lawmakers to ensure it doesn't pass, claiming that the legislation would reduce the usefulness of their products (Kang & McCabe, 2022). Additionally, due to upcoming elections, the probability of the bill being passed is slim, but it is a step in the right direction.

In keeping with the bills already proposed, the federal government has been taking additional measures to regulate AI. One such measure is the Federal Trade Commission's February 2022 agenda which entails discussing AI oversight rules to protect consumer rights. O'Sullivan, the Vice President of Arthur, an AI monitoring company, says that the U.S. will continue to advocate for voluntary standards and frameworks regardless of evidence that they are not effective. The Biden Administration is also in the process of making the Office of Science and Technology Policy a Cabinet position, which is likely to establish rules of governance over AI and place more emphasis on the issue (O'Sullivan, 2022). The U.S. is also expected to enact strict AI export controls to regulate where and the manner in which AI developed domestically is being used. State and local governments are also showing signs of not waiting for national legislature to be passed and will likely pass their own laws to regulate technologies with AI

components (O’Sullivan, 2022). This is an important shift in the view of the federal government toward AI ethics, since it shows a willingness to understand the technology in relation to the social and economic impacts it has on citizens and users of technologies built on AI, and is a necessary step to begin implement appropriate regulations.

ANALYSIS AND PROPOSED AREAS OF REGULATION

The research presented above is indicative of a lack of sufficient regulation on Artificial Intelligence in the United States, and as a result, the prevalence of numerous ethical issues surrounding the technology including discriminatory bias, bias present in the data, tracking user information, and data privacy concerns among others. To understand where and what types of regulations should be placed on AI, an Actor-Network Theory analysis (Latour, 2005, p. 7) was conducted, and the views of different groups and the interactions between them considered to develop a list of areas where it would be prudent to enforce regulations.

First, the views of the consumer and users were considered. Due to data privacy concerns and hesitancy of users to adopt fully autonomous technologies, as well as issues of informed consent, one area of regulation that should be implemented is AI safety. In this case safety refers both to the physical/mental harm that an AI system could cause such as an autonomous vehicle failing or a false diagnosis from an AI backed medical test. Safety can also refer to how securely the data used by the system is managed and whether there are safeguards in place to ensure that attackers will not be able to steal consumer data. The privacy of user data must be ensured and there should be explicit rules on how long companies can retain the data they have tracked from their users. Additionally, prior to tracking user data and using it in AI systems, corporations should be required to make consumers aware of how their data are being used in algorithms and exactly what data are being collected, implementing transparency.

Next, the stance of corporations, research firms, and industry were considered. These groups argue that regulations on the AI systems being developed will result in a loss of sales and claiming that they may not be able to protect against malware and spam using AI due to the restrictions imposed if it is passed, thus harming their consumers. However, Kang and McCabe claim that these arguments are misleading and baseless, and that they are simply advanced because the groups do not like the notion of regulation itself (2022). While creative liberty and the need for innovation in the area of Artificial Intelligence in the United States is apparent, allowing the development and use of AI systems in products without approval could have adverse effects on the user and those around them, for example an autonomous drone that loses control and flies in unintended paths towards the user. Therefore, the next area of regulation is the use of AI technologies. Research and development of AI systems, as long as it is in compliance with the proposed user safety regulations should be allowed to promote innovation in the field. However, these groups must first subject their system to rigorous beta testing and present an analysis of the results to ensure that the algorithms used are not biased, comply with user safety, and are not developed with the intent to harm others, and have appropriate use. This testing should be done prior to releasing a system to the public.

The final group considered was the government. The government exists to protect its constituents, and thus should implement regulations in the suggested areas above, since governments have the power to impose legislation on their citizens as well as corporations based in the countries they govern. AI systems are also becoming more prevalent in military use, with autonomous weapons and drones being used to collect intelligence on enemies, and to make algorithmic decisions about whether to kill a target or not, removing humans from the decision-making process (Pasquale, 2020). Although the intent of autonomous warfare is to protect U.S.

citizens from directly engaging in combat, the effect on innocent people and the possibility of unintended behaviors of the systems, such as shooting at civilians in another country, should be taken into account, and the development of such weapons should be limited and highly regulated.

SYNTHESIS AND NEXT STEPS

After completing research about the current and proposed regulations on AI, the fact that there are no regulations on the field being legally enforced in the United States is glaringly evident. While there have been numerous bills proposed and the government is expected to enact stricter regulations regarding the use and development of AI, nothing has been passed yet, and the timeline for doing so remains unclear. Having approached the problem from an Actor-Network Theory approach (Latour, 2005, p. 7), it is in the best interest of the end users, governments, and companies themselves to enforce and comply with these regulations to avoid controversies, such as instances of discriminatory bias, and harm to consumers. Abdoullaev, a Russian Artificial Intelligence expert and author of several books on the subject, presents his views on the degree to which AI should be regulated, and claims that governments are responsible for enforcing the proposed regulations. His views concur with this analysis, and he further details the areas in which regulations must be placed including on the transparency of data use and modeling and putting mechanisms into place to ensure responsibility and accountability for AI systems and their outcomes (2022). Further research should be completed to better determine the specific areas of AI in which regulations are imperative and the national and local governments need to make AI regulation a priority especially since the majority of the population interacts with a system using AI on a daily basis.

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