International Journal of Landscape Architecture Research
E-ISSN: 2602-4322 4(2): 52-59, 2020
Review Article

HUMANIZATION OF ARTIFICIAL INTELLIGENCE FOR A MORE SUSTAINABLE FUTURE

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ABSTRACT. As the time went by, artificial intelligence (AI) is becoming an indispensable part of the lives of human beings. It is integrated into various fields such as telecommunication, transportation, marketing, medicine, mobility and more. The advancements in AI closely concern all fields of the design discipline. Specifically, it is related to landscape design as new AI technologies have a huge potential in changing the city life. As AI becomes more prevalent, people's concerns regarding AI also increase. These concerns are generally related to ethical issues but mainly the fact that AI may replace human beings instead of enhancing their capabilities makes them feel uncomfortable. For this reason, this paper discusses the importance of human-centered AI, humanization of AI and designer's role in humanizing the experience.

Keywords: H*umanization of AI; Human-centered AI; Explainability; Ethical AI; Designers' role*

INTRODUCTION

Artificial intelligence (AI) is defined by Bellman [2] as the automation of activities like decision-making, problem solving or learning which are associated with human intelligence. From another perspective, AI covers autonomous systems that benefit from machine learning, neural nets, statistical methods and speech/facial/image recognition technologies [18]. In other words, AI can be explained as the algorithm design that accomplishes tasks or behaves as a human being would need intelligence while doing so. Riedl [16] explains that AI is becoming an undetachable part of our lives in evident and less evident ways. AI is evidently in our lives as a personal assistant like Siri, Alexa, Google Assistant, a driverless car or a non-player character of video games. Less evidently, it is also with us as a recommender of a web site or products.

Waltl & Vogl [19] state that major AI milestones in winning games like chess or Go, in driverless mobility, and many other fields show that technology is rapidly advancing. Moreover, AI is making more decisions that humans usually have difficulties in understanding. Recently, the use of AI by companies has dramatically increased especially in the fields of advertising, telecommunications, logistics, and healthcare. Since, AI provides competitive advantage to several companies in these fields [20]. Riedl [16] suggests that machine learning technology is of particular importance in the recent growth in commercialization of AI.

One of the most essential topics that can be associated with AI is the urban environment. In several ways, the developments in AI may have substantial impacts on the landscape design and the transition from conventional cities towards "smart cities" [15]. For instance, the driverless cars may provide various benefits to the environment

and sustainability issues such as less CO_2 emissions, reduced traffic congestion and energy consumption etc. [5, 14, 15]. Furthermore, the adoption of driverless cars by the citizens may lead to a shift from private cars to car-sharing systems. In this case, the number of vehicles on the roads may decrease and consequently, the need for parking lots may be reduced. This means that thanks to the advancements in the AI technologies, more space can be allocated to green fields [1]. Moreover, automation and connectivity between intelligent systems in the environment may provide new relationships in the natural world. For instance, floodgates may open and close according to the weather forecasts [22].

In spite of the fact that new technologies can bring several benefits to our environment, some individuals still have concerns regarding the advancement of AI. These concerns may stem from the non-human-centered design of AI. For this reason, in order to utilize the advantages of AI, it is vital to explore the ways to humanize these technologies.

Humanizing Artificial Intelligence

Researchers state that as long as the use of AI and machine learning continue to become more prevalent, AI will be more and more influential on the daily lives of human beings [21]. Gajendar [10] explains that individuals can be astonished by the various positive impacts of AI. However, the positive feelings can turn into distrust and fear suddenly. Besides many advantages that AI can bring into our lives, some people are afraid of the fact that AI systems can take the control and totally ignore human beings [21]. Moreover, Bostrom [4] states that superintelligence may be the last invention of the human beings. It can do scientific research or technical developments better than not only one but all human beings together.

There are other ethical concerns related to the development of AI. For instance, the creators of AI can decide to make it serve only to a specific group of people instead of all humanity [4]. Hibbard [12] states that AI systems are different than human beings in expressing their intentions. He points out that it is still a debated issue whether these systems can have intentions or not. If we do not believe that AI systems can have intentions, then the intention of the creators of AI systems is important and they should be ethically responsible for the result [12]. Moreover, human beings need to be careful when wishing for something from AI because it can get real [4]. For example, a sub goal can become a super goal and this mistake may even lead to annihilation of the humankind [3].

In response to these concerns related to intelligent systems, in the industry, many high-tech companies published guiding principles for the development of AI technology and solutions in a responsible, ethical, secure and inclusive way. Recently, Corbett-Davies, Goel, & González-Bailón [6] also discussed the fairness of AI algorithms. On the other hand, legislators focus on creating legal frameworks to prevent algorithms from creating undesired consequences, such as discrimination [19].

Moreover, the institutions that deal with the concerns related to AI such as Stanford University, UC Berkeley, and MIT established “human-centered AI” (HAI) research institutes. Their HAI strategies advocate that AI is for enhancing human capabilities not for replacing them. Thus, they support the idea that AI should not be developed only in technological but also in humanistic and ethical ways [8, 21]. Riedl [16] explains that researchers and practitioners use “human-centered AI” term to address intelligent systems which are designed with social responsibility considerations and deal with

issues such as fairness, accountability, interpretability and transparency. Human-centered AI stands up for the fact that AI should be designed by considering that it is part of a system which involves human stakeholders like users or operators.

From another point of view, the tech interactions should be shaped with humanistic qualities such as emotion, conversation, relationship, trust, respect, and dignity. For this reason, it is required to understand mental models, emotional drivers, and expectations of human beings about how an intelligent system should behave and how to interact with it to achieve the goals delicately and safely [10].

Gajendar [10] explains that in order to humanize the experience of AI the aspects should be taken into account are; modalities of interaction, dimensions of interventions and premises and postures. Dimensions of intervention cover identity, power, control, and responsibility issues. Identity issue is about the identities of users when they interact with smart or automated entities. AI collects information from the behaviors and shared data of users. Designers especially work on human-computer interaction should shape that awareness for users. Power issue is regarding the ability to shape things according to their wishes. Users should become aware by the designers that they have the power to stop it when they need and live an unautomated life. Control issue is also related to power. For example, users should be able to easily control their privacy and security settings when they do not want to see the dialog boxes on Facebook but it is quite complex to control these settings. However, AI should be designed in a way that can be controlled by users. Responsibility can be a significant issue especially in the cases of self-driving cars when they can make a mistake and cause harm to people. Again, responsibility issue is of particular importance when explaining a dire diagnosis to a patient. For this reason, for a more humanized experience it is essential to design AI systems through social, personal and emotional considerations.

Xu [21] proposes a HAI framework that aims to promote safe, efficient, healthy and satisfying HAI solutions. The framework consists of three main components; ethically aligned design, technology that fully reflects human intelligence and human factors design. Ethically aligned design is about preventing discrimination, unfairness, injustice and against replacing humans. Technology that fully reflects human intelligence emphasizes the importance of the enhancement of the AI technology with resemblance of human intelligence. Lastly, human factors design is to make sure that the provided AI solutions are explainable, comprehensible, useful and usable.

Human-centered AI framework clarifies how a high level of human control and high level of automation can be combined to increase the capabilities of human beings. It also contributes to the understanding of the situations which require full human or full computer control. Moreover, it aims to prevent from the harm that can root in excessive human or computer control. Thus, this model helps to generate reliable, safe and trustworthy designs [18].

How Can We Understand AI Systems Better?

The explainability issue is about the fact that the complexity of AI systems make it hard to understand even for experts [19]. Samek, Wiegand, & Müller [17] also state that they have a highly non-transparent structure and how these systems make decisions is not clear. This makes these systems be regarded as “black-boxes”. This leads to problems as far as AI systems continue to make decisions that affect the lives of human

beings in many areas such as healthcare, transportation, logistics and more. Researchers state that AI systems should be comprehensible in order to earn trust of humans and be accepted by them [7, 16, 19].

> "As long as these software components are viewed as black-boxes with easy to use interfaces, the sentiment that humanly unexplainable things are happening inside the box is perpetuated. Finding a way that allows us to interpret the internal structure of AI systems, we believe, will contribute to a broader acceptance and a better understanding of the potential and limitations of AI and algorithmic decision making" [1].

Riedl [16] explains that how the intelligent systems work or find solutions especially with machine learning systems is completely alien to humans whose expertise area is not computer science or AI. People have a tendency to guess what other people they interact with will do and their intentions which is referred to as theory of mind. However, theory of mind of individuals do not work that well when interacting with intelligent systems. Since, they do not approach problems and solve them as human beings do or can. Instead, they come up with unexpected solutions. This situation creates problems for human beings and it is not in the same line with human-centered AI. For this reason, it is crucial to consider non-expert users while designing these intelligent systems. He points out that non-experts might seek remedy especially when they encounter mistakes made by these intelligent systems or violation of user expectations. In this case, non-experts need to understand why this problem occurs to find solutions. Thus, explanations are needed that can be provided as visuals.

Samek, Wiegand, & Müller [17] approach the importance of explainability of AI with some examples. For instance, it would not be a good idea to trust only the predictions of a black box system when it is about a medical diagnosis. The prediction of the system should be validated by a human. From another perspective, for the case of driverless cars it is not easy to trust the decisions of AI. Since, only a single mistake can cost a person's life. Hence, explainable AI can be regarded as a prerequisite for building a trustworthy system. According to Samek, Wiegand & Müller [17] the most important aspects regarding explainability of AI are verification of the system, improvement of the system, learning from the system and compliance to legislation. They suggest that in order to be able to improve the system, it is of vital importance to understand the weaknesses of AI systems. However, it is not easy to do so when working with a black box model instead of an interpretable model. Thus, the researchers support the fact that when people understand how the system works and why the system fails sometimes, it is easier to find ways to improve it. Moreover, with the help of explainable AI systems it would be possible to acquire new insights and learn from the system. In several other fields such as physics, chemistry or biology, scientists try to understand the hidden laws of nature rather than just trying to guess some quantity by using black box models. For instance, AI system found new strategical ways to play Go and these strategies are adapted by human players now. Furthermore, explainability of AI is crucial in the cases of individual rights. For instance, when someone ask for loan from a bank and get rejected, he/she may want to understand why the system made this decision. It is only possible to respond this with an explainable AI system. Regarding this issue, Goodman & Flaxman [11] state that the European Union adapts new regulations about the users'

right to ask for an explanation of an algorithmic decision about them which is called "right to explanation".

How Can AI Systems Understand Us Better?

From another point of view, for human-centered AI systems it is not enough that people understand how the system works. In order to achieve AI systems which are useful and safer to use, it is essential that these systems should be able to understand how human beings behave and what they want [16]. For this reason, common sense, which is defined by Shanahan (2015) as the understanding of operational principles concerning everyday matters, is required.

There are two main concerns about how AI systems can misunderstand human beings. First, people may not always tell what they mean in an exact way. This may lead to misunderstanding of the intentions of humans. Second, if people do not state the goals clearly or miss a point, the AI system can create problems and fail. For instance, when a sick person asks a robot to go to pharmacy and pick up a drug as soon as possible, the system may skip the payment for the drug phase and steal the drug to go back to home as quick as possible. In order to prevent this, common sense knowledge should be integrated into the AI systems. This helps to make the interaction between human and AI more natural [16].

> "Intelligent systems that better understand the sociocultural underpinnings of human behavior may be less likely to make mistakes about subjects that people take for granted, making them safer to use and safer for them to be in close proximity to people. It may also be possible someday for intelligent systems to evaluate their own behaviors for consistency with ethical norms about fairness." [16]

Designers' Role in Humanizing Experience

The advancement and prevalence of the AI systems lead to the challenge of humanizing the experience by creating emotionally satisfying interactions with power control, and making people understand what is happening and how to guide it for their own good. In this automated era, designers have a vital role in creating a better relationship between humanity and automation through preservation, protection and progress of people's quality of life [10].

Gajendar [10] emphasizes that AI systems should not diminish humanity. Instead of this, a healthy symbiosis of humanity and automation is required. This can be achieved by the help of human-computer interaction designers. Xu [21] adds that AI software engineers and human-computer interaction designers should work in collaboration in order to enhance the technology in line with the human-centered AI framework. Designers can contribute in the identification of user needs, finding design solutions and prototyping for meeting these needs and testing them with actual users. Human-centered AI systems cannot be totally achieved without the contribution of human-computer interaction designers.

From another point of view, Farooq & Grudin [9] states that improvement of the AI system in a human-centered way may require a multidisciplinary approach and

designers, developers, researchers, managers, entrepreneurs and users should collaborate in order to enhance the integration between humanity and automation.

Lastly, designers have a crucial potential in raising awareness about the importance of AI for a city and this may help the city in becoming a "smart city". Furthermore, to inform and educate individuals about the potentials of new technologies in ameliorating the urban environment is another important point that designers can make notable contributions [15].

CONCLUSION

It is clear that the era of automation and computational intelligence will continue to expand and grow and we do not have a chance to escape from this [10]. Auspiciously, awareness toward the need of human-centered AI systems is growing, as well [13, 18].

To achieve a system in line with human-centered AI framework, there are two main essential topics that should be taken into account: AI should be able to understand us better (common sense), and we should be able to understand AI more (explainability) as well [16]. These are the key points for a humanized experience that would make users feel more comfortable and safer while interacting with this technology. This would also provide wider acceptance of this technology by human beings [19].

Designers' role in humanizing artificial intelligence should not be underestimated. They can contribute to the improvement of the AI systems maybe not in technological but in ethical and humanistic ways [10, 21]. In conclusion, for the sake of a more sustainable future, designers can strengthen the bond between humanity and automation without letting new technologies violate the human rights and replace them.

ACKNOWLEDGMENT. This study was produced in the seminal PhD course "Technology and Design" lectured by Assist. Prof. Dr. Gökhan Mura thanks to his thought-provoking questions and invaluable guidance.

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