Chapter 10
Artificial Intelligence Ethics in Biomedical-Engineering-Oriented Problems

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ABSTRACT

The field of artificial intelligence has recently encountered some ethical questions associated with the future of humankind. Although it is a common question that has been asked for years, the existence of humankind against badly configured intelligent systems is more important nowadays. As a result of rapid developments in intelligent systems and their increasing role in our life, there is a remarkable anxiety about dangerous artificial intelligence. Because of that, some research interests gathered under some topics like machine ethics, future of artificial intelligence, and even existential risks are drawing researchers' interest. As associated with this state, the objective of this chapter is to examine ethical factors in using intelligent systems for biomedical-engineering-oriented purposes. The chapter firstly gives essential information about the background and then considers possible scenarios that may require ethical adjustments during design and development of artificial-intelligence-oriented systems for biomedical engineering problems.

INTRODUCTION

Nowadays, Artificial Intelligence (AI) has a remarkable place among scientific developments. Because it has a wide multidisciplinary scope and a flexible structure of mathematical – logical solution ways, it is widely employed in all fields of the life. Because successful results have been obtained with its applications, the trend on using it within every advanced, complex problems of different fields have become a traditional approach within scientific efforts. It is clear that AI has a great application scope (Farkas, 2003; Negnevitsky, 2005; McArthur et al., 2005; Pham & Pham, 1999; Ramesh et al., 2004;

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Stahovich, 2001) and it is too effective nowadays on our works, studies, tasks, and generally problem solutions in the daily modern life (Kose & Pavaloiu, 2017). But as it has taken more place in people's life, the more anxieties regarding its possible dangerous behaviors have risen in time. Nowadays, there is a serious group of people, who believes that the AI will be effective on humankind's destiny and possibly cause dangerous and harmful situations while providing problem solutions. That's because sometimes a beneficial thing for somebody may not be beneficial at the same level to another one and even may cause dangerous for him / her. Furthermore, an intelligence more powerful than a human's intelligence can have better predictions for the future and cause dangerous states currently because of thinking for a better situation in the future, that a human cannot see – understand. It is also important that there are lots of moral dilemmas confusing our minds and it is an important issue to understand how an AI system can behave in such moral dilemmas. All of these anxieties and questions are trying to be solved – answered for all fields in which AI based systems – solutions take place widely. Biomedical Engineering is one of them and it has a remarkable importance because of its relation to the health and living organisms.

The applications of AI in Biomedical Engineering extend from Brain-Computer Interface and Neuroprosthetics, Sequence Analysis to Biomedical Imaging and Health-care robotics. The vast spectrum of applications generated from the AI – Biomedical Engineering symbiosis will be a major driver of a new technology which will reshape the personal tapestry of humanity and bring it one step closer to personalized medicine. Because of that this subject combination is a remarkable one, which should be examined in order to contribute to the associated literatures and also improve them. Furthermore, ethical anxieties appeared because of using intelligent systems should also be discussed widely as there is an improving anxiety in each time AI takes more place in our life. When we look at to the literature, we can see many examples of AI ethics oriented studies (Some of them to examine: Bostrom, 2003; Bostrom & Yudkowsky, 2014; Hawking et al., 2014; Moor, 2006; Russell et al., 2015; Vasant & Kose, 2017; Yudkowsky, 2008). But there is a need for dealing with ethical factors in specific application fields of AI. Here, Biomedical Engineering seems one of these specific application fields.

The objective of this chapter is to examine ethical factors in using intelligent systems for Biomedical Engineering oriented purposes. The chapter will firstly give essential information about the background and then consider possible scenarios that may require ethical adjustments during design and development of Artificial Intelligence oriented systems for Biomedical Engineering problems. From a general view, this chapter is both a reference for the interested readers and an additional approach in regard to the ethic-based discussions by taking the Biomedical Engineering as a target application field of intelligent systems.

Based on the objective and subject of the chapter, the remaining content is organized as follows: The second section is based on theoretical background and it provides about the related research subjects of Artificial Intelligence Ethics, Artificial Intelligence Safety, Machine Ethics, Future of Artificial Intelligence, and Existential Risks. Following to that section, the third section provides a general discussion about possible ethical – safety oriented issues that may appear while applying intelligent systems to problems of Biomedical Engineering. After that section, the fourth section provides some suggestions about future work in the context of the subject and finally the last section ends the paper with a brief discussion as the conclusion to this research work.