

# Chapter 23

## Intelligent Biomedical Engineering Operations by Cloud Computing Technologies

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### ABSTRACT

*Cloud computing is an effective way of using hardware- and software-oriented resources at optimum levels. Thanks to this technology, it is possible to share large amounts of resources effectively and accurately among target users. Because it is a rapidly growing technology, one cannot deny that it has remarkable relations with alternative research fields having great potential and application scope. It is clear that artificial intelligence is one of these fields. As associated with both these research fields, the purpose of this chapter is to examine artificial-intelligence-based biomedical engineering works supported/connected with cloud computing. Because it has a vital importance with applications regarding the medical/health problems, biomedical engineering needs support from the most recent technologies and research fields in this manner. So, the chapter provides a view over the intersection of these three research fields as trying to improve awareness among interested readers.*

### INTRODUCTION

Scientific developments have always found their way with combinations of different fields. In even today, we can discuss about innovative outputs of many different fields – technologies and benefit from them along our daily life. As a result of increasing need for more use of information and reaching to it via practical ways, we have surrounded by different tools running over the factor of information – data. Developments occurred in this manner are some typical results of computer and electronics oriented developments and improvements and all these developments have caused the society – community to be passed through different eras – stages (Gurstein, 2000; Jones, 1998). At this point, humankind’s improving has enabled to develop newer technologies and in this context, even the field of education has taken an important role to meet with both necessary educational technologies and necessary technological developments

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synchronously (Gurstein, 2000; Katz and Katz, 2004; Kose et al., 2013). Here, influence of educational resources over the revolutionary communication technology: Internet and its Web platform has made it possible to increase speed of community improvement level and eventually, the humankind has created a more practical but fast-experienced world looking to a more technological future. Nowadays, the look to the future has gained more philosophical trend on achieving an autonomous future and in this context, combinations of different fields and technologies in them are key factors to have desired life standards. While it is also widely thought that the future with full of technology will bring or not disadvantages to us (Abdullah et al., 2017; Brosnan, 2002; Dinello, 2005; Etzioni & Etzioni, 2017; Gelbrich & Sattler, 2014; King, 2017; Kjerulff et al., 1992; Meuter et al., 2003; Oh et al., 2017), some research fields are known as essential components, which are strong enough to direct the humankind's future. The field of Artificial Intelligence is one of them.

Artificial Intelligence is one of the most important scientific fields, which is currently building up the future. Briefly, Artificial Intelligence was born with the idea of simulating human behaviors and thinking styles for solving real world problems at computer systems and in time, its inspiration scope has improved from just human to generally nature (Buchanan, 2005; Kose, 2015a; Nabiyeve, 2003; Nilsson, 2014; Padhy, 2005; Russell et al., 1995). After its success real world problems has proved more and more, Artificial Intelligence has become a multidisciplinary approach to design and develop a more accurate and practical world. Today, there are many different types of intelligent problem solution approaches, methods, and techniques used through problems of different fields and in every time it becomes more possible to develop computer systems that are capable of solving even 'impossible' and 'too difficult' problems encountered. This success is because of mathematically and logically well designed Artificial Intelligence techniques, it is always active literature and also its strong relations with different fields. For example, developments in electronics or communication technologies (i.e. Internet, GSM, mobile systems) are important triggering factors for developing more advanced intelligent machines or software environments to deal with many real-world problems. On the other hand, theoretically and philosophically done new research works have been always key components to make infrastructure of the Artificial Intelligence more and more robust. In addition to all these factors, hybrid use of intelligent systems is also another widely followed problem solving approach that we can see often especially nowadays.

When the scientific literature is examined, it is possible to see relations of Artificial Intelligence with different, alternative and innovative technologies having important role on building the future. Briefly it is possible to see applications over Big Data (Chen et al., 2012; Chen et al., 2016; O'Leary, 2013) or Internet of Things (as build already with the idea of 'Artificial Intelligence based things' communicating) – (Bari et al., 2013; Holler et al., 2014; Katasonov et al., 2008; Madakam et al., 2015), which are currently trend research fields – technologies. In addition to them, it has been a remarkable application approach to employ intelligent problem solution ways in communication technologies and the associated software oriented solutions in this manner. At this point, another innovative technology called as Cloud Computing is a widely known essential factor taking many researchers' attention.

Briefly, Cloud Computing is both a field and technology, which has changed the way of using hardware and software by improving also use of Web and data over it. Cloud Computing finds its meaning as an effective way of using hardware and software oriented resources at optimum levels. Thanks to this technology, it is also possible to share big amount of resources effectively and accurately among target users. Because it is a rapidly growing technology, one cannot deny that it has remarkable relations with alternative research fields having great potential and application scope. It is clear that Artificial Intelligence is one of these fields. As associated with both these research fields - technologies, purpose of this

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