Chapter 4
Cognitive Computing and Its Applications

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ABSTRACT

Cognitive computing is a combination of cognitive science and computer science. Cognitive science is study of the human brain and its functionality whereas computer science seems to have severe impacts in our personal lives, healthcare, etc. Use of massive unstructured data in past few years have led to invention of cognitive systems. Programmable computers focused on fast calculations of large amounts of data whereas cognitive systems are intended towards exploring data, finding new correlations, and context in data in order to come up with new solutions. The goal of cognitive computing is to increase boundaries of human perception instead of replacing the way human thinks. A new industrial revolution in the form of cognitive computing is responsible for job automation healthcare, transportation, home automation, and many more. This chapter includes a brief history of cognitive computing and also the eras of computing in order to understand the growth of cognitive computing in future and also the applications based on cognitive technology.

INTRODUCTION

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Section I includes history of cognitive computing. Section II includes basic concepts related to cognitive computing. Section III includes related works of cognitive computing. Section IV describes components of cognitive systems. Section V tells us about cognitive computing architecture. Section VI gives features of cognitive systems. Section VII describes advantages of cognitive computing. Section VIII tells us about applications of cognitive systems. Section IX gives challenges of this technology. Section X describes limitations of cognitive systems. Section XI discusses about the future of cognitive computing.

I. HISTORY OF COGNITIVE COMPUTING

In 19th century, a book *'The Laws of Thought'* written by a great mathematician George Boole conveyed that logical operators like AND,OR, NOT provided the basis for laws of thought and at the same time Charles Babbage came with an idea of creating a programmable system which he referred as Analytical engine.

In 1950, an English computer scientist and a mathematician Alan Turing put forth an issue of artificial intelligence and introduced an experiment popularly known as *Turing Test*. This test exhibits machine's ability to behave intelligently in the same way human behaves. Turing test was based on human evaluation communication between a human and a machine in natural language and designed a system to generate responses in a language that human can understand. This test was intended to determine whether an examiner differentiates between the response given by the machine and by human. Result was that examiner was not able to tell the difference between a human and a machine and hence it was proved that machine can also think like human.

Later in 1956, the term Artificial Intelligence was first introduced by Prof. John McCarthy. He defines this subject as the "Science and engineering of making intelligent machines, especially intelligent computers."

Let us now have a look at eras of computing-

(Roe, 2014) There are two distinct eras of computing namely- *the tabulating era* and *the programming era*. We have entered into third and most transformational era in computing industry known as *Cognitive Computing era (cognitive era).*

- **Tabulating era (1890s-1940s)-**

This was first era of computing which had single-purpose electromechanical systems that used punched cards to store and input data and ultimately give instructions to data on what to do. Tabulating machines were basically calculators designed to count and summarize information but ultimately limited to single task.

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