Artificial Intelligence (AI): The Basics

By Rashid Mijumbi

Can intelligent behaviour be described using simple, elegant principles such as logic or optimization? Can a machine really think and act like a human being?

In this post, I will give basic information with regard to Artificial Intelligence. Artificial Intelligence (AI) has been defined differently by different people. According to Russell, we can organize the various definitions of AI into four categories as shown in the table below. In other words AI can be considered as attempts by the science community to develop machines that do not only think and act like intelligent human beings, but also do so rationally.

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<th>Systems that think like humans</th>
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The AI field was founded on the claim that a central property of humans — intelligence — can be so precisely described that it can be simulated by a machine. While AI has been the subject of optimism, it has also suffered setbacks. Nevertheless, AI is now an important part of the technology industry, providing the heavy lifting for many of the most difficult problems in computer science.

AI embraces many branches, each devoted to providing an appropriate approach to a given challenge. In fact there is no established unifying theory or paradigm that guides AI work. Researchers disagree about many issues. For example some unanswered questions include: Can intelligent behaviour be described using simple, elegant principles such as logic or optimization? Isn’t this just statistics with an eye catching name? Can intelligence be reproduced using high-level symbols, similar to words and ideas? Even more important: Can a machine really think and act like a human being? If not isn’t there a solid definition of intelligence that doesn’t depend on relating it to human intelligence?
To start with, in my humble opinion, the machines that can currently be developed from AI cannot be considered to think and act like humans. They are actually very far from this. While computer programs have plenty of speed and memory, their abilities correspond to the intellectual mechanisms that human designers understand well enough to put into these programs. It is true that a computer may have capabilities that a child may never develop until he is a teenager, but it’s also possible that some of these programs may not even have capabilities of a two year old. The matter is further complicated by the fact that the cognitive sciences still have not succeeded in determining exactly what the human abilities are. Very likely the organization of the intellectual mechanisms for AI can usefully be different from that in people.

But yes, many applications have been shown to show some degrees of “intelligence”. I now give some of the applications of AI, which have been adapted from John McCarthy

Game playing: You can buy machines that can play master level chess for a few hundred dollars. There is some AI in them, but they play well against people mainly through brute force computation – looking at hundreds of thousands of positions. To beat a world champion by brute force and known reliable heuristics requires being able to look at 200 million positions per second.

Speech recognition: In the 1990s, computer speech recognition reached a practical level for limited purposes. Thus United Airlines has replaced its keyboard tree for flight information by a system using speech recognition of flight numbers and city names. It is quite convenient. On the other hand, while it is possible to instruct some computers using speech, most users have gone back to the keyboard and the mouse as still more convenient.

Understanding natural language: Just getting a sequence of words into a computer is not enough. Parsing sentences is not enough either. The computer has to be provided with an understanding of the domain the text is about, and this is presently possible only for very limited domains.
Computer vision: The world is composed of three-dimensional objects, but the inputs to the human eye and computers’ TV cameras are two dimensional. Some useful programs can work solely in two dimensions, but full computer vision requires partial three-dimensional information that is not just a set of two-dimensional views. At present there are only limited ways of representing three-dimensional information directly, and they are not as good as what humans evidently use.

Expert systems: A “knowledge engineer” interviews experts in a certain domain and tries to embody their knowledge in a computer program for carrying out some task. How well this works depends on whether the intellectual mechanisms required for the task are within the present state of AI. When this turned out not to be so, there were many disappointing results. One of the first expert systems was MYCIN in 1974, which diagnosed bacterial infections of the blood and suggested treatments. It did better than medical students or practicing doctors, provided its limitations were observed.

And so, does AI have a future? As Puri states, the future through the eyes of artificial intelligence can be seen through many perspectives. Artificial intelligence is brought through the development of many different sectors in an attempt to enhance the way of life for many including the financial departments. Artificial Intelligence rather than replacing current technologies will in the future enhance and evolve current technologies. For example, currently in car’s computer chips control certain function. AI technology has the potential to take over ALL functions of a car and can eliminate the need for a driver as well. This can benefit society greatly if we are successful because AI technologies can become more efficient and safer drivers if taught to do so. Therefore, AI technology can be used to evolve current technologies and make them more efficient.