

Editorial

Rebirth of Artificial Intelligence

International Olympiad in Informatics, or the IOI as it is called, runs the IOI conference for 11th time. Last year an additional volume of papers established with a focus on experience and ideas on the host country, Iran this year. Tehran is home for the 29th International Olympiad in Informatics in 2017!

Iran participated in the 3rd IOI in Athens in 1991 as an observer, and there we found IOI a great opportunity to promote informatics in Iranian schools. National contests and training sessions in informatics were soon organized, and a team from Iran participated for the first time in the 1992 IOI in Bonn (Germany). Informatics studies attracted many Iranian students, and informatics made a minor appearance in the national curriculum, but most interest materialized in an extra-curricular fashion. It has been almost three decades since IOI has begun in Iran. Since then, the Olympiad has had great impact in envisioning informatics among the youth in the K-12 and college levels.

Organizing the 29th IOI in Iran is also a great opportunity to promote more and more informatics studies among today's youth. We have brought in a message from Donald Knuth (a computer science icon) in a special interview about how IOI may affect informatics studies. We have also discussed how we are witnessing a turning point in informatics, as the rebirth of artificial intelligence is requiring more and more informatics skills. We then looked at the rebirth of artificial intelligence through a historical approach, to look for trends and a true underlying message for the future.

Computational mathematics has its roots in ancient Egypt and ancient Greece, and more advancements were made in the 8th century in the land of Persia, where concepts of Algebra and procedural thinking evolved. But, it took a long way, until the 20th century, for modern concepts of computation to be fully articulated.

Alan Turing in 1936 introduced the concept of the Turing Machine to solve the *decision problem*. The Turing Machine also envisioned the idea of the computer and programming, ushering in a new era of information technology and rapid computational advancement.

Turing continued to advance the field of mathematics, and in his paper *Computing Machinery and Intelligence (Mind, October 1950)* he addressed the problem of Artificial Intelligence (AI).

He further proposed an experiment that became known as the Turing test, an attempt to define a standard for a machine to be called “intelligent”. Essentially, a computer

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I.—COMPUTING MACHINERY AND
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could be said to “think” if a human interrogator could not tell it apart, through conversation, from a human being.

The field of AI research was born at a workshop at Dartmouth College (USA) in 1956. Attendees such as John McCarthy (Stanford), Marvin Minsky (MIT) and others became the founders and leaders of AI research. They and their students produced programs that the press described as “astonishing”: computers were winning at checkers, solving word problems in algebra, proving logical theorems, and speaking English. AI’s founders were optimistic about the future, and they predicted, “machines will be capable, within twenty years, of doing any work a man can do”. They failed to recognize, however, the difficulty of some of the remaining tasks.

Year by year, we witnessed gradual advancements in AI, but 2015 was considered a landmark year for artificial intelligence. The success was due to a combination of increasing computational power and a staggering number of software projects that use AI. Sixty-five years after Turing in 1950, AI witnessed a rebirth!

The Internet of Things (IoT) has connected billions of sensors, appliances, and tools. It comprises of a deluge of data and application integrity. Computing power has increased tremendously: computers are no longer fast calculators with memory, but powerful computational devices that can make rational decisions through artificial intelligence and deep learning.

Deep learning is the heart of artificial intelligence. It is primarily based on the neural network architecture and is in need of more sophisticated algorithms and programming to reach the next level. A movement as “Programming for All” has become a new standard for literacy, as programming is no longer a niche but a skill fundamental to our technological society. So, IOI is a true platform to attract and encourage youth to engage in programming. Programming is an art and a power – a power that can make a better world!

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For the IOI-2017