



Making computers think

PRESIDENT OF THE IEEE COMPUTATIONAL INTELLIGENCE SOCIETY SETS OUT BENEFITS OF SMART IT

By *Nicole Zeniou*

The human brain can still outperform the computer in certain tasks, but computational intelligence is catching up quickly.

Leading researchers from all over the world gathered in Cyprus recently to ponder the challenges ahead, and how to overcome them.

Organised by the KIOS Research Centre and held at the University of Cyprus, the workshop was co-sponsored by IEEE (Institute of Electrical and Electronics Engineers) University of Cyprus Student Branch.

A new and developing field, computational intelligence involves the design of computing systems and software algorithms which can imitate human perception and reasoning to solve complex real world problems.

“Computational intelligence is at the heart of many new technological developments. It provides the “brain” behind modern smart devices, helping them to function intelligently,” Marios Polycarpou, Director of the

KIOS Research Centre told The Cyprus Weekly.

A professor of electrical and computer engineering at the University of Cyprus, Polycarpou is also currently President of the IEEE Computational Intelligence Society with more than 7,000 members worldwide

“Computational Intelligence methods are employed in devices of everyday use, such as cars, cameras, washing machines and video games,” he explained.

They are also integral to the smooth operation of complex engineering systems such as electric power systems, water distributions networks, manufacturing processes, transportation systems and robotic systems, he added.

“One of the grand challenges of computational intelligence is to better understand how the human brain works so that we can design more efficient and reliable computing devices.

There are certain tasks, such as visual perception, which the human brain performs very accurately without much

effort, while computing systems struggle greatly and do not perform satisfactorily,” he said.

Thus a human may walk into a room of 50 people and recognise almost immediately, and effortlessly, one of the people there even though they may be wearing different clothes, or they may see them from a strange angle.

On the other hand, it is difficult for computing systems to perform equally well even if you have multiple high-definition cameras and very fast computers.

“Clearly, the human brain has a certain way of processing visual perception which outperforms computers.”

Another challenge discussed at the workshop is handling large volumes of data in real time and the design of methods for human-computer interaction.

On future trends, Polycarpou cited the concept of ‘Big Data’ generated from the increasing use of the internet which requires having to decide what constitutes important information.

“One of the terms that

we will hear more and more about in the next few years is “Big Data”.

“Basically, it provides a framework for using intelligent data processing techniques such as computational intelligence in applications that have huge amount of data.”

Big data is the result of new data sources such as web browsing data trails, social networking, for example Facebook, sensor and surveillance data, and video streaming data.

“The truth of the matter is we generate a huge amount of data and there is a need to develop clever techniques and software algorithms for making some sense out of all this information out there.

This is very important for individuals, but even more so for companies

that need to analyse their business data and enhance their decision-making capability, as well as for organisations handling large scale systems such as power distribution networks, water systems, transportation systems, and many more.”

Promoting research The Internet of Things

The workshop was video recorded and will be posted on the webpage of the IEEE Computational Intelligence Society, while an article will appear in the Computational Intelligence Magazine, which is widely distributed worldwide.

Speakers included Xin Yao (University of Birmingham, UK), Gary Yen (Oklahoma State University, USA), Jennie Si (Arizona State University, USA), Piero Bonissone (General Electric Global Research, USA), Pablo Estevez (Universidad of Chile, Chile), Hisao Ishibuchi (Osaka Prefecture University, Japan), and Johan Suykens (Katholieke Universiteit Leuven, Belgium).

KIOS Research Centre for Intelligence Systems and Networks, dedicated to computational intelligence research, is part of the University of Cyprus' Engineering School.

It currently has more than 30 funded research projects, totaling more than €8m with about 70% of it coming from EU projects. The funds pay for more than 50 researchers who are currently pursuing research and development.

Computational intelligence will have a significant impact in people's daily lives.

"We are already seeing some of this technology in terms of so-called smart cars, smart energy grids, robotics, etc. There will be significant advances in intelligent manufacturing, which will facilitate more efficient productions of goods, with less energy consumed, said Polycarpou.

"We will start to see the "Internet of Things" which will connect cyberspace with real devices, such as refrigerators, buildings, factories, etc. The first generation of the Internet allowed people to connect, the second generation of Internet allowed commerce through the web. The third generation of Internet, called Internet of Things, will provide a new dimension of connecting the internet to real devices. There are many applications, including intelligent buildings, telemedicine, intelligent transportation, robotics, etc."

