Revista Facultad de Ingeniería, Universidad de Antioquia, No 79, pp. 7-8, 2016

Editorial

"The real conflict is between man and machine, between personality and organization. Man needs both machine and organization, but they must be mastered and humanized by him instead of his being mechanized and dehumanized by them. Man's real danger," Tagore warns us "lies not in the risk of our material security but in the obscuration of man himself in the human world"

Rabindranath Tagore

"El verdadero conflicto no radica en el enfrentamiento de Occidente con Oriente, sino en el de la máquina con el hombre, en el de la personalidad con la organización. El hombre necesita la máquina y la organización, pero tiene que dominarlas y humanizarlas en vez de resignarse a ser mecanizado y deshumanizado por ellas. El verdadero peligro para el hombre, no está en los riesgos que corre la seguridad material, sino en el oscurecimiento del hombre mismo en su propio mundo humano"

Rabindranath Tagore

Nowadays, Artificial Intelligence (AI) is not just part of the plot of science fiction movies, but a real and important component of different devices and systems which we interact with every day. The work of computer scientists, mathematicians and engineers has allowed computers to interplay with humans through a kind of "conversation", using speech recognition algorithms and voice synthesizers, which make users able to perform web searches or phone calls even without touching their phones. This is just one of the many examples where (AI) has become part of our lives. AI comprises many fields including robotics, natural language processing, artificial vision, expert systems, evolutionary computations, machine learning, speech processing, among others. Although many practical applications of AI involve the combination of several of these subfields, perhaps the one that has achieved more interest in recent years is Machine Learning (ML).

The aim of ML is to build computer programs able to automatically detect patterns in data, and then use the uncovered patterns to make predictions on future data. ML algorithms can then be trained to perform many different and complex tasks trying to imitate the way in which humans perform different kind of perception or recognition tasks, but more importantly, they can also be applied to problems where humans cannot work well, since the patterns to be recognised are not evident (by watching, touching, tasting, smelling or listening to them), or because the amount of data that need to be processed overpasses the human capacity. In this sense, the application of ML methods to large data sets is the key behind the success achieved by e-commerce recommender or targeting customer systems, to name just a few.

Although in many cases the information to be processed is stored in structured databases, there are many other cases where the information comes from sensor devices, which transform physical measurements into numerical values. In such cases, before a ML algorithm might be applied, the data provided by the sensor require a previous processing stage. Signal Processing (SP) is a subfield of computer science aimed to deal with the data provided by sensors, in order to extract valuable information about a phenomenon or process, that can be used for humans experts or automatic systems (such as one based on ML techniques) to make decisions. Sometimes, SP techniques are used only to improve the quality of a recorded signal, for instance to reduce the noise or compensate the lighting effects in digital cameras.

Problems addressed by SP and ML require a continuous effort of the research community involved on these fields, and as a result, currently there is a strong activity and an incredibly rapid advance of the technology associated with them. Fortunately, Latin-American countries have not been oblivious to the interest in these fields. For instance, in Colombia there have been specialized conferences related to SP and ML topics since early 90's, and there is a continuously growing community.

Bearing all this in mind, the Revista Facultad de Ingeniería of the Universidad de Antioquia has pleased dedicated one of its regular numbers, for a special issue about Signal Processing and Pattern Recognition. The journal presents a compendium of high quality works, which were selected after a peer-review process, with applications in many different areas including speech processing, bioinformatics, artificial vision, computer-aided brain surgery and automatic signature verification. The editorial board of the Journal hopes all these works published together be of the interest of our readers and that they find them useful for their own research.

In its brief existence, artificial intelligence has penetrated gradually man's life, transforming it in an accelerated manner, so it is appropriate to assess ethical aspects in the development of this scientific field. To point out the discussion, the famous Asimov's laws based on functional morality will be presented, based on the premise that robots have enough will and knowledge to make moral decisions. Asimov unlike many of his successors is farthest from the design details of robots and closer to the literary exploitation of an ingenious strategy that allows him to reconcile the huge gaps between expectation and reality in the autonomy of the robot. Asimov's Three Laws of Robotics are as follows [1, 2]:

- *"A robot may not injure a human being or, through inaction, allow a human being to come to harm".*
- *"A robot must obey orders given to it by human beings, except where such orders would conflict with the first law".*
- *"A robot must protect its own existence as long as such protection does not conflict with the first or second law".*

Later, Asimov added a fourth, or zeroth law, that preceded the others in priority:

- *"A robot may not harm humanity, or, by inaction, allow humanity to come to harm".*

In order to overcome this inconsistency in the current context with Asimov's fictional robots, new authors have proposed three alternatives to Asimov's laws aimed at regulating teams of people and robots that are in charge of the same task, unlike the framework laws posed by Asimov, which focused only on regulating the behavior of the robot [3]:

- *"A human may not deploy a robot without the human–robot work system meeting the highest legal and professional standards of safety and ethics".*
- *"A robot must respond to humans as appropriate for their roles".*
- *"A robot must be endowed with sufficient situated autonomy to protect its own existence as long as such protection provides smooth transfer of control to other agents consistent with the first and second laws".*

These three new laws implicitly consider that designers, manufacturers and users are responsible for any damage or failure caused by robots, exonerating machine of any responsibility. But, are these laws based on social robots? To what extent is society interested, or needing that robots have capabilities that allow them

DOI: 10.17533/udea.redin.n79a01