

Editor's Note

Towards an Intelligent Society: Advances in Marketing and Neuroscience

ARTIFICIAL Intelligence (AI) is becoming the main character of what is now being called the fourth industrial revolution. Its role is gaining importance in everyday life, and the reason is straightforward: it offers a wide range of possibilities to make life easier in many different aspects.

However, AI is also at the center of a debate since some studies anticipate a radical transformation of the future industry, where some scenarios involve the destruction of millions of jobs. However, it is generally acknowledged that many new, more specialized, job positions will be created, as it has happened throughout history with other technological revolutions (see The Future of Work special issue in Nature [1]). Nevertheless, uncertainties remain on the net impact on employment. While this debate is certainly useful, at this point we find it better to focus on a general objective assessment of how AI is impacting the world and the society.

From a global perspective, a clear statement can be made: Artificial Intelligence can have an immense positive impact on societies. Some of this impact is already unveiling in recent years and is particularly observable in the fields of health and medicine [2, 3], where AI is turning into a key player at the time of diagnosing diseases at an early stage or developing new medicines and specialized treatment. Personalized medicine is probably the biggest breakthrough of the coming years, and AI is taking an active role to push this field forward.

However, medicine is not the only field where AI can enhance the process of personalization and customization. Marketing is certainly another good scope of application, where intelligent software can help knowing the target audience and offering them what they need in response. In this sense, we can already find intelligent devices that are able to make predictions about our behaviors [4]. From a more practical perspective, AI can facilitate the sales process [5, 6, 7], dealing with most routinely procedures such as information tasks or documentation handling, which become streamlined and turn cheaper.

Additionally, AI enable brands to offer a commitment to their customers [8, 9]. This commitment will trigger some kind of emotional response in the customer depending on the perceived quality and the surrounding circumstances. In fact, AI can provide a software with means to detect the feelings arising during an interaction or engagement with customers, and determining whether these feelings are positive, negative or neutral.

In summary, with tools such as those outlined, AI would be capable to allow [10]:

- Knowing your tastes, desires and expectations as a consumer, as well as predicting your needs.
- Analyzing your behavior and consumer habits when browsing the Internet.
- Studying the emotional response during an interaction.
- Anticipating trends.
- Offering to selected customers the products or services they demand in a timely manner.
- Using the most effective channels to enhance the consumer experience to the best possible.
- Customizing communications to enhance the customers feelings.

All of these achievements are easy to reach when virtual assistants are able to retrieve a complete picture of a customer's behavior, tastes

and way of interacting. By these means, customers are not offered a generic experience but rather a unique result fitting their needs.

Since all data is not available in digital formats, the speed in which they are generated, processed and analyzed is dizzying. This velocity is one of the key aspects when it comes to applying AI to marketing, and especially when monetizing publications or services in social networks or the Internet.

This Special Issue focuses in cases that explore the relationship between Artificial Intelligence and marketing, as well as neuroscience. AI can be combined with specific neuroscience techniques to achieve a more successful and profitable neuromarketing. For this Special Issue, we have found that descriptions of successful use cases are highly valuable to help researchers identify fields where novel applications of AI can enhance the outcome of digital marketing and neuroscience.

The first paper of the Special Issue is entitled "Data and Artificial Intelligence Strategy: A Conceptual Enterprise Big Data Cloud Architecture to Enable Market-Oriented Organizations" and is written by C. Moreno, R. Alberto-Carrasco and E. Herrera-Viedma, a group of researchers from the University of Granada and from the Complutense University of Madrid, both in Spain. In their paper, they present an AI cloud architecture capable to help companies to switch from a descriptive to a prescriptive usage of data, bringing agility and many possibilities to acquire new marketing insights to these companies.

The second article has been written by A.Goli, H. Khademi-Zare, R. Ravakkoli-Moghaddam and A. Sadeghieh, researchers of the Yazd University and the University of Tehran in Iran, and is entitled "An Improved Artificial Intelligence Based on Gray Wolf Optimization and Cultural Algorithm to Predict Demand for Dairy Products: A Case Study". This paper combines different AI techniques to carry out the prediction of dairy product demand in Iran, testing the improvement of neural networks with the help of novel meta-heuristic algorithms such as gray wolf optimization and cultural algorithm.

The following research work, "The Promotion of Graduate Programs through Clustering Prospective Students" has been carried out by R.M. Cantón-Croda, D.E. Gibaja-Romero and F.R. Castillo-Villar, a group of researchers of UPAEP, Mexico. In their work, authors perform clustering, which is a well-known AI technique to tackle the problem of the promotion of academic programs, a crucial problem particularly interesting for private universities, suggesting how a deep analysis can be used to design better promotion strategies.

The following paper analyzes the state of emotional state of the users. Specifically, the work of M. Magdin, T. Sulka, J. Tomanová and M. Vozár, researchers from Constantine the Philosopher University in Nitra (Slovakia) is entitled "Voice Analysis Using PRAAT Software and Classification of User Emotional State." Their paper proposes the classification of the emotional state of a person based on the voice track analysis, a useful application of AI with potential direct benefits to marketing.

The following three works have a point in common: they belong to the field of AI applied to medicine and neuroscience. The first of them, entitled "A User-centered Smartphone Application for Wireless EEG and its role in Epilepsy," has been written by S. Ahufinger, P. Balugo, M.M. González, H. González and P. Herrero, researchers of Polytechnic University of Madrid and San Carlos Clinical Hospital, both in Spain. The paper presents the design and evaluation of a wireless EEG smartphone application resulting from a user-centered design,

that fits the clinical and research needs, and explore its application to epilepsy diagnosis, a field of a large medical interest.

Moreover, C. Pruenza, M.T. Solano, J. Díaz, R. Arroyo and G. Izquierdo, researchers from the Knowledge Engineering Institute, the University Hospital Quirónsalud Madrid, the Ruber Juan Bravo Hospital and the Vithas NISA Hospital, all of them in Spain, have partnered to author the following, entitled “Model for prediction of progression in Multiple Sclerosis”. In their paper, they develop a personalized prediction model of three stages of the multiple sclerosis disease, which can be used as a clinical decision support system, using AI and big data techniques.

The next paper has been published by J.M. Lombardo, M.A. Lopez, M. Lopez, M. León, F. Miron, J. Arranbarri and D. Alvarez, a group of researchers from the FIDESOL Foundation in Spain, and is entitled “Natural interaction Technologies, virtual reality and artificial intelligence for gait disorders.” Parkinson’s disease is the most common degenerative disorder after Alzheimer’s disease, and in this paper authors propose a tool that can provide health staff with means to analyze, evaluate and monitor the progress of patients’ disorders, as well as the design of custom rehabilitation sessions in patients with Parkinson’s disease.

The last paper is a work by K. Aufderhaar, M. Schrepp and J. Thomaschewski entitled “Do Women and Men Perceive User Experience Differently?”. In this paper, authors study how women and men differ when rating the user experience of different websites using standardized questionnaires. Interestingly, they conclude that gender is not a significant factor, while personal attitudes and preferences are.

This Special Issue has gathered a diverse set of applications of Artificial Intelligence to the fields of marketing, healthcare and neuroscience. Research of such applications is expected to keep growing in the upcoming years, revolutionizing the way in which we understand marketing and medicine, and opening new possibilities which we might not be able to imagine as of today.

The future of marketing and neuroscience looks exciting, and Artificial Intelligence is at the core of it.

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