

Using Neuromarketing and AI to collect and analyse consumer's emotion: Literature review and perspectives

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Abstract— In the actual era, the human being has decided to go beyond his own intelligence, for a better understanding of the world, and an easier life style, hence he created Artificial Intelligence. Robots, smartphones, machines and softwares, that once were a pure creation of sci-fi writers imagination over a decade before, are becoming gradually essential to our daily life, and the fact that the economy, especially marketing, profits from it, is inescapable. Given that Neuromarketing, is mainly based on technological tools, its combination with AI could certainly improve it, to collect and measure the consumer's emotion with more accuracy. In this paper, we present a literature review of Neuromarketing and AI, and the current usage of AI in marketing studies with different technologies, and as we found out that few academics and scientific articles take an interest on the topic, we will be giving some perspectives and guidance questions for future researches and experimental studies.

Keywords— Neuromarketing-artificial intelligence-emotions-Feel Data-digitalization.

I. INTRODUCTION

Henceforth, it is inevitable not to mention artificial intelligence (AI), regardless of the topic or the situation; it is becoming gradually an indispensable element of our daily lives. Moreover, its impact on the human life style is notoriously growing, and expected to be involved in changing the civilisations in the very near future [1], and it is likely to change the way, marketers measure and analyse consumer's behaviour. Neuromarketing is known to be the application of neuroscience tools and techniques in marketing studies, in order to understand consumer's behaviour, by analysing the brain's reaction to marketing stimuli [2], and as it's mainly a result of a combination between marketing and new technologies (Eye tracking, facial recognition, etc.), AI may make Neuromarketing more interesting from the point of view of measurement accuracy, in fact, it has been demonstrated that an Artificial Intelligence based system, can be effective enough to assure the extraction and recognition of all sort of emotions of individuals, regardless of gender and race [3]. The role of motions is very significant in our daily lives and communication, and in today's globalization, intensified by the rapid and continuous improvement of the

digital and the virtual world, developing a properly constructed marketing strategy that will have a positive emotional influence on the public, has become very challenging for companies [4]-[5]. AI is likely to impact the future of marketing, and to influence the way marketers comprehend the consumer's behaviour; we hence also believe that, combining AI, which is continually improved, with Neuromarketing tools and techniques, may help marketers to collect and measure consumer's emotions with more accuracy and reliability, to better understand his/her decision making process.

II. NEUROMARKETING

Neuromarketing is the application of neuroscience methods and knowledge in marketing and its traditional approaches [6], and it is considered an interdisciplinary field, combining psychology, neuroscience, and economics [7]. Patrick Georges and Michel Badoc [8], in their book *Le Neuromarketing en Action*, show us that today and future marketers, need to understand what can explain the difference between the declarative and the purchasing behaviour, which is often an emotional perception rather than a rational one. The book's authors emphasize the limitations of traditional market research methods, since these studies are based essentially on declarative data and information; what the questioned person states, which may be different from her actual thinking.

From another point of view, this time from a professional, The Neuromarketer Dr. A.K Pradeep [9] explains in his book *The Buying Brain* how recent advances in brain monitoring and measurement capabilities, digital technologies and computational power allow scientists to delve deeply into the functioning of the human brain. Pradeep provides insights into brain function and progress in Neurotesting and Neuromarketing that allow marketers to directly appeal to the thoughts and the feelings of the consumer. His work is recommended to product developers, designers, marketers, and digital marketers who are looking for ideas on the emerging field of Neuromarketing in their innovation strategy.

However, we need to make clear the distinction between Neuromarketing and consumer neurosciences. While the latter refers to the intersection of neuroscience and consumer psychology, from an academic point of view, Neuromarketing suggests conducting market researches specific to companies, using neurophysiological tools such as EEG, fMRI, eye-tracking, skin conductance, etc. [10]. These tools have been proven effective in the measurement of consumer's emotions, especially the difficult to express ones. In fact, emotions are omnipresent in the marketing context; they play a fundamental role in the information processing, influence responses to persuasive messages, and measure the effects of marketing stimuli [11]. Thus, emotions play a major role in the decision-making process. Moreover, in the current market, and given the progress in the digital world, the consumer is stifled by the various offers that could be found at his/her fingertip, and this situation often leads to impulsive and irrational buying.

Marketing professionals need to make the consumer's emotion an integral part of their communication strategy and product design, thereby they can hope for a significant conversion rate, and allow the company to gain in term of profit, of relationship with its customers, and the customer to live a better experience and an optimal use [9].

Nevertheless, Neuromarketing methods might have some limitations. The most relevant one is that each method could provide a correct measure for particular emotions, and not for others. For example, EDA (Electrodermal activity) the measure that rely on skin conductance response, provides an accurate measure of emotional arousal, while it is not pertinent for directional valence [12].

We need to stress that Neuromarketing will benefit from the continuous improvement and technological innovation, and we think that the actual drawbacks of Neuromarketing methods might be surpassed.

III. ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) can be defined as the creation of computer systems called intelligent, as they are composed of analytical processes whose goal is to propose solutions and algorithms that enhance our daily lives, and also learn the human behaviour via data collection [13]. In this section we will present the literature review of AI, the actual state of its application in marketing studies and digital marketing, and its potential combination with Neuromarketing for Feel Data measurement.

A. AI and marketing

AI focuses on proposing and developing of automated computer based solutions to problems that normally require intelligence when done by humans [14]. In a marketing context, there are plenty of problems and questions that require a particular intelligence and judgments capability, in order to assess these problems with a high guarantee of success.

As we said before, few academics and scientific articles have been focusing on this topic, in fact, a simple research in Scopus using marketing and AI as keywords in related journals, results in a surprising finding: the number of articles and paper discussing the topic is very low, below 50 [15].



Fig. 1. Published papers (1972–2011) on artificial intelligence/intelligent systems applied to marketing (Source: Scopus, May 2012)

Although, recent researches show that AI is a real exploitable opportunity to empower the analytical methods for an array of marketing issues [16]. In fact, the integration of AI to marketing studies has allowed the achievement of better Mass Data Analysis, a better understanding of consumer's behaviour, before, during and after the buying moment, and the improvement of user experience [3]. We believe that AI will provide marketers with the ability to predict consumers' expectations with more accuracy, and it will help them to decide the pricing strategy with much less hesitation.

B. AI and the extraction Emotional Data

Advances in new technologies have led marketers to become closely interested in exploiting intelligent computed-based systems, to extract and measure consumer's emotions when exposed to marketing stimuli, to which we refer as Feel Data or Emotional Data. Methods as Eye-tracking, facial expressions recognition and EEG, became "famous" due to the emergence of Neuromarketing, a multidisciplinary field which has allowed marketers to focus their analytical efforts on consumer's emotion, as the latter to be considered a fundamental element of his/her decision making process [17]. Recently, new AI based systems have been developed for the extraction of emotions from facial expression, and they've been demonstrated to be very effective [3]. Nowadays, researchers can chose between in an array of tools, in labs or online to conduct marketing studies, using facial expression recognition, very effective in term of results, and efficient in term of cost (SmartFace, Facetales, id3 technologies, etc.)

IV. AI AND NEUROMARKETING

Many academics and professionals keep their sceptical perception of Neuromarketing, stating that it has many limitations [18]. Nevertheless, and taking into consideration the emergence of AI, and its combination with Neuromarketing, some limitations may disappear, and Neuromarketing tools and methods would be more accessible,

especially in term of usage and costs. Similarly to AI, Neuromarketing did not arrive yet to its maturity in term of research and theoretical frameworks, and likewise, scientific papers discussing the integration of AI in Neuromarketing studies are very few, but in perspective, it's very promising. Tools and techniques as EEG, Eye-tracking would tend to be more accessible to conduct marketing studies.

The main focus of Neuromarketing is analysing unconscious and implicit elements of the consumer's behaviour, in order to measure and principally to understand his/her emotional reaction to marketing stimuli, with the purpose to outdo the limitations of traditional marketing, and to establish an accurate consumer's judgment, bias-free [19].

Eye-tracking technology allows the recording of eye movements to obtain insight into consumer's cognitive processes; it has also been proven that in some case, this technology can record facial expressions, and emotions like fear, anger and joy can be observed and analysed [20].



Fig. 2. EEG device, developed by NeuroSky. (MindWave Mobile+)



Fig. 3. Eye-Tracking device developed by Artinis

V. CONCLUSIONS

AI is changing our life style gradually, the way we interact with the world around us, and companies are aware of such upcoming change, thereby, marketers need to rethink their traditional methods of approaching the consumer, and analyzing his/her behavior. The integration of AI in Neuromarketing studies, through a scientific combination with traditional marketing researches, is expected to provide a deeper understanding of consumer's behavior toward ads, branding and the appreciation of the product/service in all its components, and it will especially help building bias-free judgments and conclusions. It is out of doubt that AI can

assist marketers in their daily struggle with complicated marketing problems.

We believe that the combination of AI and marketing can only be a win-win relationship, as the latter is known to be a mixture of quantitative and qualitative problems that can be more accurately solved relying on AI based systems which represents for AI a unique opportunity to demonstrate its power. Marketing is also an area where innovation and creativity plays a fundamental role, and that, will allow AI to show its artistic and imaginative sides.

In our future research, we will explore the strength of facials expressions recognition, using AI based tools, in extracting and analyzing consumer's emotions in front of marketing stimuli, also eye-tracking tools can be used for that matter. However, in the Moroccan academic environment, funding a research is difficult to find, thus, we will be exploring some of the low-cost solutions for our empirical study, among which some facial-expression recognition solutions offered online.

REFERENCES

- [1] O. Burukina, S. Karpova, N. Koro, *Ethical Problems of Introducing Artificial Intelligence into the Contemporary Society*. In: T. Ahram, W. Karwowski, R. Tair. (eds) Human Systems Engineering and Design. IHSED 2018. Advances in Intelligent Systems and Computing, vol 876. Springer, Cham, 2019.
- [2] M. Espinoza, B. Gallegos Barzola, *Neuromarketing and Facial Recognition: A Systematic Literature Review*. In: R. Valencia, G. Alcaraz, J. Del Cioppo, N. Vera, M. Bucaram. (eds) Technologies and Innovation. CITI 2018. Communications in Computer and Information Science, vol 883. Springer, Cham, 2018.
- [3] H. Boz, U. Kose, BRAIN – Broad Research in Artificial Intelligence and Neuroscience, Volume 9, Issue1, ISSN 2067-8957, Feb. 2018.
- [4] A. Rostomyan, The Impact of Emotions in Marketing Strategy, *Internationale Trends in der Markenkommunikation* pp 119-129, 2014.
- [5] A. Zorfas, D Leemon, An Emotional Connection Matters More than Customer Satisfaction, *The Harvard Business Review*, 2016.
- [6] N. Lee, A-J. Broderick, L. Chamberlain, What is Neuromarketing? A Discussion and Agenda for Future Research. *International Journal of Psychophysiology*, 63, 199–204, 2007.
- [7] S. Chatterjee, Neuromarketing- a path breaking approach to understanding consumer behaviour, *Journal of Management & Research*, Vol 9, Issue 4/4, ISSN 0974-497, 2015.
- [8] M. Badoc, P. Georges, *Le Neuromarketing en action*. Eyrolles, 2010.
- [9] A-K. Pradeep, *The Buying Brain: secrets for selling to the subconscious mind*, John Wiley & Sons, Inc., Hoboken, New Jersey, 2010.
- [10] Neuromarketing empirical approaches and food choice: A systematic review
- [11] The Role of Emotions in Marketing.
- [12] Andreassi, J. 2007 *Psychophysiology: human behavior and physiological response*. Fifth edition.
- [13] A. Emić, S. Čabro, *Artificial Intelligence and Neuromarketing vještačka inteligencija i neuromarketing*, 2019.
- [14] M. Negnevitsky, *Artificial intelligence: A guide to intelligent systems* (2nd ed.). Addison-Wesley, 2004.
- [15] B. Wierenga, Marketing and artificial intelligence: *Great opportunities, reluctant partners*. In J. Casillas, F. J. Martínez-López (Eds.), *Marketing intelligent systems using soft computing: Managerial and research applications*, pp. 1–8. Springer, 2010.
- [16] J. Casillas, F.J. Martínez-López, Mining uncertain data with multiobjective genetic fuzzy systems to be applied in consumer behavior modeling. *Expert Systems with Applications*, 36(2, part 1), pp. 1645–1659, 2009.

- [17] D. Norman, Designing Emotions: P. Desmet, Design Journal. 6, pp. 60-62. 10.2752/146069203789355444, 2003.
- [18] M. Odekerken, Ethics of neuromarketing, Neurofied: Applied neuromarketing academy, <https://neurofied.com/the-ethics-of-neuromarketing/> Accessed: 19/01/2019.
- [19] Ritty, F., Reena, R.: A study on neuromarketing: a unique bond between consumer's cognizance and marketing. IJCAMS 2(11), 51-54 (2016). <https://doi.org/10.22271/manage>.
- [20] Eye Tracking as a Method of Neuromarketing for Attention Research—An Empirical Analysis Using the Online Appointment Booking Platform from Mercedes-Benz Veit Etzold, Anika Braun and Tabea Wanner.

