



# ADVANCED TECHNOLOGIES AS A FRAMEWORK FOR SUSTAINABLE MARKETING CAMPAIGNS (AI APPLICATION IN NEUROMARKETING)

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## Abstract:

As the business landscape evolves into a more digital environment, traditional marketing methods are no longer sufficient for companies to stay competitive. In order to gain an advantage in the market, businesses must integrate the latest technologies, including AI. Neuromarketing has benefitted greatly from AI-powered tools, providing marketers with valuable insights into consumer behaviour, emotions, and preferences. With this information, they can create targeted and sustainable marketing campaigns that generate long-term value for the brand while minimizing negative environmental impacts. This paper delves into the potential of AI in neuromarketing as a framework for sustainable marketing campaigns. It examines the challenges and benefits of using AI in marketing, showcasing successful campaigns that have leveraged AI-powered tools to create sustainable strategies. Furthermore, the paper emphasizes the importance of measuring customer engagement, which plays a crucial role in the creation of effective marketing campaigns. The present study utilized AI technologies such as video processing to analyse the sentiment of stimuli presented in university enrolment campaigns over a two-year period. By identifying the age, gender, and sentiment of customers, we gained insights into their behaviour and preferences. Our research showed that incorporating a clear "call to action" message can significantly improve the effectiveness of marketing campaigns. Overall, our study demonstrates the potential of AI technologies in enhancing customer engagement measurement and optimizing marketing strategies for sustainable campaigns.

## Keywords:

Ai, Advanced Technologies, Neuromarketing, Marketing Management, Sustainable Marketing Campaigns.

## INTRODUCTION

With the rise of digital technologies, the marketing landscape has experienced a significant transformation. The emergence of digital technologies has brought about a significant transformation in the marketing industry, leading businesses to explore new approaches to gain a competitive edge. One of the popular technologies that have gained traction in the marketing field is Artificial Intelligence (AI). AI-powered tools have proven to be highly effective in neuromarketing, offering marketers valuable insights into consumer behaviour, emotions, preferences, and customer engagement measurement [1], [2].

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With the aim to measure the impact on the industry brands, the effectiveness of marketing campaigns is now being evaluated at their sustainability level. Sustainable marketing campaigns aim to create long-term value for the brands and clients, while minimizing the negative impact on the environment [3]. By incorporating AI in the field of marketing and neuromarketing, marketers can create campaigns that are not only more efficient but also more sustainable. The paper explores the potential of advanced technologies, specifically AI in neuromarketing, as a framework for sustainable marketing campaigns [4]. By integrating AI-powered tools into marketing strategies, brands can gain deeper insights into consumer behaviour and preferences [5] - [7].

The benefits of using AI in marketing will be discussed, along with examples of successful marketing campaigns for student enrolment purposes. Since the focus of the present research is a comparison of the marketing campaigns with and without "call to action" messages, L. Arvanitidis found in his study that incorporating a clear "call to action" message can improve the effectiveness of marketing campaigns that use AI-powered neuromarketing techniques [8]. By the time and rise of digital technologies, AI has become an integral and important part of marketing strategies, especially in the field of neuromarketing [9]. AI-powered tools shown effective in enabling marketers to gain valuable insights into consumer sentiment, behaviour, emotions, and preferences, with a focus on customer engagement [10], [11]. The effectiveness of marketing campaigns is not just measured by their impact on the brand but also by the campaign's sustainability [12] - [14].

The present study focuses on the utilization of AI technologies, particularly video processing, to analyse the sentiment of stimuli presented in university enrolment campaigns over a two-year period. By employing these technologies to identify customers' age, gender, and sentiment, the study aims to gain valuable insights into consumer behaviour and preferences. The findings of this study suggest that incorporating a clear "call to action" message significantly improves the effectiveness of marketing campaigns [9], [10]. The implications of these findings for future research and marketing practice will be discussed in the concluding section. The study aimed to gain valuable insights into consumer behaviour and preferences by identifying customers' age, gender, and sentiment. Overall, this study aims to demonstrate the potential of AI technologies in enhancing customer engagement measurement and optimizing marketing strategies for sustainable campaigns.

## 2. METHODOLOGY

The application of the advanced technologies and neuromarketing techniques was tested using an innovative hardware and software system called MojoAI during a two-day education fair in Novi Sad in 2023. The MojoAI platform (created by Mojo AI Media Technologies) displayed animated content (text, graphics, images) and anonymously recorded visitors' reactions, determining the age cohort, sentiment (positive, neutral, negative), and gender. The MojoAI platform is fully compliant with the Personal Data Protection Law and GDPR. The entire analysis takes place on the device using localized analytics containing artificial intelligence, and the application immediately anonymizes and deletes video recordings after analysis.

The accuracy of the analytics is achieved within, where the network is trained on-site to learn and recognize whether one person returns multiple times in a specific time without recording personal data. To achieve this, a sophisticated anonymization system is used, where the facial anatomy is kept as a mathematical record that cannot reconstruct the face, and these anonymized data are used for further statistical analysis of visitor reactions.

In the present study, the AI method being used is called "on-device learning" or "edge AI." Instead of training the AI model in a central location, it's trained directly on the device itself (in this case, a tablet). The model can learn and recognize patterns in the data without transmitting any personal information to a central server. It allows for real-time processing and analysis of data while still protecting the privacy of the individuals being analysed.

To further protect visitors' privacy, an anonymization system is used. This system likely involves face recognition, feature extraction, and encoding techniques to create a mathematical representation of facial features that can be used for analysis without revealing personal information. The AI features and programs that are trained on-site to recognize and track visitors without recording personal data include: 1. Deep Learning: This type of AI uses artificial neural networks to learn from data, allowing the system to recognize patterns and make predictions based on collected data. 2. Computer Vision: This AI technology enables machines to recognize and interpret images and video, which is useful for analysing facial features and tracking visitors without recording personal data. 3. Convolutional Neural Networks (CNNs): A type of neural network commonly used for image classification and recognition, which



can be used to recognize facial features and track visitors without recording personal data. 4. Anonymization Techniques: Techniques such as differential privacy and homomorphic encryption are used to protect visitors' privacy and ensure that collected data cannot be linked to specific individuals. 5. Face Recognition Algorithms: These algorithms are used to identify and track visitors without recording personal data, helping to protect their privacy.

The data collection methodology involved activating the hardware part of the platform (tablet displaying content at the Singidunum University booth at the fair), displaying stimuli (enrolment campaigns for selected study programs in 2021 and 2023), registering booth visitors within a distance of 2.5 meters from the tablet, analysing sentiment in real-time, and creating statistics according to age cohorts and gender.

During the two-day fair, the application recorded 1281 targeted displays and 600 booth visitors, of which 60% were male, and 40% female.

### 3. RESULTS

Figure 1 shows the velocity of viewer engagement. In the context of neuromarketing, velocity in viewer engagement refers to the speed and intensity with which a viewer responds to a marketing stimulus, such as an advertisement or a product display. In terms of sentiment analysis, velocity can be used to indicate the strength of positive or negative reactions to a stimulus. For example, if a viewer's sentiment shifts quickly from positive to negative during a commercial, this could indicate a strong negative response.

Figure 2 shows examples of the enrolment campaigns for the study years 2023 (a) and 2021 (b). The results showed that the velocity of the engaged visitors from the cohort 18-24 years for campaign 21 performed with higher engagement compared to campaign 23, especially in the segment which contains a call to action.

The Velocity for campaign 2021 for cohort 18-24 was 58,37% , while the velocity for campaign 2023 for cohort 18-24 was 38,71%.

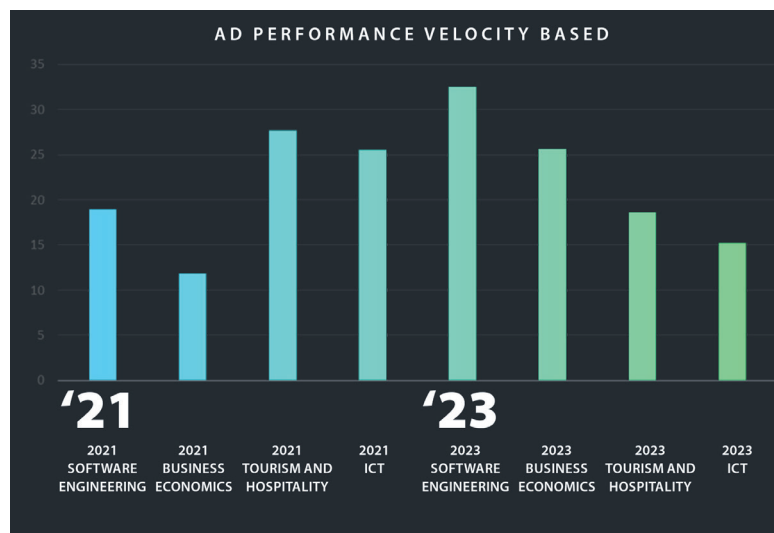


Figure 1 – Velocity of the viewer engagement in different campaigns.



a)



b)

Figure 2 – Example of the enrolment campaign for the study year 2023 (a) and 2021 (b).



## 4. DISCUSSION

The study aimed to test the effectiveness of advanced neuromarketing techniques in marketing campaigns using innovative hardware and software solutions. The study utilized MojoAI, a platform that uses AI to analyse visitor reactions to marketing stimuli in real-time while also ensuring GDPR compliance and data privacy. The platform was tested during a two-day education fair in Novi Sad, 2023. The study demonstrated the effectiveness of MojoAI in collecting anonymous data on visitor reactions, including sentiment, age, and gender.

Based on the data presented, it can be concluded that the enrolment campaign for 2021 performed better than the campaign for 2023 in terms of the velocity of engaged visitors, particularly in the cohort of visitors aged 18-24. The velocity of engaged visitors for the 2021 campaign in this cohort was 58.37%, while it was 38.71% for the 2023 campaign. This suggests that the strategies used in the 2021 campaign were more effective in engaging visitors and eliciting a response, particularly with a call to action. It would be beneficial to further analyse the specific elements and strategies used in the 2021 campaign that contributed to its success and compare them to the 2023 campaign to identify areas for improvement. The results of the study indicated that the velocity of engagement for campaign 21 was higher than campaign 23, especially in the segment with a call to action, for cohorts 18-24. This finding suggests that targeted marketing campaigns with a clear call to action are more effective in engaging visitors in this age group.

The importance of effective CTA strategies in marketing campaigns has been previously emphasized in the literature [15]. Our findings support these claims, particularly for the younger demographic. Furthermore, the effectiveness of neuromarketing techniques in generating insights into viewer engagement and behaviour has been demonstrated in previous studies [6,7,16]. Our study builds on this research by demonstrating the potential of the MojoAI platform in providing real-time insights. Additionally, the use of AI and anonymization systems in marketing research has been suggested in previous studies [17-20] for privacy protection and accurate data analysis.

## 5. CONCLUSION

Overall, the use of advanced technologies like MojoAI in marketing campaigns has significant potential in enhancing marketing efforts while also ensuring data privacy and compliance with data protection laws. These findings provide valuable insights for businesses seeking to create more sustainable marketing campaigns that engage their target audience effectively. Further research can investigate the effectiveness of these advanced techniques in other settings and explore additional factors that influence visitor engagement in marketing campaigns. The study highlights the importance of incorporating call-to-action (CTA) elements in enrolment campaigns to engage young adults. The study also demonstrated the potential of neuromarketing techniques, particularly MojoAI, in generating valuable insights into viewer engagement and behaviour in real-time. Advanced technologies such as AI and anonymization systems can help protect privacy while providing accurate data for statistical analysis of visitor reactions. Therefore, integrating these technologies into marketing campaigns can contribute to the creation of sustainable and effective marketing strategies.

Incorporating these advanced technologies in marketing campaigns can lead to more sustainable and effective marketing strategies, contributing to the growth of businesses and industries while protecting the privacy of individuals.

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