

# Social Media Marketing Experts' Perceptions Regarding the Capabilities of a Future Artificial Intelligence Software

Adrian Micu, Alexandru Capatina, Angela-Eliza Micu, Marius Geru, and Radu Lixandrou

**Abstract**—The increasing interest in Artificial Intelligence's impact on Social Media Marketing creates huge opportunities for software providers, whose innovative technologies would be broadly implemented by marketers. This article outlines the results of an exploratory research focused on 100 Social Media Marketing experts (digital agencies' owners, marketers and freelancers) that assessed the forthcoming AI Media software capabilities, based on social media analytics, reflecting audience, image and sentiment analyses. The goal of this paper is to analyze the ranking of twelve capabilities proposed for the future AI Media software, as they were perceived by the respondents included into the research sample.

**Index Terms**—Artificial intelligence, deep learning, social media marketing, predictive analytics.

## I. INTRODUCTION

We are witnesses of fast-growing IT solutions, based on machine learning algorithms and neural networks, linked to social media predictive analytics' needs. Given these trends, the key enabler for improving decisional practices in Social Media Marketing is how to take full advantage of Artificial Intelligence (AI) solutions and find ways to train them for their specific objectives [1]. The AI tools provide support to social media marketers in their quest to optimize audience, image and sentiment analyses, by identifying the channels used by top brands that have been recognized for their social media efforts and the customer engagement with social media [2].

Although marketers can implement a wide range of web-based software solutions regarding the campaigns' execution in social media, they are not fully aware about the benefits of AI tools in the deep understanding of their audience, competitors, and social content positioning.

When it comes to AI Media as a machine learning application – the main outcome of the research project entitled Future Web, three main parts, with very different

views involved in the development process, must be considered.

The first part is represented by people who extract data, who are very interested in the power and accuracy of the instruments.

The second category includes the application development part, which is focused on application performance (speed, scalability, etc.).

The third and most important part involved from a pragmatic perspective is the businessman who actually wants a solution for a certain real problem.

AI Media should design a classification model by creating a data set and then defining labels and providing positive examples of entries belonging to these labels. When tracing the data set, the system determines the same differences between the different labels to generalize the characteristics that define each tag. The model predicts the class where a new entry enters based on the predefined classes specified in the training data set.

The primary challenge of the future AI Media software, which will embed deep learning algorithms and convolutional neural networks to recognize logos of brands or companies involved in social media content, is to address the needs of Social Media Marketing experts (digital agencies' owners, marketers and freelancers) in terms of expected capabilities.

In order to develop the prototype of AI Media, a number of tools available on the market using convolutional neural networks have been identified and are in different stages of development. However, due to the high waiting times for algorithms, we also took into consideration the use of a Google Cloud Vision API service designed to meet the needs of the AI Media application. A database of images of labeled international brands used in similar tests was identified for prototype testing. The challenge in identifying logos and brands remains the lack of datasets and the fact that they are displayed on different surfaces that have different materials and textures.

The remainder of this paper is organized as follows: Section I introduces the relevant theory; Section II outlines the methods and study procedure; Section III presents the findings, while Section IV conclusions, implications and future research agenda.

## II. THEORETICAL BACKGROUND

The rise of Artificial Intelligence in Social Media Marketing is a consequence of deep learning algorithms, neural networks another related technique to provide compelling evidence of audience, image and sentiment analyses. Social Media marketers are looking to capture

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opportunities regarding the adoption of Artificial Intelligence (AI) - software to analyze the consumer-generated content shared within social networks [3]. The content shared by people on a brand page is considered as a valuable input for machine learning algorithms, trained to match decisional endeavors [4].

Deep learning algorithms and convolutional neural networks dealing with social media information enable accurate and relevant insights into customer behavior and audience affinities, identifying the highly involved consumers [5]. The lessons learnt from a case study suggest that social media could be a potential game-changer in improving social media marketers' capacity to categorize social media posts by their stage in the customer buying cycle [6]. Empirical evidence highlights that there is a tremendous assortment of brand-related user generated content across the different social networks, so social media marketers have to deal with hard decisions on which content to publish at what time in order to get the maximum reach [7]. Customer's participation in both the front-end (idea generation, conceptualization) and the back-end (design and testing) phases of the new product development enhances the capability to provide instant customer recommendation of the right product to purchase and guide him/her to the store with the lowest price [8]. Social networks have empowered consumers to connect, share, and collaborate, creating spheres of influence that have re-designed the ways marketers engage in tracking their affinities and interests [9].

Image analysis tools enabling brand logo recognition allows social media marketers to analyze the various ways people interested on a brand communicate within social networks. Researchers as Bengio [10] consider that we do not yet have learning algorithms that can discover the many visual and semantic concepts that would seem to be necessary to interpret most images on the web, so training of deep learning algorithms to recognize images/detect objects for custom categories becomes critical. A first attempt to correlate image recognition in social media with the analysis of user-generated texts in terms of their belonging to one of the stages of the customer decision journey, in order to identify places and moments of product consumption, has been made by Vazquez *et al.* [11]. The correlation between sales forecasting with the frequency a brand appears in social media photos has been approached by Lassen *et al.* [12], who analyzed the extent in which Big Social Data can predict real-world outcomes such as sales and revenues. Contextual Intelligence fully captures the dynamic nature of engagement on social media platforms, enabling image recognition through posts' impact [13].

In the field of AI applicability to sentiment analysis, previous research [14] outline that the shares of positive and negative comments, compared to neutral comments, are positively, related to brand post popularity, enabling the classification of each user-generated content based on variables such as tone, sentiment, or topic, while reviewing a product/service. The fast growth of social media and the opportunity to access the valuable opinions of numerous participants on competitive issues needs tools able to track social media sentiments related to competing brands and the reaction to new products launched on the market, as well [15]. Knowledge obtained from social networks are extremely

valuable to anticipate potential image crisis by assessing the sentiments related to social mentions, as they are highly unlikely to be biased [16].

As future AI Media application involves deep neural networks, one of the drawbacks of building deep neural network model is difficulty in making a large enough dataset for training [17].

### III. METHODS AND MATERIALS

The objective of this research is to analyze what practitioners in the field of Social Media Marketing are currently expecting in the area of Artificial Intelligence (AI)-based software development, able to embed deep learning algorithms and convolutional neural networks to recognize logos of brands or companies involved in social media content. To identify how Social Media Marketing experts perceive the features of a brand new AI Media Software, an exploratory research was undertaken. This process involved a range of highly focused research techniques. First of all, in-depth interviews have been undertaken with experts from Romanian leading digital agencies, then an online survey has been conducted to provide insights from worldwide Social Media Marketing experts, regarding the forthcoming capabilities of the AI Media software, integrated in three clusters: audience analysis, image analysis and sentiment analysis (Fig. 1).

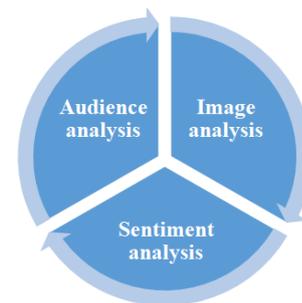


Fig. 1. Research conceptual model.

We have designed and administrated an online questionnaire (available on Google Drive: <https://goo.gl/forms/VE4baWq03A5ggJxs2> to 100 respondents (owners of digital agencies, social media marketers and freelancers from all continents (Fig. 2), registered on <http://www.topinteractiveagencies.com/>) in order to assess their perceptions regarding the ranking process of the forthcoming AI Media software capabilities on a pre-defined scale from 1 to 10: 1 (necessary) - 5 (great to have) - 10 (expected/by default).

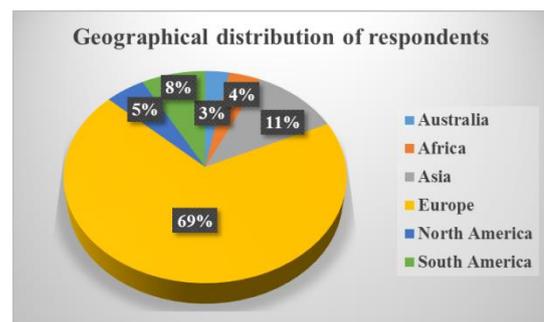


Fig. 2. Geographical distribution of respondents.

Answers have been collected in the period June – July 2018, after the submission of personalized invitations sent to target respondents to fill in the online questionnaire.

IV. FINDINGS

The first capability of the future AI Media software related to audience analysis aims at categorizing social media posts by their stage in the customer buying cycle, based on the idea that Social Media marketers should focus their attention to gain brand engagement through tailored conversation within the entire social media buying cycle. Findings suggest a perfectly balanced distribution of answers (Fig. 3), revealing different perspectives of the respondents in what concerns the integration of such a feature in the forthcoming AI Media software.

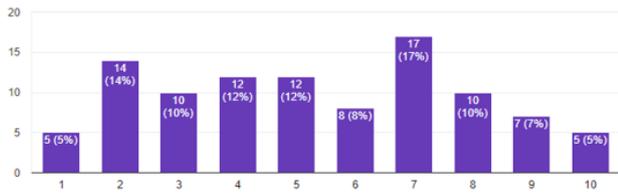


Fig. 3. Respondents' perceptions regarding the capability to categorize social media posts by their stage in the customer buying cycle

The second capability related to audience analysis highlights the opportunity to make recurrent decisions on which content to publish at what time in order to get the maximum reach. Deep Learning is an automatic learning technique that uses the deep neural networks, containing two or more hidden layers. Deep learning algorithms can be trained to ensure that a brand content in social media is worth sharing, at optimal times. The concentration of answers on the points 2 and 3 of the scale (32%) is consistent with the respondents' propensity to consider this capability a necessary one in the architecture of the future AI Media software (Fig. 4). Deep Learning has a defining feature, namely the ability to keep in mind past actions and to learn from their own behavior.

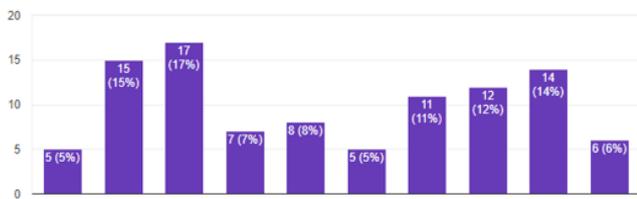


Fig. 4. Respondents' perceptions regarding the capability to make recurrent decisions on which content to publish at what time in order to get the maximum reach.

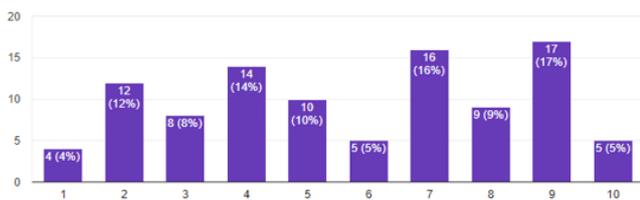


Fig. 5. Respondents' perceptions regarding the capability to provide instant customer recommendation of the right product to purchase and guide the client to the store with the lowest price

Building upon the capability to provide instant customer

recommendation of the right product to purchase and guide the client to the store with the lowest price, the future AI Media algorithms will be endowed to analyze user behavior and then optimize sales opportunities, based on real-time data. The majority of answers (37%) are situated on the right area of the scale (points 7 to 10), revealing “by default” etiquette to this capability (Fig. 5).

Network analysis is embedded in AI platforms in order to enable an in-depth understanding of an audience’s interests, by mapping attributes and connections to correlate audience groups with affinities toward a brand content in social media. Thus, visual reporting tools to make clusters with people with similar interests became compulsory for Social Media Marketing experts, who appreciate this capability as great to have (concentration of answers 42% on the points 4,5 and 6 of the scale – Fig. 6).

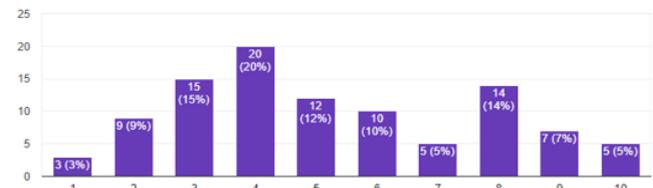


Fig. 6. Respondents' perceptions regarding the capability to track affinities and interests in a social network and to generate a visual report grouping people with similar interests.

The first capability of the future AI Media software related to image analysis is based upon deep learning algorithms trained to recognize images/detect objects for custom categories. AI media will enable the power of artificial intelligence to recognize and classify images, by using trained classifiers or train their own customized classifiers to solve specific cases. Images can contain contextual hints on all aspects of the promoted business, including customer preferences, inventory levels, and the quality of the promoted products. These clues can be used to enrich sales, service, and marketing information to get new target customer information and take appropriate action. AI Media module will try to bring sophisticated image recognition algorithms to differentiate from the existent solutions. Thus, this feature is appreciated by respondents, as they consider it necessary (most of them – 40% assessed it on the points 2,3 and 4 of the scale – Fig. 7).

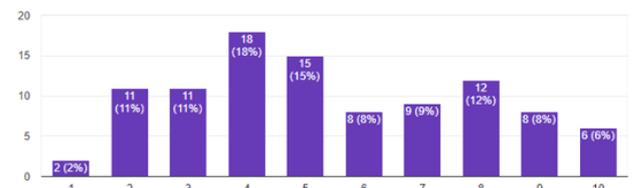


Fig. 7. Respondents' perceptions regarding the deep learning algorithms trained capabilities to recognize images/detect objects for custom categories.

The second proposed feature of the AI Media software related to image analysis consists of deep learning algorithms' capability to identify places and moments of product consumption. The research team behind AI Media software is devoted to develop a system that utilizes deep learning algorithms and machine vision to find in real time the connections between a brand logo in social media and places and moments of product consumption. We found a balanced

distribution of answers along the 10 points of the research scale, so we can state that for some SMM experts, this feature is necessary, for others great to be embedded, while others perceive it as expected/by default (Fig. 8).

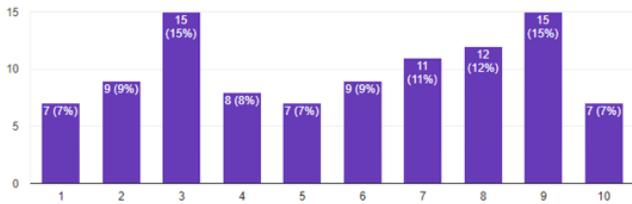


Fig. 8. Respondents' perceptions regarding the deep learning algorithms' capability to identify places and moments of product consumption.

An innovative feature that AI media research team intend to introduce is the capability to correlate sales forecasting with the frequency a brand appears in social media photos. In this case, the research team will imagine a non-linear model based on neural networks in view to capture the sales opportunities in relation with image recognition tool. Concerning respondents' perceptions related to this capability, the majority of opinions reveal that they rather consider it necessary in the AI Media software (Fig. 9).

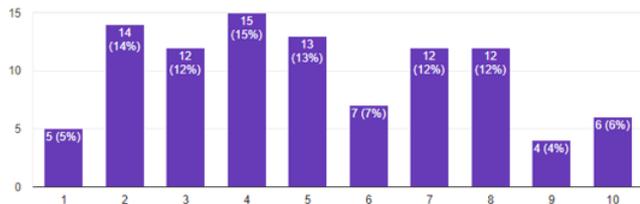


Fig. 9. Respondents' perceptions regarding the capability to correlate sales forecasting with the frequency a brand appears in social media photos.

Many experts in Artificial Intelligence applied to Social Media Marketing are aware that recognizing context is still hard in Machine Learning. If a trained machine learning model is not capable to understand the context, the image recognition is not enough to predict any expected decisional behavior. The critical point is that machine learning algorithms functions at their best when they are trained in specific contexts. Being the best predictor of performance in real-life situations, Contextual Intelligence techniques will be embedded into the AI Media software, in correlation with image recognition. More than 50% of answers related to this capability outline that it is perceived as necessary by the future users of the AI Media software (Fig. 10).

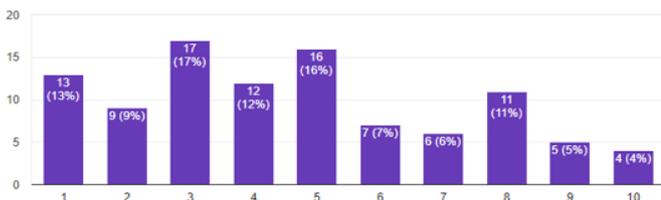


Fig. 10. Respondents' perceptions regarding the capability to correlate image recognition with contextual intelligence

Exploiting the knowledge gained through classifying the user-generated content is crucial in Social Media Marketing. As people increasingly tend to share their views, opinions and experiences online, customer review mining by means of AI techniques leads to classifications and clusters of user-generated content based on variables such as tone,

sentiment, or topic. This feature seems to be perceived by respondents as necessary, due to concentration of answers in the left panel of the evaluation scale (Fig. 11).

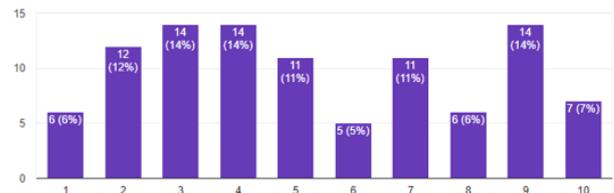


Fig. 11. Respondents' perceptions regarding the capability to classify each user-generated content based on variables such as tone, sentiment, or topic, while reviewing a product/service

Without real-time competitive insights, brands encounter risks to miss the chance to capitalize on opportunities to track sentiments related to competitors' products and services campaign updates. AI Media software will embed a competitive intelligence tool to allow brands to be more agile when analyze the sentiments related to competing brands. This feature is considered necessary by the majority of respondents (44% of answers being situated on the points 2,3 and 4 of the evaluation scale – Fig. 12).

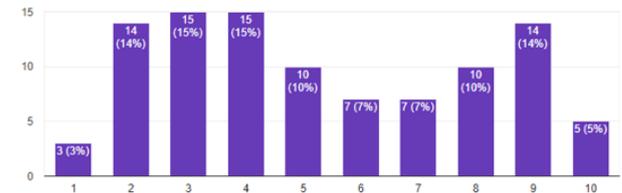


Fig. 12. Respondents' perceptions regarding the capability to track social media sentiments related to competing brands in order to enable Competitive Intelligence mechanisms

By implementing a social media crisis management plan, online marketers are able to effectively mitigate the damage to their brand image; the biggest challenge consists of the capability to anticipate a potential image crisis; the algorithms of the future AI Media software will be endowed with such a capability, considering online marketing experts' expectation to be alerted when an image crisis breaks out. Respondents' opinions converge to the idea that this capability is perceived as being rather necessary than expected/by default (Fig. 13).

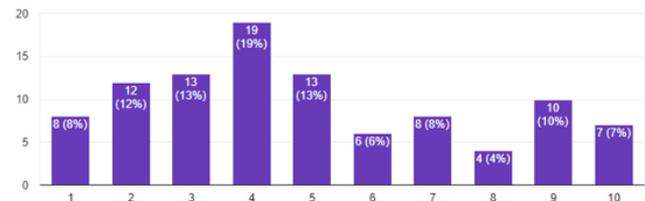


Fig. 13. Respondents' perceptions regarding the capability to anticipate potential image crisis by assessing the sentiments related to social mentions

As social media offers a cost-effective platform to promote the launch of new products/services on the market, deep learning algorithms should be trained to effectively track the sentiments of early adopters of these brand new products or services. The rules learnt by deep learning algorithms could be adapted to behavioral patterns of the customers. Respondents consider the capability to track the reaction to new products launched on the market as being rather necessary (Fig. 14).



Fig. 14. Respondents' perceptions regarding the capability to track the reaction to new products launched on the market and promoted on social networks.

The research team responsible for the design of the AI Media software is aware that machine learning tools will have the ability to analyze large sets of data retrieved from social networks and provide analytics on audience, image and sentiment analyses that social media marketing teams can use to their advantage.

## V. CONCLUSIONS, IMPLICATIONS AND FUTURE RESEARCH AGENDA

This study sought to address a key question: which capabilities a future AI Media software should have to match the expectations of potential users, such as digital agencies' Social Media marketers or freelancers. In this paper, we ranked how much the capabilities of a future AI Media software relates to the expectations of its target users. We have divided twelve capabilities in three clusters: audience analysis, image analysis and sentiment analysis. The ranking level was used to decide how pertinent the AI software capabilities will be, in the quest to improve the software design process.

The findings suggest that the majority of respondents' perceptions converge toward the idea that the AI Media software forthcoming features are perceived as being necessary in a greater extent than great to have or expected/by default. One possible explanation is as it follows: Social Media marketers are looking forward to deal with an innovative AI software, which will bring brand new features, unavailable at this moment on the market.

As the design of AI Media software is just in the planning process, we hope that recognizing the valuable feedback from potential users, regarding their expectations on the capabilities and features integrated in the software can help us in meaningful and relevant ways, while avoiding pitfalls that can threaten the software development and its integration in the Future Web platform – the main deliverable of our research project.

Considering its implications for theory and practice, AI Media application could be used to extend a marketer's vision beyond keyword identification to detect attributes about an image, such as detecting the logo itself, and competing brands in a customer's photo. So, you can use these attributes to learn more about lifestyles and customer preferences.

The AI Media application could also be used as a monitoring and statistical analysis system, for example to track whether the brand or products in question were placed in accordance with the manufacturer's requirements in social media, outreach and content marketing campaigns.

Analyzing a large sample can lead to the mobilization of influences, whose role can be expanded by acting as product ambassadors in campaigns aimed directly at a targeted audience.

The AI Media application using Machine Learning algorithms could identify the feelings caused by the influencers' posts from the different content blocks analyzed. This will take into account a multitude of context-related, location-based content, content analysis of feelings can be made possible by performing quantitative analyzes based on qualitative content resources, using predominantly Machine Learning algorithms. Although the use of artificial intelligence algorithms has accelerated lately, due to the increase in computing power, their applicability to large volumes of data generated by social media is relatively limited.

Given the convenience sampling method used in the present study and the random distribution of respondents in different countries, findings should be considered as exploratory. We intend to conduct a future research, based on a configurational approach, in view to identify the predictors of audience analysis, image analysis and sentiment analysis in the AI Media software.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## AUTHOR CONTRIBUTIONS

Please state each author's contribution to this work, it can be up to several sentences long and should briefly describe the tasks of individual authors. e.g., Adrian Micu and Alexandru Capatina designed the conceptual model and conducted the research; Angela-Eliza Micu prepared the theoretical background, Radu Lixandriou and Marius Geru analyzed the data, all authors had approved the final version.

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