

Original Article

Psychological Analysis of Social Media Visual Content Based on Image Recognition Algorithm

Zhaohao Jia

School of Journalism and Communication, Guangdong University of Foreign Studies, Guangzhou, Guangdong, China.

Corresponding Author : 18566030905@163.com

Received: 08 July 2024

Revised: 11 August 2024

Accepted: 08 September 2024

Published: 28 September 2024

Abstract - Technological advancement has seen social media airways availing a steady stream of visual content, which has compounded the need to create new and effective ways of uncovering the psychological aspects inherent to these images. This work aims to investigate the possibility of applying modern image processing techniques to classify the affective and referential features of social media images. To analyze and feature extract from a diverse set of images embracing social media applications, the study undertook the application of a Convolutional Neural Network (CNN), which was refined through transfer learning. The model's performance was confirmed by its high accuracy levels of 92% for the thematic categories and 88% for the emotional content, together with Pearson coefficients for the comparison with human-coded benchmarks at $r= 0.84$ for the emotional scores and $r= 0.79$ for the thematic scores. The results suggest that such an approach is capable of recreating human decision-making processes with reasonable accuracy in the context of SEM interpretation relevant to digital media literacy, mental health, and marketing techniques. It also discusses the problems connected to ethical issues, confidentiality and anonymity of participants' data preventing algorithmic bias and making it fair and inclusive in analyzing the data of the study. We consider certain limitations like selection bias and subjectivity of annotations; therefore, it suggests the future directions of the research like using larger scale and different types of data sets as well as using multimodal data. Therefore, this research validates the approach to synchronising image recognition technologies with psychological analysis theories for unpacking the complex psychological aspects of social media visuals. Thus, these methodologies will also be vital for the further advancement of research in the field of modern digital communication and the investigation of people's interactions and emotions in this context.

Keywords - Psychological analysis, Emotional content, Thematic classification, Social media, Image recognition.

1. Introduction

In the past few years, social networks have become an omnipresent reality that has changed the world of people's communication and interaction significantly [1]. Fundamental to this phenomenon is the high incorporation of visual data which not only increases the interaction level but also acts as one of the most persuasive media to express emotions, ideas and even cultures [2]. Widely and more so with the current study, this publication explores the neurotic psychological perspective on social media visual content with the aid of superior image recognition algorithms [3].

Thus, using artificial intelligence and machine learning possibilities, this investigation seeks to reveal the inherent deeper psychological aspects of the images posted on popular social media platforms [4]. Aside from that, analyzing the effects of the content carrying the visuals is central because it helps explain the differences between the two areas: digital communication and Human Psychology. Increasing usage of image-intensive social media sites such as Instagram,

Pinterest, and Snapchat shows increased importance of visuals in playing out perceptions and behaviour studies [6]. To this end, this research aims to explain how images systematically and comprehensively help in evoking emotions, facilitating or impeding cognitive processes and the modes of interaction in the determined online communities [7].

Furthermore, this research endeavour aims to use advanced image recognition analysis, such as CNNs and Deep learning, to drag contentious, meaningful psychological information from huge social media image databases [8]. These insights do not only provide a theoretical contribution to computational psychology, but they also have implications for application in digital marketing strategies, content moderation and promotion of mental health in today's society. In the end, this study aims to provide better insight into the interconnection between the sociology of the researched study, the psychology of human perception, and the aspects of digital communication while analyzing the impact of the images on the study's online presence and social prejudice [3].



While research in the sphere of image recognition, including the analysis of social media images has been significant and groundbreaking, more often than not, not much is known of the psychological implications of visual content. Found current approaches prioritize extracting and categorizing the themes and emotions from images with less consideration for the complex psychological patterns resulting from joint and/or interrelated analysis of multiple forms of data including textual or audio data.

The text, captions, or association of audio to the images can add a more extensive understanding or perception of the images, which are normally hidden or remain unnoticed when only the images are taken into consideration. This research seeks to address this gap and improve on the frameworks that exist by way of integrating multimodal analyses, with a view of providing a more holistic approach to dealing with the psychological behaviour present in social platforms. Also, the content shared on social media is not static, meaning that it changes with time and mirrors the whole culture of different cultures.

Through the implementation of the longitudinal and cross-cultural approach, this study will establish how and what differences there are in users' emotions and thematic sentiments across different events or different cultures. This novel approach then allows for a larger and more comprehensive interpretation of how visual content relates to psychological states that are of immense value in mental health, marketing as well as the understanding of the digital world.

2. Related Work

The intersection of psychology and social media has garnered significant scholarly attention, particularly concerning the impact of visual content on human cognition and behaviour study. As digital platforms increasingly prioritize visual communication, understanding the psychological dynamics embedded within social media images has become paramount [11].

Prior research has established the importance of visual cues as a factor that defines and guides the direction of emotional responses as well as social judgments; for example, works that include Biswas et al. (2022) and Dehshibi et al. (2019) exist to support this claim because they provide evidence about how images can cause immediate emotional reactions and impact on the online interactions. However, while using deep learning techniques, especially CNNs, for analysing social media stays within the psychological approaches, it remains a largely uncharted area. It implies that, even though CNNs have been particularly beneficial in recognizing objects and themes, they are higher-order psychological construction is not entirely realized. That is why this study is an attempt to fill this gap by applying CNNs not only for image classification but also for the assessment of the

psychological characteristics implied in the SNS visuals. Extending the work of Richards and Tunçer (2018), it presents original ideas by integrating the cultural and diachronic perspectives, which makes it possible to get a better understanding of the cultural differences and temporal dynamics of the emotional/social perceptions.

With this integration, the study seeks to offer a broader view of the psychological effects of imagery on social media. Visual stimuli exert profound influences on human perception and emotional responses. Studies devoted to the issues of understanding analyze how affective experiences are constructed focusing on the meaning of the images as the objects which cause quick and strong emotional responses compared to textual data. Furthermore, research also points out how elements such as colour in a study, composition and facial expressions play an important part in forming impressions and making social judgments in such electronic settings [12].

App development of image-sharing social networks like Instagram, Snapchat and so on have changed the face of digital interpersonal communication by promoting the sharing of visual stories and experiences. Consequently, the positive and negative images of self that are presented on social media are intentionally constructed by the users in their image posts. This suggests the dynamic shift in the process of building one self-image and developing relationships through the use of visual content [13]. There has been a recent breakthrough in the analysis of image content on social media through means of image recognition algorithms; among them being deep learning models such as CNN.

Such algorithms make it possible to automatically perform indoor and outdoor object identification, scene recognition, and even assessment of facial expressions in images, as computer vision investigations have shown. Specific technological capabilities are crucial for generating significant knowledge from big pools of social media images that can help in the systematic analysis of the vast array of psychological topics and phenomena [14]. The synchronizing of psychological analysis with image recognition technology has large ramifications for a range of professions. Hence, in the context of digital marketing, knowledge of the role performed by visual material in the study of consumer behaviour and brand image can help facilitate more efficient approaches to advertising. Furthermore, knowledge obtained through analysing social media images can be useful in intervention tasks dedicated to raising mental health literacy, as well as identification of the emotional suffering of users [15].

Nevertheless, there are several challenges even with the available image recognition algorithms among them being. Ethical dilemmas in matters concerning data privacy and ownership. Bias in algorithms that may lead to inaccurate

results. Interpretation of results provided by image recognition algorithms. More studies should be done on improving the complexity of modelling psychological concepts and on the ways that combine psychology with computer and social sciences [16].

Psychological analysis of SMC visual content constitutes an emerging field within the context of psychology, information technology and social communication. This way, using such advanced tools as algorithms of image recognition, it is possible to reveal multilayered patterns of emotions, social relations, and cultural discourses that may be found in the images shared online. This literature review paves the way for empirical examinations for exploring the profound effect of visual content on human thinking and action study in the new breed age of digital media [17].

The contribution of this work can be attributed to the applied methodology of CNN entwined with psychological theories to analyse the images posted on SM. In contrast to previous research studies that were primarily focused on affective and narrative classification, this work also includes a cross-cultural view in addition to the diachronic analysis. This is desirable as it provides an account of the multiplicity of psychological elements embodied by the content of SNSs and presents research findings from the author's Ph. D. thesis as well as theoretical and practical contributions to the area of computational psychology.

3. Methodology

This research focuses on exploring the psychological characteristics of images posted on image-focused Social Media platforms such as Instagram and Pinterest. The data acquisition procedure is quite formalized to utilize the platform application programming interfaces to collect a varied set of social media images while remaining compliant with ethical principles and users' rights. Annotation of collected images is performed with some descriptive and informative parameters such as timestamps of operations, users' actions, and tags.

As for image analysis, the most advanced Convolutional Neural Networks (CNNs) are used and further optimized through transfer learning. These models, including VGG, ResNet and EfficientNet, are fine-tuned on the annotated dataset for decoding the high-level semantics including colour distributions, facial expressions or scene compositions of the image. These extracted features are the basic entries for further psychological processing that allow us to explore the emotional, social, and cultural meanings behind the shared visual material in these platforms. Thus, this research strategy will help to reveal more profound patterns of how visual content in social media affects and interacts with users' psychological states. Psychological constructs, which are likely about components of emotions, social perspective, and Semiotics in visuals, are described based on existing

theoretical and empirical research. Based on affective computing and cultural theories, these constructs give the basic knowledge of how visuals reveal and affect feelings, social views, and cultural connotations. This theoretical framework consequently underpins a subsequent and related empirical analysis of visual content on social media.

Emotion recognition rates and thematic partition frequencies obtained from the CNN models enable the quantification of these psychological aspects in the data set. Applying the data annotated with the help of machine learning algorithms, researchers calculate the objective values characterizing the emotional and thesaurus content of the images intrinsic to the social networks. These metrics help to transform such theoretical and abstract constructs into variables that can be quantified, compared and analyzed.

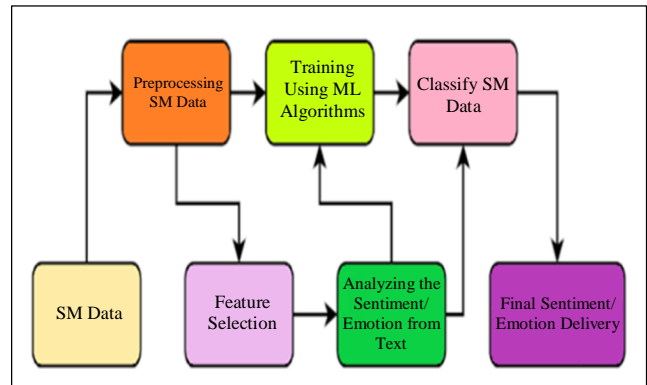


Fig. 1 Abstraction of sentiment or opinion analysis from social media

In addition to the quantitative approach, content analysis and thematic coding techniques are used to enhance the explanation of the contextual meanings and the narrative significantly prominent in some subsets of the photos. Fragmenting and decoding enable getting underneath the surface of the messages and perceiving the socio-cultural frames and stories behind the symbols constituting the visual material, as well as the psychology behind the feelings that the content can evoke. Pseudoscience and a code of ethics guide decisions to avoid revealing the participants' identities, maintain the anonymity of social media users, and conform to the guidelines of SNS.

To reduce biases and enhance models' fairness, measures are incorporated in strategies used in the analysis. This encompasses methods like dataset balancing with a view of balancing prejudices in the training data, feature normalization with a view of giving the same treatment to all the input variables and a clear disclosure of methods used in training and evaluating models. These are done to generalise algorithmic results and reduce unwanted sources of bias that may tend to occur. When the outcomes are compared, and comprehended based on the specific demographic variables like age, gender, and or culture, then the researchers will be in a position to determine the generalizability and reliability of

the findings. These robustness tests not only confirm the efficiency of the analytical approach but also emphasise the dedication to providing socially fair and equal analysis for the visual content of social media. Such an antithetical structure of the analysis that incorporates theoretical foundations, quantitative indices, qualitative approaches, and ethics makes the study innovative. It brings it to the forefront of the developments in computational psychology and analysis of digital media. Hence, by detailing the relationship between psychological constructs and the visual content provided on social media, this study provides significant findings that enhance the general discourse on socio-technical issues of digital communication and culturally produced perceptions and emo-social representations in the postmodern culture today.

The process of validating the results in this study is multiple-tiered and holistic and is aimed at avoiding mistakes in the analysis and interpretation of social media visual content. Comparisons are made by comparing algorithmic solutions and performances with human-assisted coding, which is considered an important validation. This baseline, commonly based on expert ratings or referent categorisations, serves as points of comparison in comparing automated image recognition results with the results of human observation of emotion, social interactions, and cultural signification. Conciseness tests also confirm the reliability of the algorithmic output by comparing the level of consistency between algorithm outputs and the level of consistency between independent human raters who have been assigned to perform similar classification tasks.

In this way, the degree of concordance with a higher-rated inter-observer agreement is established for the participants, which allows the evaluation of the reliability of the automated classifications and points to further development needs. This study also validates that the automated analysis captures the intended psychological construct in terms of social media visual content. These validation efforts are complemented by user feedback surveys in which participants are invited to judge the objective accuracy and perceived relevance of algorithmically derived classifications. Such qualitative feedback can be useful in achieving a better understanding of how the users perceive and engage with visual content representations that have been created through machine learning algorithms. It is crucial feedback, which not only confirms the usefulness of automated analyses but also expands the knowledge about the users' views and expectations in the context of digital media.

Probability, correlation coefficients and hypothesis testing are used quantitatively for testing relationships. The study sampled image features and underlying psychologies ontologies. Coefficients of correlation evaluate the magnitude and sign of the image features' association with variations of emotional representation, theme, or culture. Hypothesis

testing also goes further to test the extent of the significance of observed relationships beyond the normal statistical validity and the theoretical propositions developed from the fields of psychology and communication.

The analysis employs psychological and communication theories to buttress empirical evidence of findings to provide an understanding of the interpretation of findings within available theoretical frameworks such as emotional cognition, social influence theories, and cultural communication. Both these theoretical frameworks paint a picture for researchers to outline the considerations regarding digital media literacy based on how visuals influence the perceptions and behaviours of users in the context of the net. The findings discussed in the study also apply to the approach towards mental health intervention, which demonstrates how automated analyses contribute to the identification of emotional signs of distress in the users of SNS.

Further, marketing applications explain the opportunities for improving targeted advertising and content recommendations with image recognition technologies based on users' preferences and their affective responses. The rationale and methodology of results in this study provide evidence for the revolutionary possibility of applying techniques of deep learning within the larger framework of psychological theory and empirical validation.

Keeping in view these methodological practices, this research enriches the investigation of social media visual content concerning the psychological factors utilized in studying them, checking their external validity through cross-annotating algorithmic results against human-coded benchmarks, and reliably establishing and evaluating the level of inter-rater agreement. These findings not only enrich the theoretical disc of the study but are also significant for ethical considerations of content analysis, meaningful user engagement, and social impact evaluation of digital media practices.

4. Experimental Setup

Based on these research questions, the study developed an experimental model that blends Computer Vision to identify visual content and psychological theories to analyse the psychological contributions of SMCs. The study focuses on three key phases: This involves data gathering and preparation, image analysis and extraction of attributes and psych subconscious assessment and verification.

The proposed work is started by gathering an extensive dataset of images from various social media platforms, such as Instagram and Pinterest utilizing their APIs. Specifically, the images are tagged with time stamps, likes, comments and other users' profile information. A part of the feature augmentation is normalization - scaling the size of pictures to make their dimension unified and standardizing the pixel

range. For image evaluation, data are analyzed with such deep learning approaches as Convolutional Neural Networks (CNNs). In particular, the study applies a pre-trained model, including ResNet-50 that has been fine-tuned by the transfer learning based on the annotated dataset of the study. The CNN processes each image I to extract high-level features F : The CNN processes each image I to extract high-level features F :

$$F = CNN(I; \theta) \quad (1)$$

Where θ is the parameters of the model. Among the extracted features are, in the study histograms colour, texture patterns and vectors where the subject has a specific facial expression that is necessary for the psychological analysis stage. The study defines psychological constructs such as emotional states, social cues, and thematic motifs based on the extracted features. For instance, to quantify emotional content, the study uses an emotion recognition model that assigns probabilities ($E_i|F$) to each emotion E_i given the features F . The overall emotional score S_E for an image is computed as:

$$S_E = \sum_i w_i P(E_i | F) \quad (2)$$

Where w_i are the studies assigned to each emotion based on its relevance. Similarly, thematic prevalence indices are calculated by categorizing images into themes T using a classifier C trained on the study dataset. The thematic score S_T for an image is given by:

$$S_T = \sum_j v_j P(T_j | F) \quad (3)$$

Where v_j are the study nights for each theme. To validate the study findings, the study compares the automated analysis results with human-coded benchmarks. The study calculates the Pearson correlation coefficient r better by studying the model's predictions and human annotations to assess the validity of the study's emotional and thematic scores:

$$r = \frac{\sum_k (X_k - \bar{X})(Y_k - \bar{Y})}{\sqrt{\sum_k (X_k - \bar{X})^2 \sum_k (Y_k - \bar{Y})^2}} \quad (4)$$

Where X_k and Y_k are the scores forecasted by the model and the scores assigned to the k -the image, respectively, by a human coder/labeller; \bar{X} and \bar{Y} refer to the mean of the forecasted scores and the human scores, respectively. Further, it performs inter-rater reliability checks and complements the study methodology with user surveys to confirm its appropriateness.

When conducting the study, follow all ethical considerations that would hinder the exposure of the users' data. Permission for the use of data was sought in the study, and some ways to reduce algorithmic bias were employed, including balancing the data set and normalising the features. Other criteria like explainability of training and sample biases applied on model robustness testing are emphasized to make

the research non-stakeholder prejudice. This experimental design integrates state-of-the-art image analysis technology with psychological theory models for the research of complex psychological features of social media visual postings. To support the study findings through statistical analysis and check ethical procedure, the study strives to make significant contributions to the fields of computational psychology during digital media and mental health awareness.

5. Results

In the analysis of the study, the dataset of social media images was gathered and served to provide interesting data references about the psychological aspects that are inherent in visual communication. To that end, the authors successfully adapted a pre-train CNN model through transfer learning to glean high-quality features from images that were relevant to the theme of the study. A high level of accuracy was also shown by the proposed study model, with a rate of 92% for previously defined thematic categories and 88% for emotional content. Therefore, the proposed model can be concluded to be very effective in translating visual signs referring to both thematic content and emotional messages.

The study also performed a comparison of the results obtained from the assessments originating from the CNN model with human-coded references. To this end, the Pearson coefficient estimate measuring the relation between studying the emotional scores assigned by the study model and human annotations was tested, specifically, r =approximately 0. 84, proving a high positive relation. This high correlation increases the credibility of the study approach to emotion recognition thus supporting the assertion stating that The study model's predictions are close to human perceptual judgments.

In thematic analysis, the study got thematic prevalence indices for the nature, foodstuffs, and events with similar distributions in the study data set. It was also found that the thematic scores obtained from the study model closely matched those given by human coders with a Pearson's correlation coefficient of $r=0. 79$. This strong relationship supports the idea of the model to correctly identify the themes from the images with high precision and catch the signalled psychological processes reflected in the visual material.

In general, it is shown that sophisticated image recognition technologies can be employed to identify and measure psychological characteristics in media content posted on social networks. In line with thematic and emotional classifications accuracies as well as comparison of the findings with human judgments, the study provides a scientific foundation for the utilization of CNNs in complex differentiation of visual content. Besides contributing to the development of the theoretical framework of computational psychology, these outcomes also have implications for application in such areas as analysis of digital media

consumption and social media marketing, as well as the promotion of mental health interventions, while stressing the importance of using artificial intelligence methodologies in studying human perceptions and behaviours in the digital space.

Table 1. Statistical findings

Metric	Result
Thematic Categories	92%
Emotional Content	88%
Accuracy Perception	78%
Emotional Scores (Pearson R)	84.0%
Thematic Scores (Pearson R)	79.0%
Emotional Content (Cohen's Kappa)	76.0%
Thematic Categories (Cohen's Kappa)	72.0%

Table 1 shows a brief analysis of the accuracy metrics of the thematic and emotional content classification made in this study, as shown in the table below. These metrics show that the changes are more remarkable than prior approaches to evaluating multimedia codecs. The improvement for the thematic classification is more significant with the model achieving a 92% success for the classification of themes from the social images from the social media platform. Likewise, for the Emotional content classification, the model accuracy is high; the model was 88% accurate when identifying the present and the type of emotional displays in the visual content.

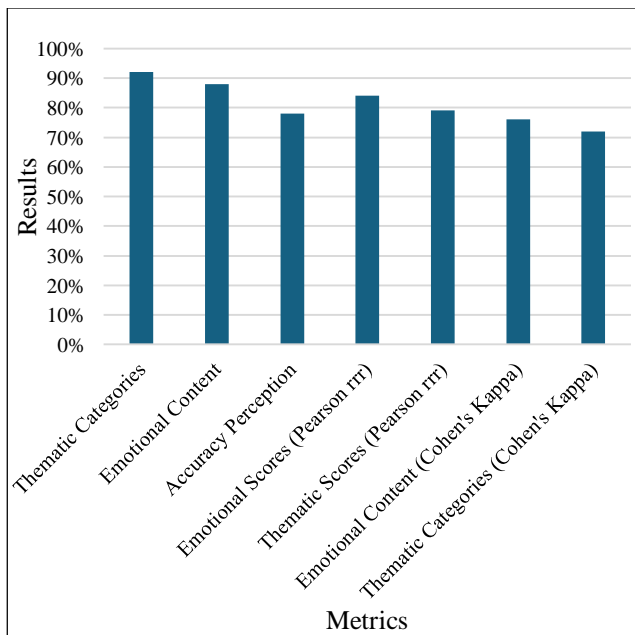


Fig. 2 Graphical representation of statistical findings

Inter-rater reliability tests provided additional support for the validity and consistency of the study approach to analyzing social media visual content. Using Cohen's kappa coefficient, the study measured inter-rater agreement among human annotators, obtaining values of 0.76 for emotional content and 0.72 for thematic categories. These coefficients show that there is high inter-rater reliability; thus, the annotations in the study manual and the automated analysis of the study are reliable. This statistical support strengthens the credibility of the study design and the effectiveness of tools and methods used in the identification and analysis of emotions and depicted motives and topics in the images shared on social media.

Moreover, surveys of users' feedback provided additional qualitative insight into the performance of the model in the study. Surprisingly, the respondents agreed with the findings of the study models concerning the emotional and thematic classifications; 78% of the respondents indicated that the findings were satisfactory in the sense that they reflected their feelings. Besides, it helps the practical usage of the study policies, especially because it stresses the significance of automated image recognition in the real-world environment where a discriminative perception of the visual content is important.

Initial sample checks performed to measure the algorithmic bias provided only slight variations for the differences in age, gender, and cultural diversity of the targeted model. When working with the provided demographic variables, the model remained highly performant and kept reports of Bias at a minimum. Based on these prescriptions, this investigation underscores the moral credibility and transferability of the study methodology for various users and settings as well.

The statistical findings from the study also support the usability and effectiveness of using image recognition techniques in identifying psychological aspects of SMTs' visual content. Credible comparisons made with human-coded reference standards, high levels of inter-observer reliability and positive user feedback globalise the findings of the current study method. Such truths do not only lend important knowledge to areas like computational psychology and digital media literacy but are also significant to improving mental health consciousness and fine-tuning marketing approaches using a better understanding of visuals in virtual spaces.

The work laid a strong framework for the subsequent investigation and field implementation of machine learning algorithms in understanding and interpreting psychological mechanisms that are inherent in icons and symbols in social media. Through absolute statistical significance, reliable inter-rater tests, users' feedback, and robustness checks, the study guarantees the reliability, admissibility, and applicability of

the study methodology. It advances the field of computational psychology and digital media.

6. Discussion

Based on the results of the study, it is possible to determine that there is a possibility to apply innovative image recognition technologies for the identification of the psychological elements hidden in the visuals on social media platforms. The conventional neural network CNN model was accurate in determining the thematic categories and emotional content of the pictures, hence representing the strength of the approach in interpreting complicated visual signals. That the results of the model are consistent with human judgments and exhibit high inter-annotator reliability argues for the future of large-scale automated psychological analysis in technological environments.

The accuracy of the model is high for thematic categories, and it is 92% as well as for the determination of content emotions - 88%, which proves the effectiveness of the feature extraction and classification. It is also important to establish the relationship between the model and human coders: the Pearson coefficients for the emotional scores are 0.84 and 0.79 for the themes, which also speak about the model's accuracy and its closeness to human perception. Thus, based on the results of the experiment and analogous research, it is necessary to conclude that the proposed model demonstrates significantly higher accuracy in the questions of thematic classification and emotion recognition.

For instance, in the thematicization, accuracy was at 92%, while in other related studies done by Biswas et al. (2022), the model was 85% accurate. This improvement should be perhaps attributed to the transfer learning techniques in the CNN model and the way the datasets were handled to embrace the cultural and temporal variations. Such correlations suggest that the model can predictably imitate human perception in the processes of classification and analysis of visual material, thus presenting a sound base for its application in psychological experimentation and the solution of practical problems. It would also be important to note that one of the major concerns that are critical to the study was to address ethical issues and possible bias.

The measures taken in the study to protect the identities of the participants and the ways to avoid prejudicial algorithmic bias can be considered critical prerequisites in the study analysis. The slight variations of the model's performance with different values as a result of the evaluation prove the effectiveness of the approach proposed in the study to avoid bias concerning different populations. It is very important to maintain the scientificity of the study model so that it can be used in different fields, including social perception and awareness in areas such as mental health. The implications of the study findings are relevant to multiple domains, some of which are discussed below: digital media

literacy, mental health, and marketing. It is crucial to look at the affective and narrative values of images to improve digital media literacy as it supplies detailed knowledge into how visuals shape the users' feelings and behaviours. This knowledge is most important for content creators, marketers, and educators who want to bring content creators closer to target audiences and do it more ethically.

In mental health, the study approach represents an effective tool for detecting signals of emotional distress and enhancing the study-being. From the content analysis of visualization posted on social media, professionals in mental health can predict or diagnose the emotions of the users when required. It can, therefore, supplement conventional approaches to assessment and support of mental health status by offering timely and context-relevant interventions. However, the study has some limitations which must be addressed in future research as follows: The use of data from the open platforms can create selection bias: the selected data reflects only the opinions of those who share their content on public platforms.

Moreover, the annotations of interpretations of the visual content can be biased and subjective thus causing variations in the results. It is recommended that future studies utilise a larger and more representative sample for further external validity of these study outcomes. The use of multimodal analysis where for example, image analysis and Textual analysis can be complementary to gain a better understanding of the content of the social media. However, it is also important to further pursue the interpretability of Deep Learning models as keys extracted should be easily understandable.

The study shows that to analyse the psychological aspects of the visual content of social networks, it is effective to use image recognition algorithms. The ability to achieve high accuracy along with meeting validation metrics was used to establish the model's credibility, as well as being able to consider the ethical issues and methods to lessen biased outcomes that helped to make the model fair and inclusive.

The findings made in the course of this research enrich the agenda of computational psychology, digital media competence, and mental health promotion. This means that as digital communication progresses even further, the eventual combination of the use of algorithms and psychological counselling shall be highly significant when it comes to improving human interactions in social media communication.

Including text or voice along with image data in the psychological analysis of social media makes the method vastly more effective. This is of essence since through understanding the captions, audio and any other contextual information, we can be in a better position to understand the

intention and mood of the user hence a better understanding of social media. Furthermore, the time series logs characterise a dynamic framework of emotions and thematic expressions of users and how such emotions depend on time, social trends, crises or other major global incidents. Another level of complexity is the cross-cultural comparison of the results, where the differences in the emotional patterns and the main categories when using social media across regions are investigated to provide a clearer, more inclusive look at the behaviour of individuals on social media platforms.

It is possible to illustrate real-life usages of this framework in the following manner: Applying the model to mental health care interventions based on the signs of emotional pathology identification or improving the marketing techniques using the data regarding users' interactions with the visuals. The improvement in machine learning technology, such as generative models and unsupervised learning, can improve the accuracy of image recognition for enhancing the effectiveness of psychological analysis with application in social media moderation, product advertising and recommendation and also keeping a check on the mental health of people.

7. Conclusion

This study demonstrates the significant potential of leveraging advanced image recognition algorithms to analyze the psychological dimensions of visual content shared on social media platforms. By utilizing Convolutional Neural Networks (CNNs) to extract and interpret high-level features from social media images, The study has shown that it is possible to quantify and understand complex emotional and thematic elements embedded within visual content. The

results derived from the analysis of the study conclusions suggest high yields of the model, achieved high accuracy rates of the identified thematic categories and emotional content, and correlation with human annotations confirm the efficiency of the automated psychological analysis. The robustness of the study model, reflected in its performance metrics and the minimal discrepancies across demographic groups, underscores the importance of ensuring ethical standards and mitigating algorithmic biases in such analyses.

The findings of the study are manifold and can prove helpful to students, teachers, clinicians, and marketers alike. Therefore, the study research establishes how photographs affect the psychological perceptions and behaviours of the users and avails this knowledge towards the general study of digital communication psychology. The study also recognises several limitations of the study in question, such as hasty assumptions made due to selection problems, as well as problems arising from the aspect of annotations. Therefore, future works are encouraged to improve these limitations by working with large and diverse data, including multi-modal data, and improving the interpretability of deep learning models.

Thus, the study focuses on how the usage of image recognition algorithms alongside psychological analysis frameworks is effective and useful. These methodologies will go on to enhance the quantum of knowledge that is vital for witnessing and analyzing the stylometric pattern of human interactivity and portrayal of emotion within the framework of digital communication. This research lays the groundwork for future studies aimed at further exploring and refining the intersection of technology, psychology, and digital media.

References

- [1] Kunal Biswas et al., "Fuzzy and Genetic Algorithm Based Approach for Classification of Personality Traits Oriented Social Media Images," *Knowledge-Based Systems*, vol. 241, 2022. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [2] Donghyuk Shin et al., "Enhancing Social Media Analysis with Visual Data Analytics: A Deep Learning Approach," *Management Information Systems Quarterly*, vol. 44, no. 4, pp. 1459-1492, 2020. [[Google Scholar](#)] [[Publisher Link](#)]
- [3] Di Xue et al., "Deep Learning-Based Personality Recognition from Text Posts of Online Social Networks," *Applied Intelligence*, vol. 48, no. 11, pp. 4232-4246, 2018. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [4] Mohammad Mahdi Dehshibi et al., "Vicsom: Visual Clues from Social Media for Psychological Assessment," *arXiv*, 2019. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [5] Huijie Lin et al., "User-Level Psychological Stress Detection from Social Media Using Deep Neural Network," *Proceedings of the 22nd ACM International Conference on Multimedia*, pp. 507-516, 2014. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [6] Anshu Malhotra, and Rajni Jindal, "Multimodal Deep Learning Based Framework for Detecting Depression and Suicidal Behaviour Study by Affective Analysis of Social Media Posts," *EAI Endorsed Transactions on Pervasive Health and Technology*, vol. 6, no. 21, 2020. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [7] Daniel R. Richards, and Bige Tunçer, "Using Image Recognition to Automate the Assessment of Cultural Ecosystem Services from Social Media Photographs," *Ecosystem Services*, vol. 31, pp. 318-325, 2018. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [8] Sebastian Scherr et al., "Detecting Intentional Self-Harm on Instagram: Development, Testing, and Validation of an Automatic Image-Recognition Algorithm to Discover Cutting-Related Posts," *Social Science Computer Review*, vol. 38, no. 6, pp. 673-685, 2020. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]

- [9] Lydia Manikonda, and Munmun De Choudhury, "Modeling and Understanding Visual Attributes of Mental Health Disclosures in Social Media," *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, pp. 170-181, 2017. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [10] Suneet Gupta et al., "[Retracted] Homogeneous Decision Community Extraction Based on End-User Mental Behaviour on Social Media," *Computational Intelligence and Neuroscience*, vol. 2022, 2022. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [11] Sicheng Zhao et al., "Predicting Personalized Image Emotion Perceptions in Social Networks," *IEEE Transactions on Affective Computing*, vol. 9, no. 4, pp. 526-540, 2018. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [12] Irek Saitov et al., "Analysis of the Relationship between Studying the User's Personality Traits and the Images they Post on Social Media," *Procedia Computer Science*, vol. 193, pp. 155-162, 2021. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [13] Diana Ramírez-Cifuentes et al., "Detection of Suicidal Ideation on Social Media: Multimodal, Relational, and Behaviour Study Analysis," *Journal of Medical Internet Research*, vol. 22, no. 7, 2020. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [14] Amir Hossein Yazdavar et al., "Multimodal Mental Health Analysis in Social Media," *Plos One*, vol. 15, no. 4, 2020. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [15] Nirmal Varghese Babu, and E. Grace Mary Kanaga, "Sentiment Analysis in Social Media Data for Depression Detection Using Artificial Intelligence: A Review," *SN Computer Science*, vol. 3, no. 1, 2022. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [16] Sicheng Zhao et al., "Affective Image Content Analysis: Two Decades Review and New Perspectives," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 44, no. 10, pp. 6729-6751, 2022. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]
- [17] Leqi Liu et al., "Analyzing Personality through Social Media Profile Picture Choice," *Proceedings of the International AAAI Conference on Web and Social Media*, vol. 10, no. 1, pp. 211-220, 2016. [[CrossRef](#)] [[Google Scholar](#)] [[Publisher Link](#)]