



Depression Detection using Facial Features with Machine Learning Techniques: An Overview

Sujata D. Sumbare¹, Sonali B. Jadhav², Pandurang R. Shinde³, Prof. Monika Rokade⁴

UG Students, Department of Computer Engineering, Sharadchandra Pawar college of Engineering, Otur, Pune, India^{1,2,3}

Assistant Professor, Department of Computer Engineering, Sharadchandra Pawar college of Engineering, Otur, Pune, India⁴

ABSTRACT: Depression is the most prevalent mood disorder worldwide having a significant impact on wellbeing and functionality, and important personal, family and societal effects. The early and accurate detection of signs related to depression could have many benefits for both clinicians and affected individuals. The present work aimed at developing and clinically testing a methodology able to detect visual signs of depression and support clinician decisions. Automatic depression assessment based on visual cues is a rapidly growing research domain. The present exhaustive review of existing approaches as reported in over sixty publications during the last ten years focuses on image processing and machine learning algorithms. Visual manifestations of depression, various procedures used for data collection, and existing datasets are summarized. The review outlines methods and algorithms for visual feature extraction, dimensionality reduction, decision methods for classification and regression approaches, as well as different fusion strategies. A quantitative meta-analysis of reported results, relying on performance metrics robust to chance, is included, identifying general trends and key unresolved issues to be considered in future studies of automatic depression assessment utilizing visual cues alone or in combination with visual cues. The proposed work also carried out to predict the depression level according to current input of face images using Machine learning as well as Google API.

KEYWORDS : Depression detection, Image processing, Machine Learning

I.INTRODUCTION

In many situations humans who are depressed are totally ignorant of their disturbed mental condition. They are unable to identify the cause of constant unhappiness in them and eventually such students fall into a state of mind where they start having suicidal tendencies. In some cases students do know that they are suffering from depression, but they are hesitant to seek any kind of help from anyone mainly due to the wrongly conceived notion of 'humiliation' associated with depression. It is better to identify the signs of depression at initial stages of depression. Depression if identified in the initial stages, just a simple one hour talk with a counselor may be of immense help for the student. This may totally change the negative state of mind of that student into a positive one. Such a student can be given good counseling of how to deal with mental stress and can be guided to follow the right path to success. The most important form of non-verbal communications is facial expressions of a person. Many studies have been done for finding out the facial expressions that are related to depression.

Nowadays people share lot of data on social media in the form of images and videos - be it personal, daily scenes, or their opinions in the form of memes. Internet is a huge platform for communication and for sharing information globally and instantaneously, thus providing users with a good collection of people's perspectives and their sentiments regarding to a huge spectrum of topics [1]. Several posts on social media rarely contain any textual caption, but are rather flooded with images. Thus primarily contributing to a variety of opinions and emotions being conveyed quite implicitly merely through visual content.

One can express sentiments through text, image or videos. Although several works in past have employed techniques to decipher sentiments from user posts, especially on social media [2,3], image sentiment analysis is yet to be explored. In the current scenario there is increasing use of social media for expressing sentiments, hence it is an important research area. Current developments aim at improving the accuracy. There are many algorithms and techniques proposed for image sentiment analysis. These are mainly classified into lexicon based algorithms and machine learning based algorithms. Lexicon based algorithms includes semantic based as well as statistical techniques, while machine learning based algorithms includes neural network, bayesian network, support vector machine, naïve bayes, and maximum entropy.



II.OVERVIEW OF MACHINE LEARNING

It is the sub-branch of machine learning that makes the machines smart enough so the machines are capable to learn from past experience and understand the real world concepts. In the process, machines gain knowledge from the real world experience and improve on decision-making[4].

In Machine Learning, “deep” indicates the number of hidden layers in the Neural Networks. Machine Learning models are trained by using any large set of labeled data. Machine learning techniques are used for image sentiment analysis and providing optimum results. Machine learning plays a massive role for image sentiment analysis for providing various techniques like Convolutional Neural Network, Machine Neural Network, Region Neural Network and Machine Belief Network to get optimum results[4]. We have purpose to describe the application of Machine learning algorithm like convolutional neural network is used to visual media for determining its sentiments accurately. The major problem occur in situations where we have found incompatible emotions which is express through image and text, and thus it fulfill the requirement[5].

Rest of the paper is organized as follows. Section 2 gives brief overview of latest research, section 3 explains proposed work, system overview, datasets description section 4 observations Section 5 research contribution Section 6 application of image object detection Section 7 concludes the paper section 8 future work.

III.BACKGROUND

Recently, a whopping number of people worldwide are increasingly using images and (video/audio) recordings to express their feelings freely on social media. Recognition of visual matter emotions on such a large scale can help improve a client's assessment of opportunities or topics, for example, in image tweets, so the features expected to be removed from visual matter are printed emotion are related to the investigation. The assumptions models that help this are bounteous: incredible dazzling images frequently contain rich information contains that help view effectively interface with those images. With the proliferation of internet based life an expanding number of individuals utilize images to express their feelings, opinion, and fatigue via web-based networking media stages like Flickr and Instagram. Programmed induction of the sentiment and estimation data from such consistently developing, huge measures of client produced images is of expanding significance to numerous applications in medicinal services, human sciences, correspondence studies, advertising, and many sub-territories inside software engineering, for example, computer vision [1].

The Convolution Neural Network was used on a large dataset - ImageNet for classification of images. The parameters of previous trained layers are transferred to the sense prediction layer in order to produce the image representation using fine tuning specific to the field. Individuals share a great deal of substance via web-based networking media as images - be it individual, or ordinary scenes, or their sentiments portrayed as kid's shows or images. An important aspect in image sentiment algorithms is to break down the images (obtained from social media such as Flickr, Twitter, Facebook and so forth.)into individual objects from which sentiments are deciphered. This can be used for the further general estimation of individuals about state of mind too. Likewise it is valuable to comprehend the sentiment an image delineates to and consequently anticipate the class label. As a chunk of this task, it intends to give a sentiment based class to an image. Images conventionally fall under five classifications - love, happiness, sadness, violence and fear [1].

IV.LITERATURE SURVEY

Finger Reader: A Finger-Worn Assistive Augmentation Researchers in both academia and industry exhibited a keen interest in aiding people with VI to read printed text. The area of finger worn camera devices for interaction, not necessarily as assistive technology, is rapidly growing into a research agenda of its own, albeit without notable consumer products yet in availability[1].

Facial geometry and speech analysis for depression detection. Subsequently, feature selection was employed to reduce the dimensions of the feature vectors, through Principal Components Analysis (PCA), for both video and audio. A nearest neighbor classifier on the decision fusion of geometrical features in the gender independent mode, and audio based features in the gender based mode; single visual and audio decisions were combined with the OR binary operation.[2]

Discriminating clinical phases of recovery from major depressive disorder using the dynamics of facial expression. Our preliminary results indicate that supervised featureslearned from these video recordings can distinguish different phases of depressionand recovery. The overarching goal of this research is to develop more refinedmarkers of clinical response to



treatment for depression. Major depressive disorder(MDD) is common and associated with impaired function at work, at home, and inrelationships. Following resolution of this transitional phase, patients continue on a path of subjective improvement, culminating in stable treatment response or remission from depression[3].

Intelligent depression detection and support system: Statistical analysis, psychological review and design implication. As the initial step we conducted an extensive survey among120 participants, belonging to different academic departments, social class, age, and gender. The survey outcome is analyzed from a psychological viewpoint and finally some design implications on an automated system of depression detection and support system have been proposed [4].

Classroom Teaching Assessment Based on Student Emotions. Methodology includes the preprocessing phase in which face detection is performed, LBP encoding and mapping LBPs are done using Machine convolutional neural networks and finally emotion prediction [5].

V.PROBLEM STATEMENT

The proposed research to design and implement a system for depression level prediction using Machine learning, the visual features has extracted from users face to predict mood and predicts the scale of depression using the response of user for PHQ questionnaire.

System Overview

System can predict depression by analyzing text data. System can be evaluated synthesis as well as real time text data, which has been taken from any third party web application. System has training as well as testing phase for classification. System can classify text data using sentiment based on symbolic analysis like comment is happy, sad, excited, positive or negative etc. System uses Machine learning algorithm to detect offensive languages. Evaluate the system from the bases of accuracy and false ratio. System can specify data as containing the containing of offensive language or else it will be displayed at negative.

VI.CONCLUSION

A quantitative meta-analysis of reported results, relying on performance metrics robust to chance, is included, identifying general trends and key unresolved issues to be considered in future studies of automatic depression assessment utilizing visual cues alone or in combination with visual cues. The optimal performance of geometrical features in the gender independent mode can be attributed to that they do not carry gender based information as opposed to appearance based features. This pattern of performance is common among screening tools.

Our study explored the techniques of Machine learning in systems of classification, such as in conducting estimation checks, even on raw data collected directly from Flickr.Our explorations suggest that in-depth learning provides promising results with a presentation that is practically identical to some strategies, using carefully assembled highlights on the characterization task. Images have several applications in programmed labeling of images with sentimental sections in sequence, consequently classifying video groups with emotions category and automatically classifying video scenes into thrillers, comedy, romance, and more.

VII.FUTURE WORK

To extract various synthetic as well as some real time features and predict the depression scale using various machine learning and Machine learning algorithms.

REFERENCES

- 1 Girard, Jeffrey M., Jeffrey F. Cohn, Mohammad H. Mahoor, SeyedmohammadMavadati, and Dean P. Rosenwald. "Social risk and depression: Evidence from manual and automatic facial expression analysis." In Automatic Face and Gesture Recognition (FG), 10th IEEE International Conference and Workshops on, pp. 1-8. IEEE, 2013.
- 2 Alghowinem, Sharifa, Roland Goecke, Jeffrey F. Cohn, Michael Wagner, Gordon Parker, and Michael Break spear. "Cross-cultural detection of depression from nonverbal behaviour." In Automatic Face and Gesture Recognition (FG), 11th IEEE InternationalConference and Workshops on, vol. 1, pp. 1-8. IEEE, 2015.



- 3 Pampouchidou, A., O. Simantiraki, C-M.Vazakopoulou, C. Chatzaki, M. Padiaditis, A. Maridaki, K. Marias et al. "Facial geometry and speech analysis for depression detection." In Engineering in Medicine and Biology Society (EMBC), 39th Annual International Conference of the IEEE, pp. 1433-1436. IEEE, 2017.
- 4 Harati, Sahar, Andrea Crowell, Helen Mayberg, Jun Kong, and ShamimNemati."Discriminating clinical phases of recovery from major depressive disorder using the dynamics of facial expression." In Engineering in Medicine and Biology Society (EMBC), 38th Annual International Conference of the, pp. 2254- 2257. IEEE, 2016.
- 5 Cohn, Jeffrey F., Tomas Simon Kruez, Iain Matthews, Ying Yang, Minh Hoai Nguyen, MargaraTejera Padilla, Feng Zhou, and Fernando De la Torre."Detecting depression from facial actions and vocal prosody." In Affective Computing and Intelligent Interaction and Workshops. ACII 2009. 3rd International Conference on, pp. 1-7. IEEE, 2009.
- 6 Tasnim, Mashrura, RifatShahriyar, NowshinNahar, and Hossain Mahmud. "Intelligent depression detection and support system: Statistical analysis, psychological review and design implication." In e-Health Networking, Applications and Services (Healthcom), 18th International Conference on, pp. 1-6. IEEE, 2016.
- 7 Pampouchidou, Anastasia, Kostas Marias, ManolisTsiknakis, P. Simos, Fan Yang, and FabriceMeriaudeau."Designing a framework for assisting depression severity assessment from facial image analysis." In Signal and Image Processing Applications (ICSIPA), International Conference on, pp. 578-583. IEEE, 2015.
- 8 Maddage, Namunu C., RajindaSenaratne, Lu-Shih Alex Low, Margaret Lech, and NicholasAllen."Video-based detection of the clinical depression in adolescents." In Engineering in Medicine and Biology Society, (EMBC). Annual International Conference of the IEEE, pp.3723-3726. IEEE, 2009.
- 9 Meng, Hongying, Di Huang, Heng Wang, Hongyu Yang, Mohammed AI-Shuraifi, and Yunhong Wang. "Depression recognition based on dynamic facial and vocal expression features using partial least square regression." In Proceedings of the 3rd ACM international workshop on Audio/visual emotion challenge, pp. 21-30. ACM, 2013.
- 10 Katikalapudi, Raghavendra, SriramChellappan, Frances Montgomery, Donald Wunsch, and Karl Lutzen."Associating internet usage with depressive behavior among college students." IEEE Technology and Society Magazine 31, no. 4 : 73-80. 2012
- 11 Sahla, K. S., and T. Senthil Kumar. "Classroom Teaching Assessment Based on Student Emotions." In The International Symposium on Intelligent Systems Technologies and Applications, pp. 475-486. Springer International Publishing, 2016.
- 12 Athira, S., R. Manjusha, and LathaParameswaran."Scene Understanding in Images." In The International Symposium on Intelligent Systems Technologies and Applications, pp.261-271. Springer International Publishing, 2016.
13. Rokade Monika D, Dr. Yogesh Kumar Sharma "Deep and Machine Learning Approaches for Anomaly-Based Intrusion Detection of Imbalanced Network Traffic" IOSR Journal of Engineering, 2018.