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EFFICIENT FACIAL MASK DETECTION THROUGH MACHINE LEARNING APPROACHES – A STUDY

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Abstract:-- The prevalence of the global pandemic has been taking a large toll on human life. The covid-19 pandemic has been a large problem which is resulted in many deaths across the world. This is a highly problematic scenario as the disease is very infectious and infection rates have been increasing constant with no indication of reduction. One of the most useful technique for the reduction of the infection rates is the utilization of facial masks by individuals when they step out of the house to reduce the spread of the infection. Therefore it is mandated by governments across the world to wear a mask and the law enforcement agencies have been informed that the citizens follow this rule religiously. Therefore there is a need for an effective techniques that can automatically detect the mask on individual face to reduce the load on the law enforcement agencies. For this purpose a number of researchers have been effectively outlined in the survey paper to achieve our methodology for facial mass detection through the use of Convolutional Neural Networks and Decision Tree which will be elaborated in the upcoming editions of this research.

Keywords: Convolution Neural Network, Decision Tree, Deep Learning model.

I INTRODUCTION

The facial characteristics of a person and highly unique and are extremely discernible from another individual. This is why humans can effectively identify one individual from another just by looking at their facial features and characteristics. There is a special part in the brain of humans that is dedicated towards recognition of facial features and other characteristics to identify various individuals. Sometimes this part of the brain gets damaged due to trauma or other accidents which leads to that individual being unable to identify and collect different persons. But this unique feature is highly useful for communication as humans are highly social been that effectively communicate with one another through facial expressions.

The nonverbal communication is highly intuitive for a lot of individuals which have had a normal and social upbringing.

Due to humans being social animals this is a large part of their interaction in day to day life. Therefore special characteristics and features play an important role and differ significantly from one person to another.

This leads to the usage of facial features and other characteristics of the face to be utilized in various applications for the purpose of authentication and identification easily. The biometric analysis of these features leads to an effective and useful implementation that can be effective for a variety of applications.

In the past year there was a rise of a highly fatal and extremely infectious version of the influenza virus that has led to large scale destruction and loss of life across the world. This has been noticed as an effective solution for this problem is to wear masks and other protective covering on the face to prevent the spread of virus to a large degree. The effort to reduce the spread of this virus the governments

across the world have mandated the wearing of masks on the faces of individuals while stepping out of the house.

Therefore there is a need for an effective technique that can automatically detect the presence of a mask for an individual to reduce the efforts put in by the law enforcement agencies in scanning each and every person. The utilization of computer vision and other image processing techniques can come in handy for this approach to detect the presence of the mask on individuals face. But most of the current techniques that has been written just for this facial recognition approaches are unable to identify the facial features due to the presence of the Mask which leads them to failure. Therefore this survey article is dedicated towards the analysis of predominant techniques for facial recognition and facial mask recognition which has been instrumental in achieving our approach for the purpose of facial mask detection through the use of Convolutional Neural Networks and Decision Tree. This approach will be further elaborated in detail in the upcoming editions of this research article

This literature survey paper dedicates section 2 for analysis of past work as a literature survey, and finally, section 3 concludes the paper with traces of future enhancement.

II RELATED WORKS

Wei Bu states that there has been an increase in the threat of terrorist attacks in the recent years. These attacks are

highly debilitating and can lead to a lot of damage to property and large-scale loss of life [1]. This is a problematic occurrence and needs to be eliminated significantly to achieve peace. But most of these attacks are performed by criminals which hide their face with mask. Therefore the machine learning at image processing approach can come in handy for these approaches to detect and identify a masked face. Doctors in this approach has proposed the utilization of a convolutional neural network for the purpose of implementing deep learning for the purpose of masked face detection.

Gayatri Deore explains that the conventional approaches for video surveillance requires a security personnel to monitor the various surveillance cameras for a specified time. These are surveillance systems require a security personnel to be present in the monitoring room at all times to ensure your effective security off the premises [2]. This is a highly challenging approach which requires a lot of dedication by a particular person which could also lead to a lot of human errors. Report to improve this approach the authors is this research article proposed the utilization of an effective technique that detects a masked face in a video stream through the utilization of Viola Jones algorithm and projection histograms.

Naveen S expresses that it the recognition of facial features has been and upcoming and cutting edge technology that is highly useful for individual identification. This is due to the fact that facial features are highly unique and can be used for effective authentication purposes in an easy-to-use manner [3]. There are various authentication systems that utilize facial recognition for their approaches but are highly vulnerable to different attacks such as spoofing attacks. Therefore to ameliorate this affect the authors have proposed the utilization of binarized statistical image features and local binary patterns to achieve highly accurate facial authentication effectively.

Yasaman Heydarzadeh elaborate on the topic of facial recognition and its application that has been highly useful for various techniques such as surveillance, authentication and inspections. The approach for effective realization of facial feature detection has been one of the most demanding applications of image processing in the recent years [4]. The food to improve this approach has significantly improve the accuracy of the facial detection and the organs on the face such eyes, nose etc., the authors of proposed utilization of Viola algorithm that improves the performance by reduction of the false negatives and the false positives considerably.

R. Raghavendra introduces the application of facial identification and authentication for enabling effective biometric recognition for various implementations. The biometric approach has been significant in the recent years due to the fact that it offers a highly personalized and effective authentication system that cannot be easily spoofed or counteracted [5]. These approaches have been significant in providing increase security to various implementations by the implementation of biometric authentication which significantly improve the security of the entire process. The traditional approaches utilize different biometric implementations that are cater towards fingerprint or other features of the individual which are not as accurate. For this purpose the authors propose and attack detection technique for the facial recognition through the use of support vector machines and binarized statistical image features in 3D mask facial features attack.

Almabrok Essa discusses the feasibility of facial recognition in various pattern recognition and image processing implementations. Detection of facial features are highly useful for a variety of different implementations that can be effective and highly accurate. The different approaches in the current researches for the purpose of feature extraction official features utilizes holistic features based on subspace for the use of local appearance which is not as accurate for detection [6]. Therefore the authors present a novel approach that utilizes oriented directional features through the use of

modular histograms to achieve illumination independent facial recognition system accurately.

Mitsuhiro Fujita narrates that there has been an increase in the utilization of various surveillance systems across the world due to increasing security threats. Various approaches have been effectively implemented to reduce the incidences of security lapses in high security implementations such as the utilization of biometric authentication for improving the reliability of the approach. There have been a significant number of techniques that are utilized for facial recognition and character identification in various surveillance systems [7]. To improve this approaches to implement biometric authentication the authors have studied a variety of techniques for region of interest masks that are used for facial identification.

Toshnalal Meenpal explains that the paradigm of facial recognition has been implemented and utilized with great vigor in the recent years. This might be due to increased surveillance and affordability of image and video capturing technologies that has led to the feasibility of such approaches. Most of the conventional researches have been targeted towards achieving effective facial detection has a lot of drawbacks [8]. Therefore to address these issues and implement it a semantic segmentation approach for the facial mask detection has been proposed in this research paper. The authors have utilized gradient descent along with training weights to a fully convolutional network for achieving their semantic segmentation accurately.

M. S. Ejaz expresses that the facial recognition paradigm is an upcoming and highly useful implementation in the computer vision category in the recent years. This has been supplemented with the fact that there is increased interest in this area as it can improve various applications such as criminal investigations, voter verification, smart doors, airport passport checking, etc. Therefore to enhance the approach for the detection of facial mask on a person's face the authors have proposed the utilization of support vector machine and the implementation of cascaded multitask convolutional neural

network [9]. The approach has been implemented on a Google facenet to achieve highly promising results.

M. R. Bhuiyan elaborate on the various improvements in computer vision that have been implemented across the world due to increased amount of research on the image processing paradigm. These improvements in computer vision are highly useful and can be applied in a variety of applications to achieve significant improvements in the preexisting paradigms. One such application is the utilization of automatic detection of facial mask which has been mandated by various governments across the world due to the covid-19

pandemic [10]. The authors propose the utilization of yolo V3 algorithm to deploy deep learning characteristics for the classification of face mask to improve safety of the residents.

Theekapun Charoenpong states that the use of surveillance cameras has been increased exponentially across the world due to the increased affordability of the image capturing sensors. This has led to a lot of establishment owners as well as law enforcement agencies to implement surveillance to curb crime and reduce the instances of criminal activity [11]. Therefore the authors in this approach have realized and effective technique for the detected that identification of covered faces such as by masks or helmets through a single view point. The authors have achieved this approach through implementation of a multi skin color repository and skin ratio detection for highly accurate facial detection.

H. S. Lin expresses that in the recent years there has been a significant improvement in the computer vision approaches that have been useful for the purpose of various applications and implementations in the real world [12]. Therefore this improvement can be highly useful for the purpose of facial recognition and authentication through implementation of these approaches. But there have been instances where these approaches have been highly spoofed through the utilization of different techniques such as 3D mask and other techniques for fooling the system. Therefore the authors have proposed an efficient technique to reduce these spoofing attacks through the implementation of liveness detection by the usage of machine learning approaches such as convolutional neural networks.

III CONCLUSION AND FUTURE SCOPE

The methodology for an effective facial mask detection technique has been outlined in this survey article. Facial mask have been migratory since the emergence of the covid-19 pandemic which has led to large-scale loss of life across the world. The loss of life has been significant which has been highly problematic to keep the infection rate under control. These problems can be reduced through the use of facial mask which is mandatory to get out in the open by the governments across the entire globe. Therefore they need to be e a technique that can effectively e detect the presence of a mass on an individual automatically through the use of image processing approaches. But most of the approaches that have been outlined in the survey article are designated towards finding out the facial features which are obscured when a mass has been worn by the individual. Therefore an effective technique has reached the conclusion in this survey article which implements Convolutional Neural Networks and Decision Tree and will be elaborated further in the upcoming editions of this research article.

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