iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** IX **Month of publication:** September 2022

DOI: https://doi.org/10.22214/ijraset.2022.46847

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue IX Sep 2022- Available at www.ijraset.com

Technique of Face Spoof Detection using Neural Network

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Abstract: ***Face detection is one in every of the foremost relevent application of image processing and biometric system. Artificial neural networks (ANN) are utilized in the sphere of image processing and pattern recognition. For the recognition and detection of spoofed and non-spoofed images, face spoof approach was proposed. Earlier presented support vector machine classification model is used for the detection of spoofed or non-spoofed images. within the earlier research, SVM based approach was proposed to detect the face spoof. The face spoof detection approaches involves two stages. The initial stage includes feature extraction and second stage includes classification. The features are extracted using Eigen based system. The classification is performed through SVM classifier. within the proposed approach, the KNN classifier is used in place of SVM classifier for improving the accuracy of the face spoof discovery. The performance of the proposed algorithm and also the earlier algorithm is analyzed through some comparisons among them in terms of precision and execution time.***
Keywords: ANN, CNN, SVM, KNN, Face detection.

I. INTRODUCTION

A biological system developed by the composition of neurons may be intended as ANN. Artificial neural network (ANN) are computed by the research of an animal's central nervous system. Hence we can say that the ANN is a biological neural networks which create the constitution of animal brains, so it may be a good pattern with flexibility to machine learning. A neural network may be understand by a graph in which neurons is represented by na arcs in the nodes of graph. A neural network may be defined as an algorithm of machine learning by which we can understand about somebody neurons. Neurons are presents in the human brain. So the human brain sends some electrical and chemical signals. Synapses connect these neurons to the neurons of the rest body and allow to pass signals. This man made neural network is additionally reffered to as information science technique. It works just like the way that human brain process information, ANN used to classify information to predict out puts which is expected from a given input and to defined the cluster data. ANN is a computerised model to receive inputs and deliver outputs to activate the predefined function ANN use different layers of mathematical processing to make sense of the information. This networks has million of artificial neurons called units. The data will be receive from outside world by input layer's from the input unit the data passes through one and more hidden layers and this layers send the data to output unit where the network processed the data.

Face detection is one of the most widely used techniques which are mainly used for the security purpose. In these days, crimes are increasing at a very high rate, so these methods are very useful to keep a check on the people in various fields such as industries, banks hospitals and much more. These methods can also be used in a number of applications such as biometric study; content based coding of images and videos, surveillance and human computer interaction (HCI). Due to the presence of similarity among some faces because of their colour, age, gender, the execution of face detection technique proved very complex. The problems which occur during the execution of this method are image quality, background, expressions and the environmental changes. The technique of face scooping detection is mainly based on the facial characteristics in the light weighing physiological properties recognition. The false faces identifies as positive and negative false faces. Real faces having restricted variation are called positive faces while negative face involves dummy, spoof faces on images and much more. The documents are classified in three types: unsupervised, supervised and semi supervised methods. The automatic text classification has been analyzed extensively and demonstrates excessive success in this region. This classification approach involves machine learning algorithms. Support vector machine classification model is proposed for regression, classification and pattern identification of information. This classifier is identified as one of the best classifier proposed by the researchers due to of its extremely comprehensive outcomes without having any previous knowledge to add. The major aim of Naïve Bayes classifier is to allocate the objects to the class when the resources of objects are given to each class. The prospect objects can be explained just as vector of variables. This issue is generally identified as issue of supervised classification and several techniques are commenced for creating rules for them.

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Decision tree classifier is nonparametric supervised learning method make use of the classification and regression of information. A technique named face liveliness is used to tell apart the important faces from fake faces. This method mainly focuses on the identification of physiological signs of life. so as to live and analyze the build individuality, biometric characteristics are used . These characteristics may be divided into two parts, physical characteristics and activity characteristics. biometric systems could be a vital test. due to the variations, chances of fraud occur and this can be called spoofing attack. By unauthorized access within the system, the stolen data is destroyed and imitate by the intruder. The technique of face scooping detection is principally supported the facial characteristics within the light weighing physiological properties recognition

ANN is a deep learning method developed from human brain. Biological neural network groups has ANN algorithm supported brain function and accustomed model complication and forcast issue. ANN is just like a biological neural network but not identical. ANN algorithm use different layers of mathematical data and proceed it to make a sense of information. While the understand and non numeric data like image, text and speech are not accepted by CNN (convolutional neural networks) & RNN (recursive neural network). This text focuses only on ANN. The artificial neural networks has a millions of artificial neurons called units these units works together to process information. But the lack of literature survey give overview about the studies and research. Therefore this research contain general review of face detection system. A lot of models of ANN proposed by the researcher. The requirement of a challenging model of ANN to solve problem reliably is always remains. Some basic ANN models with full efficiency may be applies in the modules of face recognition system. A combination of geometric feature based method and ICA method is proposed for facial feature extraction. A model which have combination of many Artificial neural networks may be applied for face detection. This technique mainly used for security purpose.

Neural Network

In neural netwotk contain three layers input layer, hidden layer and output layer. The data will be received by input layers. This unit passed data through once more hidden layers and this unit send data to output unit where the network processed the data. ANN are used in the sector of image processing. The best application of image processing is face detection.

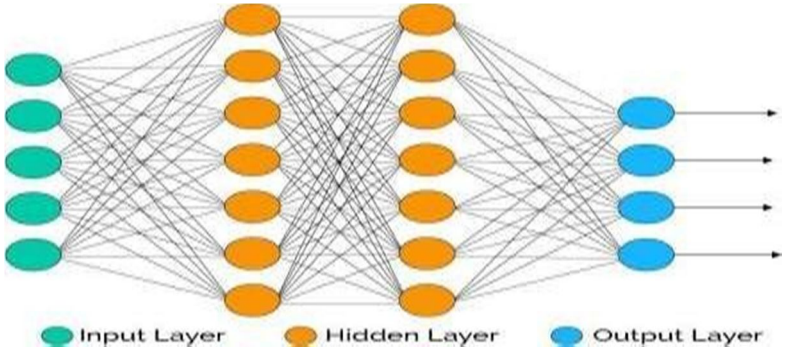


Figure1 Artificial Neural Network:

II. LITERATURE REVIEW

Zhenqi xu et.al[2015] proposed an anti-spoofing neural network architecture may be obtained by putting LSTM layer above a convolutional layer. By exploring this temporal structure from input sequence we can extract a feature locally and densely. The study of an CASIA dataset showa that the implementation of LSTM-CNN architecture is better than general CNN architecture and traditional hand crafted feature. This architecture works well for face anti spoofing by utilizing the LSTM (long short term memories) units. And it extracting a local and dense features through convolutional operations. This model shows an improvement over general CNN architecture (5.93% and 7.34%) and hand crafted features (5.93% to 10.0%) on (CASIA) dataset.

Litong feng et.al[2016] proposed an anti-spoofing approach to handle all type of spoofing attack in varying scenarios. A bottleneck feature fusion strategy can merge different liveness feature successfully. Bottleneck features are derived from convolutional neural network (CNN) to obtained a decisions at a higher level. The bottleneck feature are fused to give an input to the model, this fusion model gives a performance of 98.33% absolute sensitivity 99.49% absolute specificity 99.22% absolute overall accuracy.

Mr.kaustubh D.vishnu[2017] is state that the liveness test of face spoof detection is directly related to a biometric system. This system should pander to any or all or any styles of spoofing attacks, In this face and figure print is matched. In this method we used datasets to develop chimerical datasets. It is associated with five figure print image and three face data. These datasets divided into five pains of training and testing tests. A training set may check 40% fake matching, this collected data is related with neural network generators. This data is matched with the available datasets to detect face.

Shatish balaji R et.al[2019] presented a review to detect the colour texture of input image. The input image obeyed l*a*b colour space model. Some texture and distorted feature may be draw out from the image by using this model and this data is treated through VGG7 CNN model. It is noticed that the accuracy of real image is 88% while the spoofing accuracy observation is 95%. Thus the (VGG7 CNN) architecture produced good accuracy of predicting the real and spoof face in a picture. Under the surrounding of constant light condition. It can not predict the face properly under certain improper light condition. Face cropping is a picture is performed by using HOG. Thus we can say that by using VGG7 convolutional neural network model we can observe better result in comparision to others models like SVM logistic regression and KNN. Hence this system may produced the better results in face recognition used as a security purpose. Thos proposed system are often implemented in security the accounts and devices from spoof attack.

L Ashok Kumar et.al [2019] proposed a framework with convolutional neural networks to detect the spoofed face. The picture is set as an input to the CNN framework. Since we used the strategy of coaching the fake and real face dataset separately it is easy and efficient for the system to classify the image between real and pretend when an input image is given. the pliability of the neural layers is that the most reason for the upper performance in detecting the spoofed images. Face recognition is that the extensively used approach because of its uniqueness. we would like to make sure that only the live face images grant permission to access the confidential resources during a very genuine way. But hackers disrupt this method by duplicating the faces of genuine users by photo attacks, video replay attacks and 3-D attacks. Many mechanisms are devised to daunt these impostors. Hence, a way is projected that employs a neural network to uncover the spoofed faces. Own datasets of real and pretend images are created to teach the neural network. The two datasets are trained separately to resolve absolutely the result.

Dr.A.Usha Ruby et.al [2020] the pixel wise image classification represented (discussed here by combining binary cross entropy loss with CNN, which works like a auto encoder. This paper shows that the pixel wise classification technique may detect all time frequency (T-F) bin from all images and the CNN is used with binary mask. This mask detect all T-F bin as a pixel in multi label. It shows that by using binary cross entropy loss function with soft max classifier. We can obtain best result.

Balamurli K et.al[2021] proposed an approach of face spoof detection using VGG face architecture. This model is used to check an unauthorized person for security purpose. This face recognition system have its own importance and highly susceptible to photographs and also video spoof attack. During this approach the detected face is denoised then converted to YCbCr and CIELUV colour model, thus older face architecture for extraction of face embedding of every colour space. This method have 99.6% accuracy and 99.5% spoof detection. The support vector classifier (SVC) are ready to detect real and spoof faces with 99.6% accuracy. Thus the difference between real and spoof face in YCbCr and CIELUV colour space easily detected by using VGG face model.

Authors Names	Year	Description	Outcomes
Zhenqi xu	2015	This method proposed a deep neural network for face anti spoofing LSTM-CNN architecture performs better than general CNN architecture and traditional hand crafted feature.	This model shows an improvement 5.93% to 7.39% over CNN model and hand crafted feature improvement 5.93% to 10% on CASIA dataset.
Litong feng	2016	The anti spoofing approach combines liveness feature for security of face authentication.	Using the liveness detection an EER of 5.83% was achieved on CASIA-FASD database.
Mr.kaustubh D.vishnu	2017	Use live interaction to maintain and face authentication information.	Using the live-ness detection we find the best accuracy.
Shatish balaji	2019	The input image pass through L*a*b colour space then face is detected by passing through HOG and VGG7 CNN model is used for spoof detection.	The accuracy of real and spoof face is about 88% and 95%.

L Ashok kumar	2019	To detect the spoofed face we can use CNN framework. We would like to make sure that only the live face image grant permission to access the confidential resources during a very genuine way.	The two dataset resolve the best accuracy.
Dr A Usha ruby	2020	We discuss a neural network approach with binary cross entropy loss and pre training of CNN. The inception V3 architecture is used to further boost imageNet classification accuracy.	The proposed algorithm has a best accuracy. The training accuracy is achieved from various epochs is 95.62%.
Balamurli K	2021	This approach detect the face using VGG face architecture and the difference between real and spoof image is obtained by YCbCr and CIELUV colour space.	In this method the test accuracy is 99/6% and spoof detection accuracy is 99.5%.

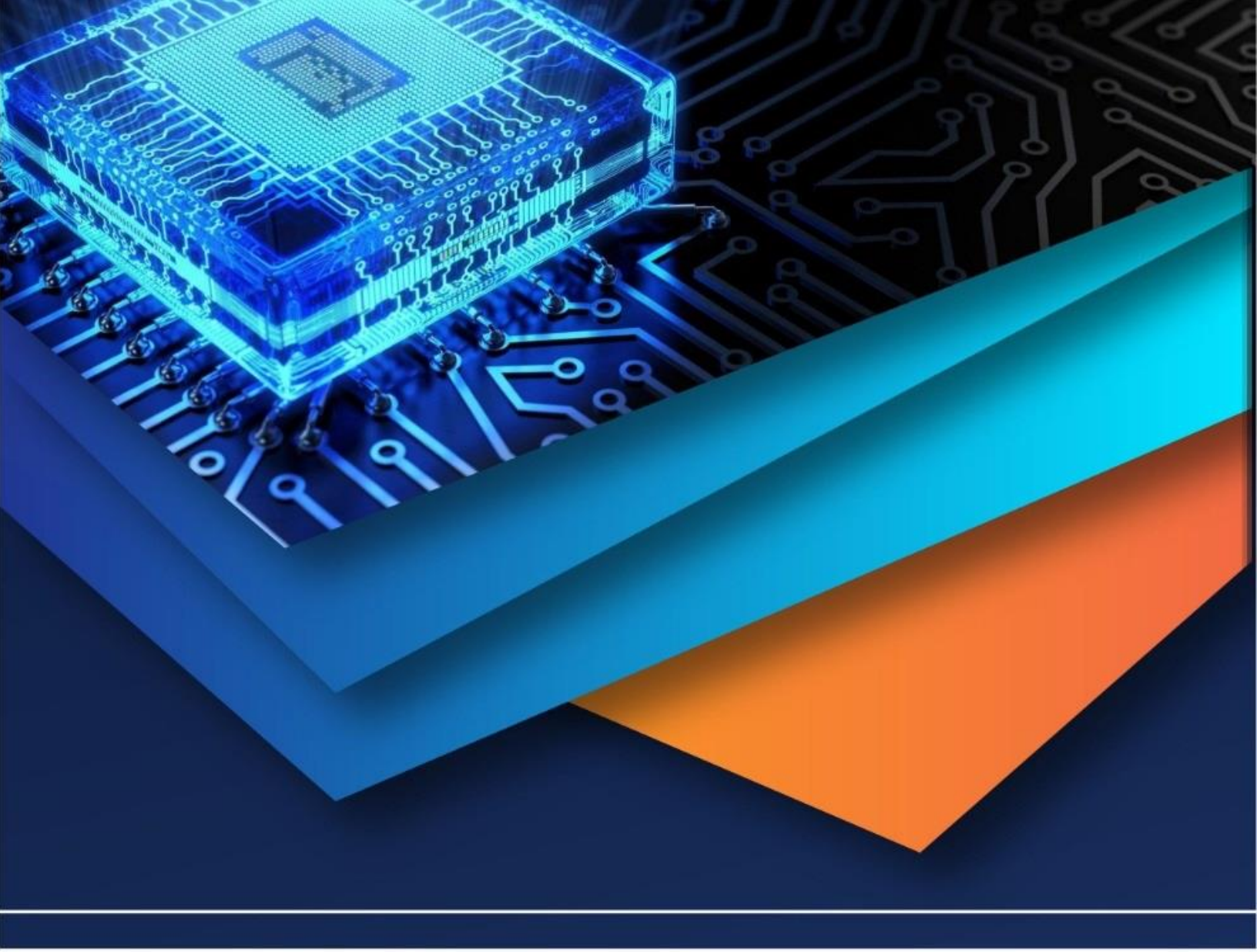
III. CONCLUSION

This paper introduce the classification technique of face spoof detection based on artificial neural network (ANN). Face spoof detection technique was used to detect face for biometric authentication. We have classified many types for face spoof detection and identification. In this approach we use the real and fake face detection and find the best accuracy of real face. SVM and KNN both are the classifier of machine learning algorithm which is used for face detection to find out the best accuracy.

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