International Journal of Research
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 07 Issue 05
May 2020

Face Liveness Detection

G. Kiran Kumar
Department of Computer Science and Engineering
Anurag Group of Institutions, Hyderabad, Telangana, India
Email - *kirankumarcse@cvsr.ac.in*
N. Rithik Reddy
Department of Computer Science and Engineering
Anurag Group of Institutions, Hyderabad, Telangana, India
Email - *16h61a05n0@cvsr.ac.in*
K. Anudeepika
Department of Computer Science and Engineering
Anurag Group of Institutions, Hyderabad, Telangana, India
Email - *16h61a05k9@cvsr.ac.in*
T. Abhishek
Department of Computer Science and Engineering
Anurag Group of Institutions, Hyderabad, Telangana, India
Email - *16h65a05p4@cvsr.ac.in*

Abstract-Face recognition systems are becoming more prevalent than ever. From face recognition on your iPhone/smartphone, to face recognition for mass surveillance, face recognition systems are being utilized everywhere. However, face recognition systems are easily fooled by "spoofing" and "non-real" faces. Face recognition systems can be circumvented simply by holding up a photo of a person (whether printed, on a smartphone, etc.) to the face recognition camera. In order to make face recognition systems more secure, we need to be able to detect such fake/non-real faces — liveness detection is the term used to refer to such algorithms. In order to create the liveness detector, we'll be training a deep neural network capable of distinguishing between real versus fake faces and then create a Python + OpenCV script capable of taking our trained liveness detector model and apply it to real-time video.

Keywords- Face Liveness Detection, Machine Learning, Deep Learning, OpenCV, Convolution Neural Network

I. INTRODUCTION

The general public has immense need for security measures against spoof attack. Biometrics is the fastest growing segment of such security industry. Some of the familiar techniques for identification are facial recognition, fingerprint recognition, handwriting verification, hand geometry, retinal and iris scanner. Among these techniques, the one which has developed rapidly in recent years is face recognition technology and it is more direct, user friendly and convenient compared to other methods. From face recognition on your smartphone, to face recognition for mass surveillance, face recognition systems are being utilized everywhere. Therefore, it has been applied to various security systems. However, face recognition

e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 07 Issue 05
May 2020

systems are easily fooled by "spoofing" and "non-real" faces. Face recognition systems can be circumvented simply by holding up a photo of a person (whether printed, on a smartphone, etc.) to the face recognition camera. In order to make face recognition systems more secure, we need to be able to detect such fake/non-real faces — liveness detection is the term used to refer to such algorithms. In order to create the liveness detector, we'll be training a deep neural network capable of distinguishing between real versus fake faces and then create a Python + OpenCV script capable of taking our trained liveness detector model and apply it to real-time video.

II. PROPOSED ALGORITHM

The proposed algorithm is divided into the following 3 modules:

1. Gather Real and Fake Dataset
2. Build, Train and Test the CNN
3. Liveness Detection

Gather Real and Fake Dataset:

First record a video/click a picture of ourselves using our smartphone (i.e., "real" faces). Then, held the smartphone up to our laptop/desktop, replay the same video/picture, and then record the replaying video/picture using our webcam (i.e., "fake" faces).

Build, Train and Test the CNN:

First, build the Keras + Deep Learning Convolution Neural Network and then using the datatsets from the previous module, here we will train and test the Keras + Deep Learning Convolution Neural Network.

Liveness Detection:

To demonstrate the full liveness detection pipeline in action we need a Python + OpenCV script that loads our liveness detector and can apply it to real-time video streams. This liveness detector is capable of distinguishing between real and fake faces.

e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 07 Issue 05
May 2020

Fig.2.1. Working of proposed algorithm

Convolution Neural Network:

In neural networks, Convolutional neural network (ConvNets or CNNs) is one of the main categories to do images recognition, images classifications. Objects detections, recognition faces etc., are some of the areas where CNNs are widely used. CNN image classifications takes an input image, process it and classify it under certain categories (Eg., Dog, Cat, Tiger, Lion). Computers sees an input image as array of pixels and it depends on the image resolution. Based on the image resolution, it will see h x w x d(h = Height, w = Width, d = Dimension). Eg., An image of 6 x 6 x 3 array of matrix of RGB (3 refers to RGB values) and an image of 4 x 4 x 1 array of matrix of grayscale image.

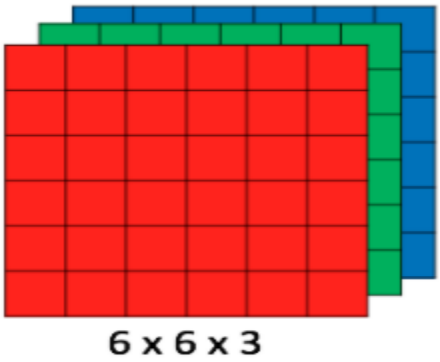
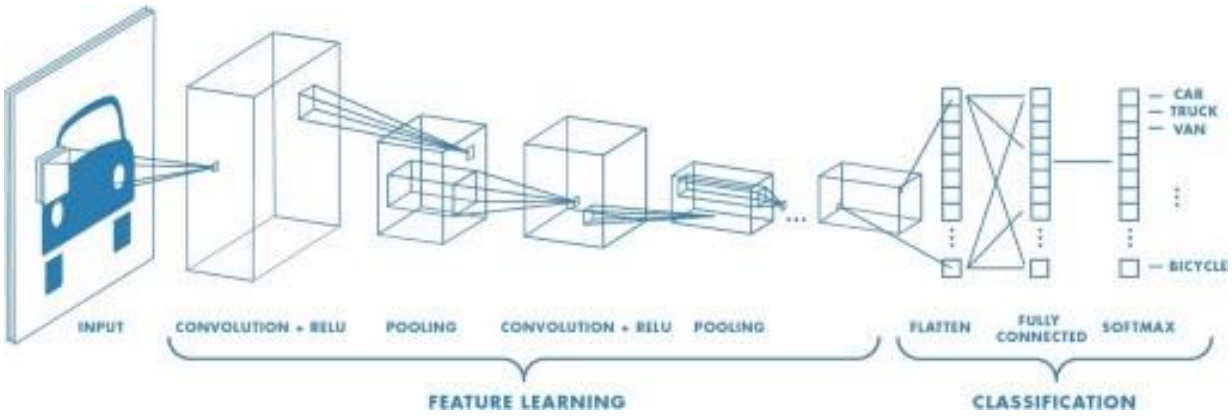


Fig.2.2. An image of 6 x 6 x 3 array of matrix of RGB

Technically, deep learning CNN models to train and test, each input image will pass it through a series of convolution layers with filters (Kernals), Pooling, fully connected layers (FC) and apply Softmax function to classify an object with probabilistic values between 0 and 1. The below figure is a complete flow of CNN to process an input image and classifies the objects based on values.



e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 07 Issue 05
May 2020

Fig.2.3. Processes involved in Convolution Neural Network

III. EXPERIMENT AND RESULT

First the person faces the camera and then face liveness detection system distinguishes it as a real/live face or it is a fake one using convolution neural network which we have built. Initially, we will be providing two datasets namely fake and real, which are used for training and testing of the convolution neural network. The detector works with an accuracy of 90 percent which is achieved by convolution neural network, TensorFlow and OpenCV. The result of the project can be seen below.

Fig.3.1. This image shows that the detector identified two faces of same person one as fake and the other as real, as one is pic from phone and the other is the real face, respectively.

e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 07 Issue 05
May 2020

Fig.3.2 This image shows that the detector identified it as a fake one as it is a passport size photograph.

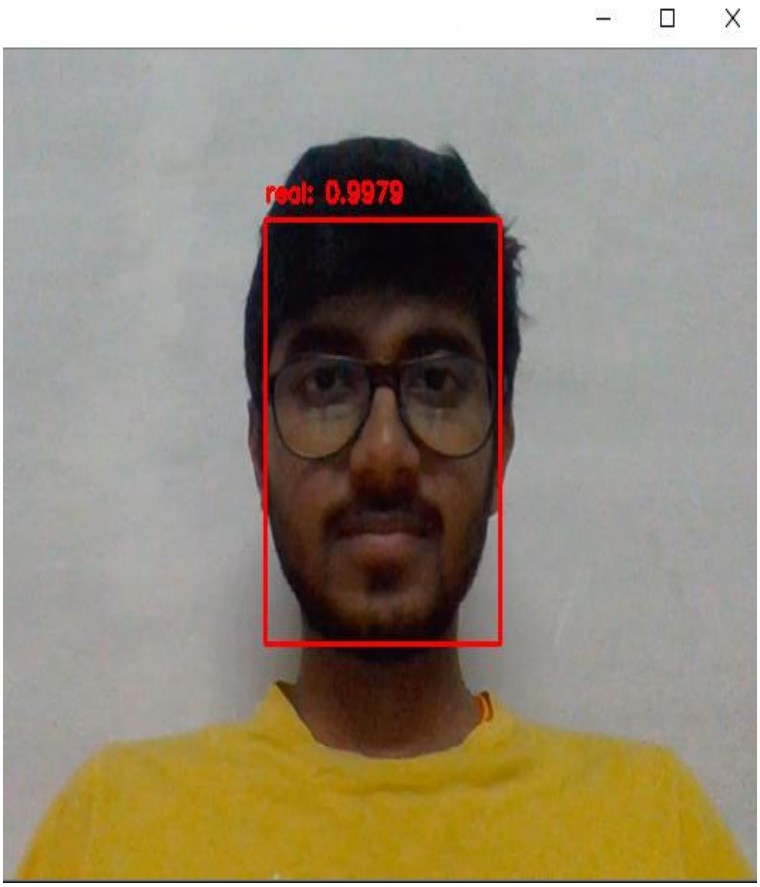


Fig.3.3 This image shows that the detector identified it as a real one as the person himself is facing the camera.

e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 07 Issue 05
May 2020

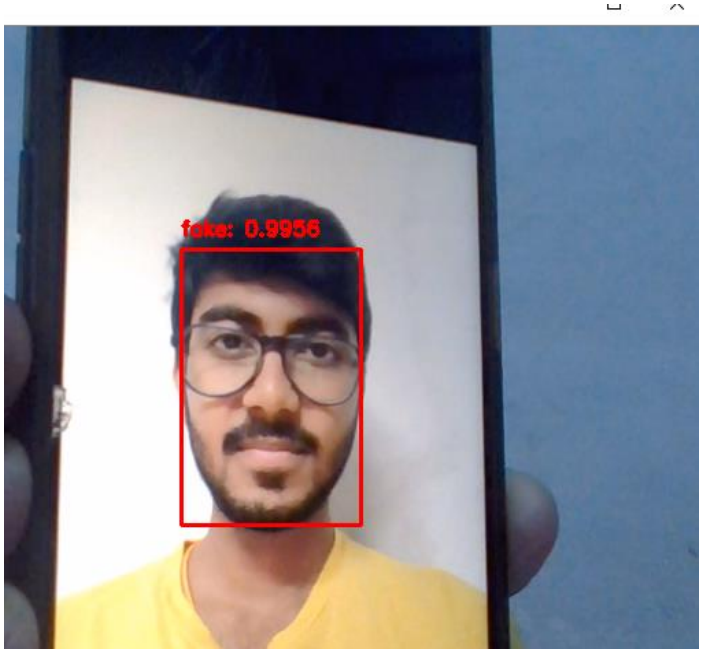


Fig.3.4 This image shows that the detector identified it as a fake one as it is a digital photo shown using a smartphone.

IV.CONCLUSION

In this study, a face liveness detection system is proposed which can distinguish between fake and real faces, that is, non-live and live faces of a person. Using this liveness detector, we can now spot fake faces and perform anti-face spoofing in your own face recognition systems. The detector is created by training a deep neural network, where we use Convolution Neural Network, Python and OpenCV, by which we can improve face detection system and protect user data and belongings.

REFERENCES

[1] Saptarshi Chakraborty and Dhrubajyoti Das, "AN OVERVIEW OF FACE LIVENESS DETECTION", Dept. of Computer Science and Engineering, National Institute of Technology, Silchar, India, April 2014.

[2] Dhananjay Garud and Dr. S.S. Agrwal , "Face Liveness Detection ", International Conference on Automatic Control and Dynamic Optimization Techniques (ICACDOT) International Institute of Information Technology , Pune, 2016.

[3] G. Pan, L. Sun, Z. Wu, and S. Lao, "Eyeblink -based anti-spoofing in face recognition from a generic webcamera," in Proc. IEEE 11th Int. Conf. Comput. Vis. (ICCV), Oct. 2007, pp. 1–8.

[4] J. Maatta, A.Hadid, M.Pietikainen,"Face Spoofing Detection From Single images Using MicroTexture Analysis", Proc. Intn Joint Conference on Biometrics,2011, Washington, D.C., USA.

e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 07 Issue 05
May 2020

[5] C.Anuradha, R.Kavitha, A.V.Allin Geo, S.R.Srividhya, "Liveness Detection with Opencv", International Journal of Innovative Technology and Exploring Engineering (IJITEE), ISSN: 2278-3075, Volume-8, Issue-9S3, July 2019.