

Face Spoofing Detection using CNN



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Problem Definition:-

Fraudulent user can subvert or attack a face recognition system by masquerading as a registered user and thereby gaining illegitimate access and advantages. Here we will be devising a methodology for creation of a face liveness detector in order to distinguish fake and real faces in real time as much as possible.



Introduction:-

Biometric systems are widely used for identifying or recognizing people on basis of their physical features but these can be spoofed too using various traits. CNN is most commonly applied to analyzing visual imagery, is good fit for binary classification problem of classifying real time faces as real or fake.



Literature Review:-

Serial Number	Method	Strength(s)	Limitation(s)
1	Face motion analysis	Effective for print attack.	Requires multiple frames, Slow response.
2	Face texture analysis	Relatively low computational cost and fast response	Poor generalizability, Requires face and/or landmark detection.
3	Face 3D shape or depth analysis	Effective for 2D attacks	Requires multiple frames or additional devices.

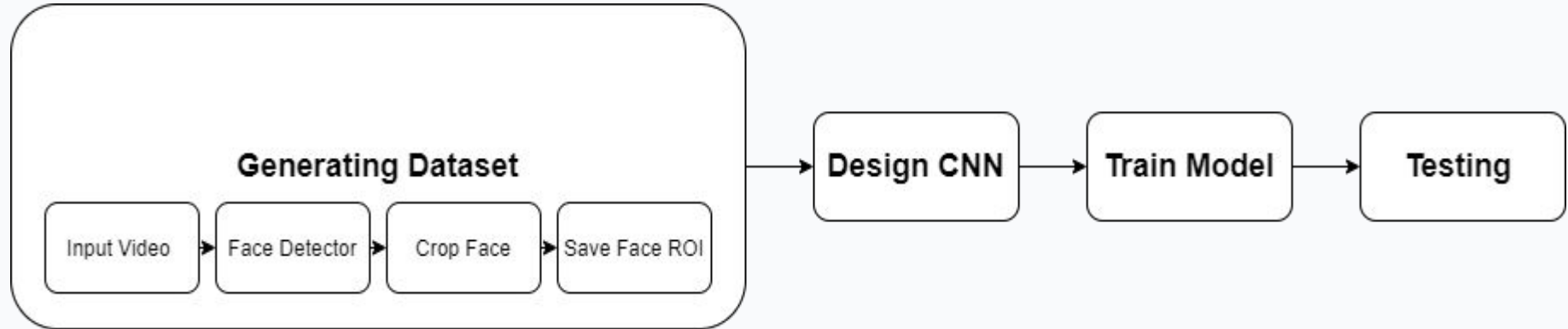


Literature Review:-

Serial Number	Method	Strength(s)	Limitation(s)
4	Image quality analysis	Good generalizability, Low computational Cost, Fast response time, Face and/or landmark detection not required	Image quality measures can be device dependent.
5	Frequency domain analysis	Good generalization ability, Low computational cost	Spectral features can be device dependent.
6	Active approach	Good generalizability	Requires additional devices.



Proposed Methodology:-



Problem Faced:-

1. Works for the person with skin tones near the trained model images of the person's skin tone
2. More parameters for perfection will make implementation slow.
3. Overfitting
4. Image redundancy
5. Small dataset plotting and accuracy calculations



Results:-

Our Face Spoofing Detector was successful in distinguishing between fake and real faces, which utilize CNN that shows the same qualities as VGGNet-esque with only a few learned filters.

Accuracy	Misclassification Rate	Recall	Precision
0.95	0.05	0.98	0.95



Conclusion:-

Biometric spoof attacks are a larger threat, where a spoofed biometric sample is presented to the biometric system and attempted to be authenticated. Hereby, we conclude the methodology for face spoofing detection using CNN discussed here works amazingly with good accuracy results upto 95% on testing dataset. Our task of detecting faces being real or fake via webcam can be made more accurate with a wide dataset with various skin tones.



References:-

- 1) Saptarshi Chakraborty and Dhrubajyoti Das, "AN OVERVIEW OF FACE LIVENESS DETECTION" in International Journal on Information Theory (IJIT), Vol.3, No.2, April 2014.
- 2) Keyurkumar Patel, Student Member, IEEE, Hu Han, Member, IEEE, and Anil K. Jain, Life Fellow, IEEE, "Secure Face Unlock: Spoof Detection on Smartphones", IEEE TRANSACTIONS ON INFORMATION FORENSICS AND SECURITY, VOL. 11, NO. 10, OCTOBER 2016.

