Facial Liveness Testing: For The Web

Student Name: Ryan Collins

Supervisor Name: Prof A. Krokhin

Submitted as part of the degree of MEng Computer Science to the

Board of Examiners in the Department of Computer Sciences, Durham University

January 16, 2019

***Abstract* —**

Context/Background TODO

Aims TODO

Method TODO

Results TODO

Conclusions TODO

***Keywords* —** Facial liveness, convolutional neural networks, image quality metrics

I INTRODUCTION

Currently, username and password authentication is commonplace throughout the web. However, username and password based authentication systems have a number of problems. Some common passwords can be broken using dictionary attacks, especially if they consist partially or entirely of a word in a standard dictionary. Furthermore, the process of shoulder surfing is possible (watching out for someone's password, and how they type it).

An easy to use system is necessary to remove the choice from the user (in terms of password), relying on the user being automatically detected, and several confirmation methods to ensure the user is indeed who they say they are (and not just someone spoofing the system). Before such a system is developed, a facial liveness testing method must be found that operated in near real-time, and that is fairly accurate.

II RELATED WORK

TODO related Work

III SOLUTION

A A system for preventing 3D spoofing attacks

While the systems before might go partially towards preventing 3D spoofing attacks, we now propose a method that is designed for classifying facial liveness based on a 3D point cloud.

A.1 Point Cloud Reconstruction

In order to classify an image/video, a 3D point cloud needs to be created, containing many 3D points (x, y, z) of a user's face. With video, producing this 3D point cloud is fairly easy, using Structure from Motion.

However, some information may not necessarily be known, such as camera information, so this could prove more tricky.

TODO: confirm what method we'll use (leaning towards 3D reconstruction)

A.2 3D point cloud classification

An architecture called PointNet can then be used, being passed the 3D point information. This can then be used to classify.

IV RESULTS

TODO results

V EVALUATION

TODO evaluation

VI CONCLUSIONS

References