Mr. Speice

Independent Study Mentorship 2A

28 January 2020

Liveness Detection

Assessment 13 - Research Assessment

Date: 28 January 2020

Subject: Liveness Detection

Works Cited:

Liu, Shuhua, et al. “An Identity Authentication Method Combining Liveness Detection and Face Recognition.” Sensors (14248220), vol. 19, no. 21, Nov. 2019, p. 4733. EBSCOhost, doi:10.3390/s19214733.

Assessment:

Security is a major issue in today’s world especially with fields such as cryptography and cybersecurity where people must safeguard against the digital dangers of the virtual world. In the world of computer vision, more specifically face recognition, the main problems of security lie in the area of face spoofing. In order to counter this, research and technology have been released over a counter method known as face liveness detection. Face liveness detection, in essence, can differentiate between images that have two-dimensional features and reality which has three-dimensional features. In face liveness detection, there are a couple of methods to paths when implementing it into a project: the hardware path and the software path.

The hardware path primarily consists of optimizing camera hardware whether it be changing the camera to an infrared camera, depth camera, or light field camera. Within the world of software development, hardware solutions are almost never considered. However, in the

computer vision field hardware is extremely prominent. With the introduction of these camera types, there are now alternatives to just taking a straight software path. Additionally, the study presented utilized a Kinect camera which is highly accessible for most people, which makes this project more practical for consumer use. In considering going through the hardware path, the software development strain would be much lower and the progress would be much quicker. One thing to consider though is that project expenses will increase hence making it less practical for consumer use and people may not be able to use it on the go when with just their laptops. Essentially, the setup will be significantly harder with the utilization of an extra camera beyond that of an external webcam or laptop webcam.

The other option would be going through the software development route. This route is more challenging but also far more flexible. Using software development paths, texture, depth, and even life information can be extracted by simply designing a program. Using features such as texture are especially effective and easy to implement when detecting liveness because their properties are static within every instance. Depth and life recognition seems to be more convoluted and impractical for a simple product like an attendance tracker. One thing to consider when going the software development route is that the route may be more computationally intensive because larger programs with more features generally require more resources. Because of this, cloud computing or better hardware may need to be used. The software path has also produced good results with high detection accuracies and versatilities with several spoof mediums. Because the software development route only requires a laptop and maybe more cost-effective going forward.

The key to deciding between implementing the hardware and software is finding the right balance between cost, computation resources, consumer practicality, and developer practicality. Looking ahead, it will be absolutely necessary to do further research within the development paths for each and decide based upon that. With the culmination of my current product and the implementation of hardware or software liveness detection solutions, the final product is bound to be one that cannot be spoofed.

Annotations