CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Samantha Darryanto; Karyne Yakupoglu

Project Number
S1603

Project Title
Biometrics: A Study of Algorithm-Based Facial Recognition Systems

Abstract

Objectives/Goals
Does the application of lighting, gender, ethnicity, facial distortion, and facial obstructions, on the detection of algorithm-based facial recognition softwares affect its accuracy?
The overall objective of this experiment is to use the application of independent and dependent variables to test the overall accuracy of the detection of facial recognition softwares based on a test group of 55 subjects. The application to all softwares, emerge from the experimental results of Veriface, a facial recognition software, in which the variables are applied to.

Methods/Materials
Veriface Lenovo Software, Survey with variables to be tested, 11 students with glasses, 11 male students, 11 female students, 11 students who can test for facial expression, 11 students testing for lighting, Compaq Laptop, Acer Webcam, Chair, Digital Camera, Stopwatch
The subject remains expressionless throughout the process. The system is then exited, and logged out; the program reappears in the log in page and again, takes a series of photographs of the subject. These recent photographs are then compared to the series of photographs already registered in the system. If the recognition occurs, the subject is logged back into the homepage. The process is repeated, when a variable of light, facial expression or facial obstructions is applied. Gender and ethnicity, are based with time as a control.

Results
Ethnicity & Facial Expression changes were the factors that created the most difference in time and pictures taken between the control and the variable testing. Males had a faster recognition time than females. Lastly, lighting had the least discrepency between control and variable.

Conclusions/Discussion
The hypothesis claimed that lighting and facial expression would take much longer to identify within the system, which proved to be true. Facial recognition affected the softwares concise measurement of the nodule points on the subjects face to be measured. Ethnicity also proved to be a common source of error, the system favoring caucasian subjects for their light skin and large eyes, in comparison to the longer identification of dark-skinned AfricanAmericans and smaller-eyed Asians. Males were the quickest to be identified, rather than females. Glasses, as an obstruction also had an impact, not as much as ethnicity and facial expression, but affecting the distance between the nodule points previously recorded within the system.

Summary Statement
The purpose of our project is to inform the public and biometrics manufacturers/providers about the most common source of error in this specific algorithm-based facial recognition system.

Help Received
Parents supplied us money for board supplies, Blessing Information Technology provided our LCD monitor, Friend supplied Lenovo Veriface