C5   Age Estimation of Adolescents and Adults Using the Dimensions of the Eye and Pupil in "Selfie" Photographs

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After attending this presentation, attendees will understand how to use dimensions of the eye and pupil to assess the age of an individual from a digital image.

This presentation will impact the forensic science community by demonstrating the effectiveness of investigating digital images and correlating an age with the photographed individual. This becomes most relevant for individuals in their teens, as they often appear older due to the use of makeup, posing, and filter technologies commonly used to take a picture of oneself, otherwise known as a "selfie." By analyzing facial features, particularly the eye and pupil regions, the subject has less ability to hinder age estimation based solely on physical appearance.

Institution Review Board (IRB) approval was obtained in order to use human subjects. The reasoning of this project, as well as the safety and privacy of the participants, procedures, consent forms, and storage of data needed IRB approval. The target age group of participants is between 11-19 years old; however, participants not within the age range were accepted. Participants were recruited by word of mouth, personal connections, and e-mail communications. Those under the age of 18 years old were required to obtain parental permission and provide child assent. Those over the age of 18 years old required informed consent. Because there are many variables that influence the functionality of the pupils, such as mood, eye problems, medications, and lighting, images were taken under controlled conditions which include using the same room and lighting.

Each subject was given an Identification (ID) number for the project and asked a series of simple questions detailing his/her mood, medications, and eye-problem history as well as his/her age, birthday, and other demographic information. The illumination of the room was captured with a Dr. Meter® Digital lux meter for each participant, so that the camera settings and metadata from the Nikon® D3100 digital camera and Apple® iPad® iOS® Version 7.1.1 could be compared. Each participant sat 1.5 meters away from the digital camera and a set of two pictures were taken, one with a spontaneous gaze, looking past the camera, and the other with an attentive gaze, looking straight into the camera. A forensic evidence ruler was included in these photographs for accurate calibration of measurements using Adobe® Photoshop® CS5. Finally, the participant was asked to take a picture (a "selfie") and a short video of him/herself using the iPad®. The distance at which the subject comfortably held the iPad® to perform these procedures was recorded.

The images were downloaded onto a computer for analysis using Photoshop®. Each image was calibrated so the pupillary diameter, area, and interpupillary distance could be determined and compared using formulas given in MacLachlan & Howland.[1] Using the known age of each participant and the age from the formulas, the effectiveness of age estimation can be determined.

Reference:

1.   MacLachlan, C. & Howland, H.C. (2002). Normal values and standard deviations for pupil diameter and interpupillary distance in subjects ages 1 month to 19 years, Ophthalmic and Physiological Optics, 22(3), 175-182.

Age Estimation, Visual Biometrics, Interpupillary Distance

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