



Digital & Multimedia Sciences Section - 2016

C12 Age Estimation of Adolescents Using Eye Measurements From Various Angles in Videos

Neeka M. Parker, 932 1/2 12th Avenue, Huntington, WV 25701; Joshua L. Brunty, MS, Marshall University, 1 John Marshall Drive, Huntington, WV 25755; Robert J. Boggs, West Virginia State Police Digital Forensics Unit, 1401 Forensic Science Drive, Huntington, WV 25701; and Terry Fenger, PhD, 1401 Forensic Science Drive, Huntington, WV 25701*

After attending this presentation, attendees will understand how to use eye measurements to estimate the age of an individual in a digital video, even when the eyes are viewed from an angle rather than from directly in front.

This presentation will impact the forensic science community by providing information about how the angle at which an image of a face is taken can affect the measurements of that face and their usefulness in estimating age. This is particularly relevant when looking at pictures of people who appear to be teenagers and pre-teens, such as with potential child pornography. The appearance may be natural, but it may also be due to makeup, posing, clothing choice, or filter technologies available when taking a picture of oneself — also known as a “selfie.” By relying on measurements of features of the face, including the eyes and pupils, rather than appearance age, the age of an individual can be estimated with fewer hindrances.

Due to the prevalence of social media and devices like smartphones, “selfie” photographs have become extremely popular. These and other images could be part of evidence in a criminal investigation. Any such images can be taken at any camera angle relative to the front of the face. If the age of the individual in the photograph is in question, it becomes necessary to have a way to estimate the person’s age regardless of angle.

Institutional Review Board (IRB) approval was obtained in order to use human subjects. The target age group of participants was 11 years to 19 years old, with those less than 18 years of age needing documented parental permission and child assent while those 18 years of age and older only required documented consent. Due to the fact that the pupil is affected by many variables, including mood, medication, and lighting, images were taken under controlled conditions with the illuminance of the room documented. Participants were asked for their birthday and other general demographic information, as well as basic questions regarding mood, medication, and eye problem history. Photographs were taken using a Nikon® D3100 digital camera and Apple® iPad® iOS® Version 7.1.2. A set of two to four photographs was taken with the participants sitting 1.5 meters from the digital camera holding a forensic evidence ruler: one photograph was taken with the participant looking past the camera generating a spontaneous gaze and one was taken with the subject looking at the camera with an attentive gaze; an additional pair of photographs was taken if the participant wore glasses to produce images both with and without glasses. The participants were then asked to take a “selfie” and a short video using the iPad®, with the distance at which these were taken documented. Images were analyzed using Adobe® Photoshop® CS6, while videos were additionally analyzed using Adobe® After Effects®.

Nikon® images were analyzed and the data compared with the formulas given in MacLachlan and Howland.¹ Stills from the videos were analyzed to determine the angle relative to a reference point. The measurements made in these stills were analyzed for a connection to both the angle and the age of the participant.

Reference(s):

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, Digital Video