Master Thesis Defense

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ABSTRACT

Face aging technologies generally address two areas: face age-estimation and face age-progression. The face age-estimation problem is defined as building computer software that has the ability to recognize the ages of individuals in a given photo. Meanwhile, the face age-progression problem has a more powerful ability to predict the future faces of people appearing in photos. This thesis first introduces a novel age estimation approach that combines Active Appearance Models and Support Vector Regression, to dramatically improve the accuracy of age estimation over the current state-of-the-art techniques. In this age estimation technique, characteristics of the input face images are interpreted as feature vectors by Active Appearance Models, which are then used to discriminate between children and adults, prior to age estimation. Faces classified as adults are passed to the adult age-determination function and the others are passed to the child age-determination function. Based on the generation of a unique aging function for children and adults, this novel approach to age estimation has yielded the highest accuracy of age recognition rates of all comparable published results both in overall Mean Absolute Error (MAE) and Mean Absolute Error per decade of life (MAEd). The combination of Active Appearance Models and Support Vector Regression is used again for a new proposed face age-progression method. In this age progression method, especially, the familial information of siblings is also collected so that the system can predict the future faces of an individual based on parental and sibling facial traits.

Additionally, a new longitudinal familial face BGC (Burlington Growth Center) database is also presented. The BGC database was developed at the Faculty of Dentistry, University of Toronto, under a special agreement between our research centre CENPARMI, and the Faculty of Dentistry at the University of Toronto. The dataset was collected to study the problems associated with age-progression during growth and development. It is very difficult to collect these kinds of databases because of the chronometrical image series of an individual. Compared to other databases, the BGC database is unique in that it contains family-based longitudinal images. This database contains not only frontal face images but also the corresponding profile face images. Additionally, the BGC has the largest number of pre-adult face images per subject on average