# Automatic Age Estimation by Wrinkle Analysis in Biometrics: A Review

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**Abstract:** *Recently, age estimation using facial images has become an important factor useful in many potential applications. Using human face as biometric measure, dealing with aging process of an individual has been overlooked since years. An age estimation system is generally composed of feature extraction and classification with the combination of global and local features. Several micro features such as moles, scars, expressions, has been used commonly in face recognition, but due to some anomalies, we use the discriminative power of wrinkles in age estimation processes.*

## 1. Introduction:

Face is a prolific image source. The human face contains great deal of information related to personal characteristics including identification age, emotion, gender and race. This information has been extensively used in human computer interaction capable of interpreting facial information. Generally human image is considered as a complex signal composed of facial attributes and geometric facial features. This plays a crucial role in facial image analysis. Among them age is more significant among these attributes. For example users may require age specific human interaction system for secure system accesses control and information gathering. The specific challenge with age classification is that age of a person is hard to predict exactly because facial appearance slowly changes when a person is aging.

An automatic face image age estimation system is composed of two parts: face detection and age estimation. The purpose of face detection is to localise the face in an image. Although automatic face detection of an image is a mature technique but it seems to be a challenging problem as this process is determined by external factors such as health, lifestyle location and weather conditions.

Age estimation is designed to use two steps: an aging feature extraction and feature classification. Feature extraction is very important in age estimation as the extracted feature affects the classification performance. For this reason a great deal of effort has been directed towards extraction of discriminative ageing features. From studying the aging process of humans we find that wrinkles are good indication of loosening skin, thus we have selected wrinkle as a biometric facial feature in age estimation of a person..

## 2. Literature Review:

### [1]Automatic Age Estimation System for Face Images:

This paper describes categories of feature extraction which uses statistical based approach, appearance based approach and frequency based approach.Statastical method uses iterative learning component, appearance based uses intuIt also presents intuitional for facial image analysis work and frequency approach plays important role in image processing and pattern recognition. This paper presents the novel and reliable framework for automatic age estimation based on computer vision images.

## [2]Marked Point process model for facial wrinkle Detection:

This paper describes wrinkle detection algorithm on particular framework which uses reversible jump Markov chin Monte Carlo (RJMCMC) for measuring probability density of wrinkle model, prior energy concept and optimization. Probability density shows the distance between line segments of wrinkle and design of prior energy to find the relationship between lines, RJMCMC sampler simulates the Markov chain and demonstrates the performances based on algorithms.

## [3] Age estimation from face images: Human vs. Machine Performance:

This paper describes hierarchical approach and provide analysis of how aging influences facial components. It also shows face pre-processing, localization and feature extraction since the face is determined by both intrinsic and extrinsic factors.It also shows comparative study of different databases

## [4] Human age estimation using enhanced bio inspired features.

It discuss contribution towards automatic localization using micro facial features , automatic initialization using active shape models(ASM)by combining regression based and classification based system.It incorporates use of ASM for automatic localization of landmark points.this undergoes two stages training and fitting.

## [5]Investigating Age Invariant Face Recognition Based On Periocular Biometric:

This paper presents novel framework of utilizing periocular for age invariant face recognition. To obtain age invariant feature it applies robust, WLBP (Walsh-Hadamard Transform) transform to maintain consistency of same individual across ages. It proposes preprocessing schemes, pose correction, illumination and periocular normalization. It includes the convolution filtering by Walsh masks to capture local image characteristics to get the desired results.

## [6]A Study Of Face Recognition As People Age:

It describes the robust face description to aging and face recognition across ages using gradient orientation pyramid (GOP) within a real passport photo verification. For a image pair, gradient orientations are used to build the differences between the pairs which is combined with SVM classifier for face verification tasks.

## EXISTING SYSTEM:

For accurate age estimation the aging feature extraction is most important as the features highly affect the performance of age estimation. Till now the global features has been used.

## Global Features:

Global feature uses concept of AAM i.e. Active Appearance Model and AAS i.e. Active Appearance Shape to estimate age as a facial global feature.

It offers sufficient information for detailed age estimation, as proposed by Lanitis. Here every face require 28 feature points divided in 10 wrinkle specified region. Xin Geng proposed AGES: aging pattern sub space to model the aging pattern defined as sequence of individual aging face image including iterative learning Principle Component Analysis (PCA). It models the aging pattern in a 2D sub space to construct the face and determining the age.

Use of non-generative approaches used by ling as a face operator to obtain the parameters for support vector machine to classify people and geometric attributes with the set of landmark points to give perception of age. Use of gradient orientation pyramid methods to perform
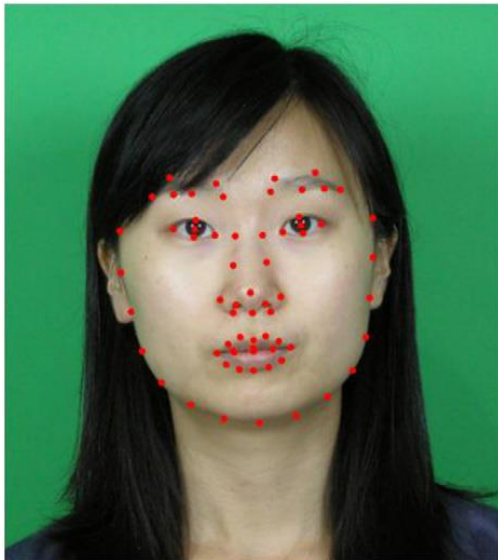
Fig1: Normalization of feature points

Normalization and age estimation. The entire process involves three stages: pre-processing, feature extraction, and classification.

## DRAWBACKS OF EXISTING METHODS:

1. There are large shape and texture variations over a long period i.e. muscles drop, wrinkles appeared and so on. In the traditional AAM method it is very hard to describe all these variations.

2. The perceive face age often depends on global non facial factors such as hair colour, style, the boldness of the forehead etc., while these non-facial features are usually excluded in face aging modelling.

3. It is very difficult to collect face images of the same person over a long period of time and the age related variation mixed with other variations i.e. illumination, pose variation, expression.

4. There exist large variation of perceive age with biological face group due to external factors such as help, lifestyle.

5. Lack of qualitative measure to evaluate age results.

6. Existence of moles and scars: unique features varies from person to person.

## PROPOSED SYSTEM:

### Local Features:

We adapt local features to improve the performance. The local feature focus on wrinkle and skin which generally appears as high frequency component on face images. A set of wrinkles as a pattern may be unique to every individual which gives us the motivation to exploit the relative location of wrinkle as a discriminative feature for face recognition. It includes wrinkle pattern matching methodology to find the curve correspondences between two wrinkle patterns which can be resolved by canny edge detection algorithm.

Firstly this system will capture image and detect the face by normalization method. A database of many facial images of different age group will be taken where the cropped portion will be extracted from facial images of three kinds as images with dominant wrinkles, images with average number of wrinkles and images with less or no wrinkles. The normalization will be done with the peak value and edge points in consideration, as image with large number of wrinkles has more number of edge points. Feature selection process will be carried out for selecting wrinkles in predetermined regions. Many a times Gabor wavelet can be used for image analysis using biological relevance and vector representation at different scales. The Gabor wavelet feature is used in SVM (Support Vector Machine) classifier to identify how old the face is. Support vector machine has potential to sparse training data in order to solve classification and regression problems.

For efficient age estimation experiments FG-NET aging database is used which is composed of thousand images of 82 subjects and additional meta information. Hence,local feature provide a basis for better performance in age estimation.

## Applications:

*1) Major role in Twin Identification:*

This work will play a major role in identifying twins. Since twins are said to have almost same features and identities. So, wrinkles on various expressions can determine age of twins.

2) *License photo & passport validation:*

Since passport is generally valid till 5 years. So, in certain circumstances it becomes difficult to estimate age of a person while validation, as many features change in some duration. Hence wrinkle analysis will play a major role in passport validation process.

*3) Guess the state of missing person:*

Many times it becomes very difficult to determine age of a missing person. So, wrinkle analysis helps in guessing face and age of a person.

*4) Automatic update of face database at security checking:*

Many times in security purpose like in airports, station, foreign countries wrinkle analysis helps in face detection and age estimation of a person.

*5) Basis for authentication in crime investigation, disease detection:*

Wrinkle analysis provides a basis for authentication of a valid user in crime investigation of a culprit.

## Conclusion:

Human ageing is important aspect for biometrics and age estimation is one of the major issue in long term performance hence we need to construct a robust mechanism for face verification and age perception using descriptors. We proposed a new framework in real time and fully features extraction to provide robust generalization ability.

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