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Personality Identification using Facial Features

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----------ABSTRACT----------

The paper is based on physiognomy. It deals with the measurement of the facial features to enable one for judging the character of a person based on the person's facial features. There is a popular saying, Face is the index of mind. Hence the Personality can be derived from the facial features. It is said that facial features like face shape, ear length, forehead length and forehead width, eye distance or the entire body features are related to the thinking pattern. This relation is made use of to identify the personality of an individual. Personality Identification can be used in several applications, among them one of the application is military selection. The experimentation so far has been conducted on several people and the results obtained from the implementation of the paper match with the character of the people involved in experimentation. This method is cost effective, time reducing and highly time efficient technique that involves personality identification by measuring the facial features.

Keywords *- Physiognomy, Facial features, Personality Identification, Measurement of facial features*

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I. INTRODUCTION

Personality of an individual is identified from his/her facial features. The facial features used for identifying the personality of a person are ear length, nose length, eye distance, eye width, forehead length, forehead width, distance between minor axis and eye axis, distance between minor axis and lip axis.Personality Identification using facial features finds its applications in various areas. Some of them are military selection, fraud detection, criminal judging system, selection of actors, recruiting process.

The facial features used as biometrics for authentication, can be used for other applications too. Facial features like ear, nose, forehead, distance between the eyes are used to analyze the character of a person. The mechanism does not require any expensive device for biometric retrieval. It only requires the image of the person whose character has to be known. Using the facial features the estimation of the character of a person is made.

Physiognomy which deals with inferring character from the feature, forms the basis for this technique. The character detection technique infers the character of the person using the facial features. Physiognomy (physis meaning "nature" and gnomon meaning "judge" or "interpreter") is the assessment of a person's character or personality from his or her outer appearance, especially the face. The term can also refer to the general appearance of a person, object, or terrain, without reference to its implied characteristics, as in the physiognomy of a plant community.

The regular approach of conducting interviews, written test, group discussion etc may not revile the true character of a person as he/she would have prepared himself/herself for the situation and circumstances. Hence finding the true suitability of a person for a particular job or profession is difficult. But by employing physiognomic approach the true nature or personality or the thinking pattern can be known. It is found that the thinking pattern forms the physical features of the person, which in turn help us to understand the personality of the person.Physiognomy which deals with inferring character from the feature, forms the basis for this technique. The character detection technique infers the character of the person using the facial features. Section 2 gives the literature survey for the paper. In section 3 a brief overview on the existing methods is provided. Section 4 gives the proposed method of the paper. Section 5 presents the input and computation. Section 6 has the algorithm used in the paper. Section 7 gives overview on experimentation and Critical Analysis and Section 8 gives the conclusion of the paper.

II. LITERATURE SURVEY

Facial Features are used for authentication and identification purpose. The biometric which is measure of various features of a person is an aid for authenticating the person[2][4].

As depicted in [1] the facial features extracted can be used for judging the human characteristics. Mythological literatures like Vedas illustrate that the facial features like face shape, ear, forehead can be analyzed for personality identification[5][6]. In chinese mythology too there is an specification about physiognomy[3].Thus extracting the facial features enable analyzing the personality of a person.

Since face is the index of mind, analyzing the facial features

help in deriving the personality of a person. Facial features are constant hence they can be used for personality identification.

Facial features like position, size, shape of different face parts like ear, nose, forehead etc are not subjected to change, therefore they are appropriate for identification of personality. The characters resembling different parts of the face is referenced in [8][9][11][12][13][14][15][16].

III. EXISTING METHODS

Personality of an individual is obtained by conducting interviews, written tests, psychological tests, group discussion, hand writing analysis, signature analysis etc. the above methods cannot assure correct results because an individual can get prepared to cope with the situation and circumstances and thus hiding his/her original personality.

IV. PROPOSED METHODOLOGY

In the proposed method the facial image of the person, whose characteristics is to be identified is grabbed from the camera and various measurements of the facial features like eye axis and lip axis of face, nose length and ear length, forehead length and forehead width, distance between the eyes is obtained by measuring in terms of pixels:

4.1 Face Shape Detection

The face shape is measured as a ratio of minor axis of the face and the axis drawn parallel to the eye level with the minor axis of the face and the axis drawn parallel to lip level as shown in Fig 1. The eye axis passes through the center of both the eyes and the lip axis passes through the center of the lips. Eye axis and lip axis are parallel to the minor axis, the minor axis which passes through the tip of the nose.

Based on these measurements, results on personality identification based on face shape can be obtained like:

An individual having round face is sensitive and caring. Person with Oblong face is practical and methodical. Triangular face signifies creative, fiery temperament. Square face resembles intelligence, analytical skills, decisive mind and boldness. Rectangular face people are dominant in character. Oval face people are balanced and diplomats.

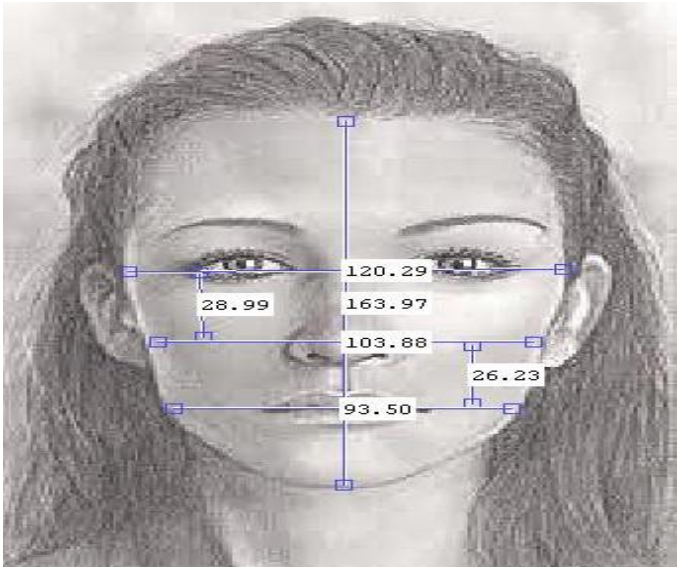

Fig 1: Image for detecting Face Shape

4.2 Ear Length and Nose Length Detection

The next important feature is the ear and nose as shown in Fig 2. Ear length plays an important role in judging the character of a person. Ear length is measured as the distance between the topmost and bottom most tips of the ear. Nose length is the distance the midpoint of the eye brows to the tip of the nose. Ear length is measured and compared with the length of the nose to derive character based on ear length. If the ear length is greater than nose length than the ear is considered to be big, otherwise it is considered to be small. Normal ear is one in which ear length is equal to nose length.

A person with small ears is honorable, mannered and affectionate. Person having big ears is generous and has free spirit. Normal eared people are materialistic.

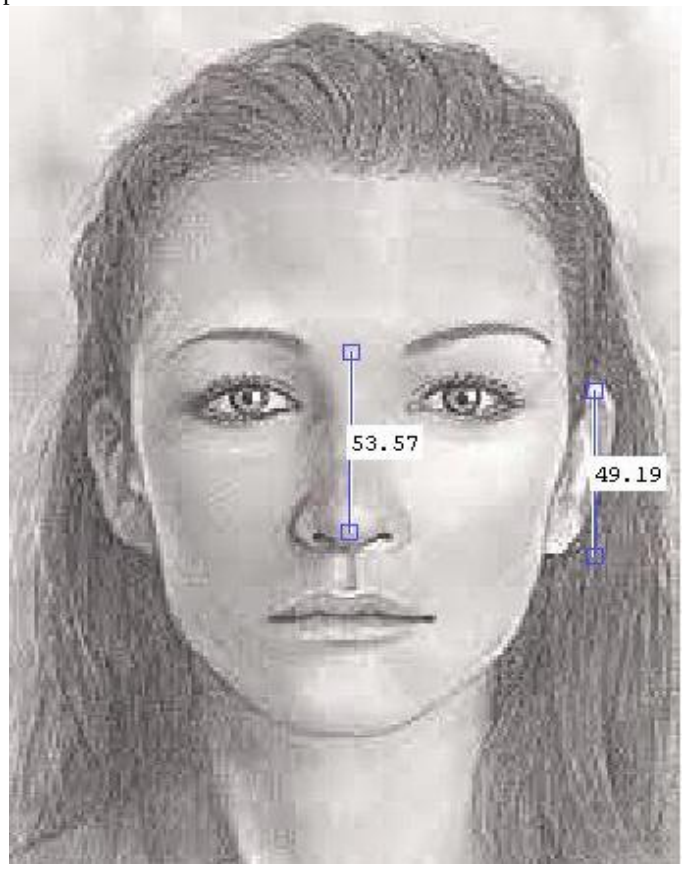

Fig 2: Image for detecting ear length and nose length

4.3 Forehead Length and Forehead Width Detection

Forehead gives the image of the brain. The brain characteristics like intelligence, analytical skills, imagination, intuitive nature etc. Forehead also depicts human qualities like sincerity and honesty.

Forehead length is the distance between midpoint of the eyebrows to the midpoint of the upper line of forehead. Forehead width is perpendicular to forehead length and passes through the midpoint of forehead length. Fig 3 refers to finding of length and width of the forehead.

Forehead length and width are computed to retrieve character of a person based on forehead. The forehead length and forehead width are measured. If the forehead length is greater than forehead width then the forehead is considered to be lengthy, otherwise the forehead is considered to be wide. Square forehead has equal forehead length and forehead width.

People with wide forehead have intuitive nature and imagination. Lengthy forehead people achieve permanent success. Square forehead people are honest and sincere.

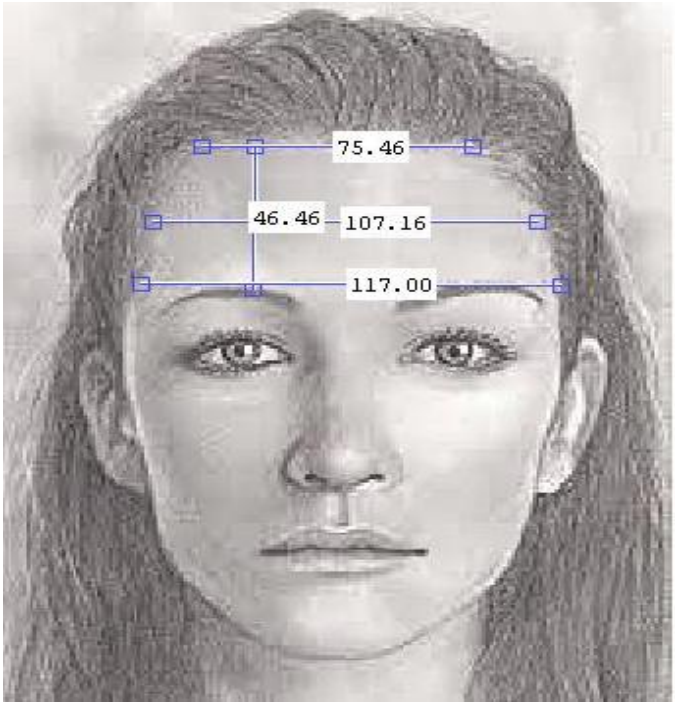

Fig 3: Image for finding forehead length and width

4.4 Eye Distance Detection:

The difference is the distance between the eyes and the eye width provides another facial feature for detecting the character of the person.

Eye width is the distance between the end points of the eye. Eye distance is the distance between the end points of the eyes. Fig 4 shows the mechanism of finding eye width and eye distance.

The difference between the eyes denotes the concentration power of an individual. If the distance between the eyes is small then it is considered as small eye distance otherwise large eye distance.

A person with small eye distance is considered to have powerful ability to concentrate, focused, stressed. The individual hates to be disturbed, has deep interest in details.

A person with larger eye distance has trouble in concentrating for a long period of time. The individual has managerial skills and doe s not care about must details.

Fig 4: Image for finding eye width and eye distance

V. INPUT AND COMPUTATION

5.1 Input

The image of the person whose character has to be known is taken as input. The input can be soft copy of the image or the input taken from a web cam. The input features that are required for analysis of the character are face shape, ear length, forehead length and forehead width, distance between the eyes.

Fig 5: Image of ear

Fig 6: Image of nose

Fig 7: Image of forehead

Fig 8: Image of circular face

Fig 9: Image of Triangular face

Fig 10: Image of Rectangular face

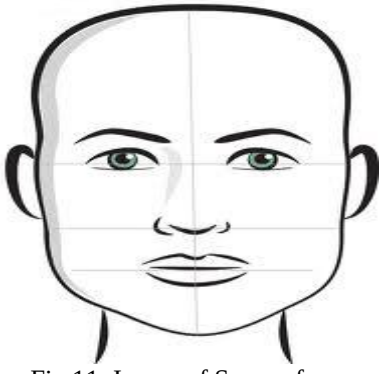

Fig 11: Image of Square face

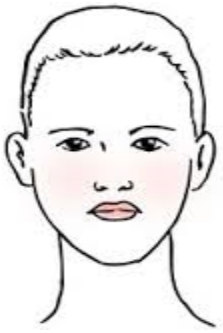

Fig 12: Image of Oblong face

a. Computation

The features extracted in the input are measured. According to the measurements made the character of the person is displayed. The facial measurements are computed and the final output is generated. The net result is generated as a consolidation of the results obtained from the individual facial features.

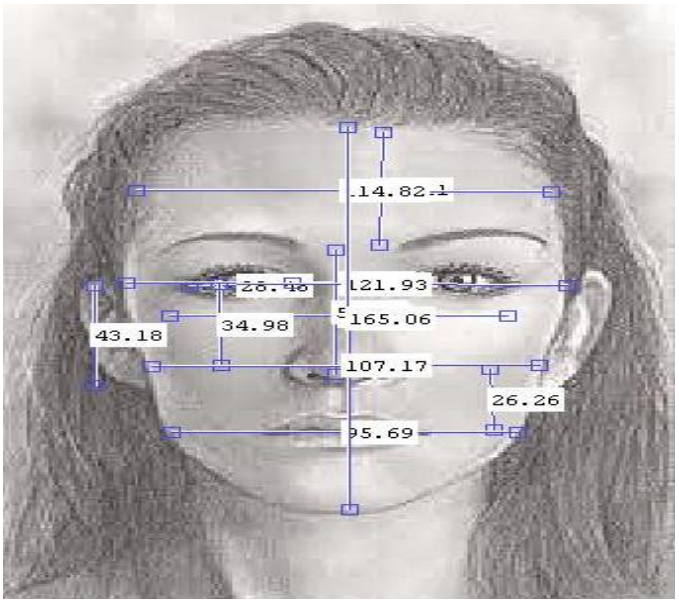

Fig 13: Image of all facial measurements

Feature	Character
Round Face	Sensitive and Caring
Oblong Face	Practical and methodical
Triangular Face	Creative, fiery temperament
Square Face	Intelligent, analytical, decisive mind, bold
Rectangular Face	Dominant with less force
Oval face	Balanced, diplomats
Small ears	Honorable, mannered and affectionate
Big ears	Generosity and free spirit
Normal ears	Materialism
Wide forehead	Intuitive nature, imagination
High forehead	Permanent Success
Square forehead	Honesty, sincerity
Small eye distance	Powerful ability to concentrate, focused, hates to be disturbed, stressed and has deep interest in details
Large eye distance	Having trouble in concentrating for long period of time, does not care much about small details and good managerial skills.

VI. ALGORITHM

Input: Facial features of a person
Output: Personality of the person

Case1:
Step 1: Obtain the face image as the input from web cam or soft copy of an image
Step 2: Measure the facial features like forehead length, forehead width, eye distance, eye width, distance between minor axis and eye axis, distance between minor axis and lip axis, nose length
Step 3: Compare eye distance and eye width and generate the suitable features
Step 4: Generate ratio of distance between minor axis and eye axis to the distance between minor axis and lip axis. Depending on the ratio output the suitable features
Step5: Compare forehead length and forehead width and generate suitable features
Step 6: Display the result of the computation done in steps 3,4,5.

Case 2:
Step 1: Take input from web cam or soft copy of an image
Step 2: Measure ear length
Step 3: Compare ear length and nose length and generate suitable features
Step 4: Display the result of the computation in the display.

VII. EXPERIMENTATION AND CRITICAL ANALYSIS

In our experimentation 4 facial features are chosen to detect the personality of a person. They are face shape, ear, forehead and eye distance.

The experiment is conducted with 2 cases. Case 1 considering the image of the face and Case 2 considering the image of the ear. The below database provides the measurements of facial features i.e. eye distance, eye width, forehead length, forehead width, distance between minor axis and eye axis, distance between minor axis and lip axis for case 1, and ear length and nose length for case 2.

The feature depending on eye distance is computed as the difference between eye distance and eye width. The feature corresponding to forehead is retrieved by the difference between forehead length and forehead width. The feature reflected by the face shape is obtained by the ratio of distance between minor axis and eye axis to the distance between minor axis and lip axis. In the second case, the feature depending on ear length is evaluated which is the difference between the length of ear and nose.

The experiment is conducted with 25 people and it is found that their character matched to the output generated by the code to approximately 72%. Testing of the result generated is evaluated by conducting a personal interview with the people whose image was given as an input to the code.

VIII. FUTURE OUTCOME AND CONCLUSION

The character can be easily analyzed by measuring the facial features. Further improvements can be made by including some additional facial features. It is said that the thinking traits forms the physiological features; what we achieved is that given the physical features we have evolved a method to identify the characteristics or personality of the person.

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