



## Review of Emotion Evaluation in Image

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**Abstract**— *Emotional detection by image one of important area in image processing. In which we detect the human emotion and link with different application where it use. In this paper we given areview of emotion detection and application of emotion detection by images.*

**Keywords**— *image processing, Emotion*

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### I. INTRODUCTION

Tourism has reached almost all regions of the world. Tourism today is one of the fastest growing industries throughout the world. A tourist economy has expanded consistently over the last few decades with global international arrivals. An increase in demand met by a general growth in business activities has seen many regions develop the tourism economy. Tourism in India has grown in leaps and bounds over years. According to World Tourism Organization survey report 2014, India was ranked 10<sup>th</sup> position in the Asia pacific region with around 6.8 million international tourists arrival and 62nd overall on the list of world's attractive destinations. People travel for leisure and recreational purposes. Due to people's inclination to seek out novelty, including that of traditional cultures, tourism has become a major "new" area of demand. A tourist faces many challenges in unfamiliar territory. In unfamiliar territory tourists are unable to take decision in which place they go or which place is best suitable to visit. Navigation system is usefthisul in guiding them to a destination using graphics, text and voice information. They help them to finding a way to get to a place they are travelling. Modern tourists have huge possibilities to search information about interesting places through the Internet, but then decision-making becomes difficult for them from that huge list of places. They are unable to judge which place they visit first. Navigation System becomes an essential requirement for the tourists visiting unfamiliar territory. Sometimes, people come with preset mood because of certain circumstances like travelling fatigue, climate effect etc. in such cases travel experience get affected. They should visit the places where there should no further fatigue. There is an impact of effective states such as emotions and mood generated by leisure consumption services (Sirakaya et al. 2004, Zins 2002). So, to solve this problem an effort is done in developing facial expression recognition system and to provide the tourist visiting Chandigarh a priority wise list of destination places people generally like to visit when they are in different emotional state. Chandigarh is the best planned city in India, with architecture which is world renowned, and a quality of life, which is unparalleled. According to Chandigarh administration in year 2014, 885597 domestic tourists and 22998 international tourists visited city.

Emotions play critical role in rational and intelligent behavior. It is a mental state that does not arise through free will and is often accompanied by physiological changes. These changes need to be monitored as they contain information about different types of emotions which will assist in understanding behaviors. Emotion is a strong feeling deriving from one's circumstances, mood, or relationships with others. Emotions seem to rule our daily lives. We make decisions based on whether we are happy, sad, angry, or surprised. We choose activities and hobbies based on the emotions they incite. Emotion plays a vital role. Emotions play a central role in decision making, problem solving, communicating, negotiating and adopting to unpredictable environments. It consists of external physical expression as well as internal feelings, thoughts and internal processes which the person experiencing the emotion may not be aware of. Of all the nonverbal behaviors- body movements, postures, gaze, voice, etc- the face is probably the most accessible window into the mechanisms which govern our emotional and social lives. Realistic animation of faces would serve a major role in bridging the gap between man and machine. Machines that can recognize emotions will be able to relate to the emotion of the user. Facial expression is one of the most powerful, natural and immediate means for human beings to communicate emotions and intentions. Often emotions are expressed through the face before they are verbalized.

Two procedures are necessary for an automatic expression analysis system: facial feature extraction and facial expression recognition. In facial feature extraction, there are mainly two types of approaches: geometric feature-based methods and appearancebased methods. In geometric feature-based methods, the facial components or facial feature points are extracted to form a feature vector that represents the face geometry. In appearance based methods, image filters are applied to either whole-face or specific regions in a face image to extract a feature vector. Geometric feature extraction can be more computationally expensive, but is more robust to variation in face position, scale, size, and head orientation. In facial expression recognition, most automatic expression analysis systems attempt to recognize a small set of prototypic expressions.

The neural network performs the very important role for recognizing the facial expression. The artificial neural network is an information processing paradigm that is inspired by the way of biological nervous system. An ANN is configured for a specific application such as pattern recognition or data classification through a learning process. Learning system involves adjustments to synaptic connections that exist between the neurons. For analyzing any type of information, trained neural network treated as an “expert” system. The neural network has an ability to do task based on data given for training and it also creates its own organization during learning time. Artificial neurons are a device with many inputs and one output. After getting the inputs from the pre-processing block the neural network trains the network by using different modeling techniques and provides the recognized output. For implementation of face detection and neural network involve the image processing toolbox and neural network toolbox of MATLAB.

The main objective of this paper is to develop a real time monitoring system that will recognize four human emotions i.e. happy, sad, angry and surprised through face recognition and then show the priority wise list of places tourist like to visit when they are in a particular mood.

## II. LITERATURE REVIEW

Various research work carried out in this field has been studied. The literature reviewed covers the study of various techniques and related parameters for facial expression recognition system. Subsequent paragraphs give an overview of the important literature relevant to this research.

**Ekman (1969)**, studied emotions using facial expressions in different cultures. Six basic emotions i.e. happy, sad, anger, surprise, disgust and fear had been used. These six basic emotions have been accepted widely and till date they are used. Ekman later expanded various emotions in his list.

**Lyons et al. (1998)**, in the paper, method for extracting information about facial expressions from images was presented. Facial expression images were coded using a multi-orientation, multi-resolution set of Gabor filters which were topographically ordered and aligned approximately with the face. The results show that it is possible to construct a facial expression classifier with Gabor coding of the facial images as the input stage. The Gabor representation shows a significant degree of psychological plausibility, a design feature which may be important for human-computer interfaces.

**Yang et al. (1999)**, an emotion avatar image (EAI) as a single representation for video or image sequences for emotion recognition was created. Scale invariant feature transform (SIFT) flow algorithm to align the face images which was able to compensate for large global motion while maintaining facial feature emotion detail was used.

**Zhang et al. (2005)**, in the paper a semi- automatic acquisition technique was developed to obtain emotion information using a sentence or text. A Chinese language emotion thesaurus was constructed in which word has its own classification (such as commendatory, derogatory) and the corresponding emotion information. Their emotion recognition system was able to analyze the textual input, using sentence and paragraph to obtain the emotion such as the emotion value and category of emotion.

**Cowie et al. (2005)**, developed an intelligent emotion recognition system, interweaving psychological findings about emotion representation with analysis and evaluation of facial expressions. Created a system which was based on fuzzy rule for classification of facial expressions.

**Valstar et al. (2006)**, designed a fully automatic system for fast and robust facial expression recognition from face video. Analyzed subtle changes in facial expression and their temporal behavior by recognizing facial muscle action units. These action units helped in the detection of facial expressions of emotions, attitudes and moods from facial signals in a face video. A fully automatic facial localization method was used to detect 20 point of interests in the first frame of an input face video. Support, vector machine trained on a subset of most informative spatio-temporal features, was used for recognition of temporal segments and muscle action units.

**Chakraborty et al. (2009)**, presented a fuzzy relationship approach to human recognition from facial expressions and its control. Their proposed scheme used external stimulus to excite specific emotions in human subjects whose facial expressions were analyzed by segmenting and localizing the individual frames into regions of interest.

**Li et al. (2009)**, designed an emotional chatting system incorporating personality factor. The participants were asked to chat with the emotional chatting machine. The recorded results from the chat were then read by another machine which followed basic emotion reasoning rules.

**Ryan et al. (2009)**, focuses on real-time system which will detect the seven universal expressions of emotion disgust, Fear, Anger, Contempt, Sadness, Surprise and Happiness providing investigators with indicators of the presence of deception during the interview process. In addition, the system will include features such as full video support, snapshot generation, and case management utilities, enabling users to re-evaluate interviews in detail at a later date.

**AlMejrad (2010)**, studied emotions of human using wave signals of wave and classified emotions of human in three types i.e. social, motivational or social. These types represent different human emotions i.e. basic type includes emotions like disgust, anger, fear, sad, happy and surprise, motivational type includes emotions like hunger, thirst, pain and mood and social type includes emotions like pride, embarrassment, shame and guilt.

**Calix et al. (2010)**, focused on automatic emotion detection in descriptive sentences and used it to tune facial expression parameters for 3-D character generation. They compared manual and automatic word feature selection approaches to determine the influence of word features on classification accuracy using support vector machines (SVM).

**Dailey et al. (2010)**, in this paper two studies explored the effect of culture and learning on facial expression understanding. Japanese and U.S. participants interpreted facial expressions of emotion. Each group was better than the other at classifying facial expressions posed by members of the same culture. The model demonstrates how each of us, interacting with others in a particular cultural context, learns to recognize a culture-specific facial expression dialect.

**Rehaja et al. (2010)**, a system was developed that recognize the different human gesture in color image. Depending on threshold value the researchers system can recognize the facial expression. The approach of this system can be adapted to real time and describes the scheme of capturing the image and to recognize the gestures.

**Agrawal et al. (2010)**, the method of Eigen faces were discussed which was calculated by using Principal Component Analysis (PCA). Two type of methodology was introduced - feature extraction using principal component and feed forward back propagation neural network method.

**Hamdi et al. (2012)**, aimed to recognize the six, basic, primary emotions proposed by Ekman, using a widely-available and low-cost brain-computer interface (BCI) and a biofeedback sensor that measures heart rate. Results showed that the collected signals allowed identifying user's emotional state. In addition, a partial correlation between objective and subjective data can be observed.

**Saudagare et al. (2012)**, study presents a review of various techniques of facial expression recognition systems using MATLAB (neural network) toolbox. The task of detecting face was complex due to its variability present across human faces including color, pose, expression, position and orientation. So using various modeling techniques it was convenient to recognize various facial expressions.

**Valstar et al. (2012)**, presents a meta-analysis in automatic recognition of facial expressions, it details the challenge data, evaluation protocol, and the results attained in two sub challenges: AU detection and classification of facial expression imagery in terms of a number of discrete emotion categories. It also summarizes the lessons learned and reflects on the future of the field of facial expression recognition in general and on possible future challenges in particular.

**Quazi et al. (2012)**, an algorithm was being developed for automatic recognition of emotions using various clustering techniques. The partial developed system has shown good results in monitoring the physiological parameters. A smart sensing system, which would help in detecting human emotions based on information from physiological parameters obtained from sensors, has been designed and developed. Sensors continuously monitor the heart rate, skin conductance and skin temperature. The amplified and filtered signals from the sensors are then processed by a microcontroller and transmitted wirelessly using Zigbee technology. The received signals from the system were displayed and stored on the computer where they were analyzed visually for obvious patterns.

**Pushpaja et al. (2012)**, in their study presents a review of various techniques of facial expression recognition system using MATLAB (Neural Network Toolbox). Presents coding and decoding methodology for face recognition and classification of face recognition and token matching can be carried out any neural network for recognizing the facial expression.

**Shivhare et al. (2012)**, an emotion recognition based on textual data and the techniques used in emotion detection were discussed. Emotion can be expressed in many ways that can be seen such as facial expression and gestures, speech and by written text. Emotion Detection in text documents is essentially a content – based classification problem involving concepts from the domains of Natural Language Processing as well as Machine Learning.

**Savran et al. (2013)**, here the first practical 3D expression recognition using cheap consumer depth cameras was done. Despite the low fidelity facial depth data, and show that with appropriate pre-processing and feature extraction recognition was possible. Their method for emotion detection uses novel surface approximation and curvature estimation based descriptors on point cloud data, was robust to noise and computationally efficient. Experiments show that using only low fidelity 3D data of consumer cameras, we get 77.4% accuracy in emotion valence detection. Fusing mean curvature features with luminance data, boosts the accuracy to 89.4%.

**Lin et al. (2014)**, studied static 2D face images through reconstructing 3D model by a specific algorithm. Geometric features were collected and obtain the three-dimensional space of false geodesic distance. The experimental results show the recognition rate reaching to ninety percent. Results illustrate the validity of the algorithm.

It has been concluded from the research report by various researchers that emotion plays a vital role in people's everyday life. It is a mental state that does not arise through free will and was often accompanied by physiological signals. Therefore, monitoring these changes was important as they contain information about different types of emotions which will assist in understanding human behaviors and can help in identifying matters of concern and human opinion. Emotion recognition has become an important subject to human-machine interaction. Various methods have been used in the past to detect and evaluate human emotions. The most commonly used techniques include the use of textual information, facial expressions, speech and body gestures and physiological signals. Physiological Signals are obtained from skin temperature sensor, heart rate sensor and skin conductance sensor. Action units have been used for analyzing emotions in some facial expression recognition systems. 3D and 2D cameras were used for the detection of facial expression. For recognizing human emotions still images as well as video images has been used. Various techniques of facial expression recognition were reviewed using neural network toolbox in MATLAB and system was developed using machine learning.

## V. CONCLUSION

In this paper an emotion recognition system was developed which is based on data provided and also provided a priority wise list the people generally like to visit places in the city beautiful(Chandigarh)when they are in various different moods.The neural network approach is based on face recognition and feature extraction. A survey is developed basically on four human emotions i.e. happy, sad, angry and surprised. A still image facial expression recognition technique has been developed. Training is provided to the software to analyze or recognize the emotion. The literature review enabled an appropriate method of selection for the human emotion by facial recognition. Training the geometrical features found

to be the best approach to recognize emotional changes, as they provided information about changes that takes place physiological and out of a person's control. Information and knowledge gained from other researches helped in choosing the technique for facial expression recognition. Proposed technique can be thought as the two step approach. Firstly, training of geometrical features is provided through different images and features are extracted through PCA. Secondly, survey of tourist has been done of city beautiful (Chandigarh). The survey includes the places generally people like to visit when they are in a particular mood.

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