ABSTRACT

The development of a computational model of facial expression involves a comprehensive understanding of expression. This is a complicated task and is a multidisciplinary area of research. While developing a facial expression recognition system, multiple factors affecting and 'expression' should be taken into consideration. Broadly these factors are anatomical, neurological and psychological factors. Almost all researches can be classified through the above-mentioned factors, yet some researchers have overlooked these factors and directly developed computational models. No researcher has taken into consideration all factors simultaneously. Western scholars have pursued researches in this direction. But this research provides a new dimension in the Indian context, as Indian faces, is hardly touched by it. Facial expression recognition system work under the specified facial database. The western researchers had developed standard database for facial expression recognition, but it has not get been tested for Indian faces. The goal of this research is to develop an Indian facial expression database with facial action coding system (FACS) correlation. Moreover, the western models lack the categorization under the various age groups. My research is focused on especially Indian faces and hence I have proposed to develop own database, which is consistent with the expression and also the action units (AU). The goal of my database is to develop a set of appropriate images of Indian faces that can be used in the generation of an expression space. For the images to be deemed appropriate, I have taken care that images provide a means of measuring the variation in shape and texture of an individual regardless of identity while minimizing the variation in illumination, pose and orientation.

Psychology plays an important role in the formation of emotions and their exhibition through expression. Psychologists have classified expression as happiness, sadness, fear,
anger, disgust, surprise and the seventh expression ‘neutral’ for convenience [5] [6]. Psychology contributes to human behavior and mental thinking process immensely and hence facial expression, giving each individualistic expression a different identity differing in intensity from a set of prototypic expressions set [7]. A neural face is a relaxed face without contraction of facial muscles and without facial movements. It is the state of a person’s face most of the time, especially during unconscious state or when a person sleeps in contrast for a face with an expression, the facial muscles are some how contracted. Hence, facial expressions are deformations of the neutral face due to a person’s psychological state. When speaking, a persons expression is deformed from neutral face because of the movement of the mouth and other muscular motions induced by the dramatic content of speech therefore it can be taken into consideration that it is the psychology of a person that determines his emotions and hence expressions. Psychology plays an important role in the formation of emotions and their exhibition through expression. Psychologist and psychiatrists have proposed that the expressions of a normal person and a mentally retarded person differ in intensity and suitability for a particular stimulus. Psychology contributes to human behavior and mental thinking process immensely and hence facial expression, giving each individualistic expression a different identity differing in intensity from a set of prototypic expressions set.

Emotion is an important aspect of the mind, and these emotions are exhibited through facial expressions. Feedback and arousal theories suggest that the brain processes the emotional significance of the situation and produces responses mainly through facial expression appropriate to the stimulus. A person with a ‘disgust’ expression, responding to an offensive taste or smell, can be taken as an example. The neurons present in the brain activate different parts of the brainstem system, producing and controlling emotional responses and exhibiting or inhibiting them through facial expressions. Fundamental expression related to happiness, sadness, fear, anger, surprise, disgust, and neutral. Attempts have been made to express an expression in terms of anatomical facial action coding system (FACS), which involves anatomical aspects of the face. As the expression are controlled by the brain, it is useful to correlate the expressions with the brain. The objective of the present work is to report the experimental work carried out in this direction. For this experiment; portable Electroencephalograph (EEG) system has
been used to record the electrical signals from the brain for a given subject. The results correlated to facial action coding system and the average values with their standard deviations have been measured and reported in the thesis.