

A Theoretical Study on Pain Assessment through Human Facial Expression

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Abstract : A facial expression is undeniably the human manners. It is a significant channel for human communication and can be applied to extract emotional features accurately. People in pain often show variations in facial expressions that are readily observable to others. A core of actions is likely to occur or to increase in intensity when people are in pain. To illustrate the changes in the facial appearance, a system known as Facial Action Coding System (FACS) is pioneered by Ekman and Friesen for human observers. According to Prkachin and Solomon, a set of such actions carries the bulk of information about pain. Thus, the Prkachin and Solomon pain intensity (PSPI) metric is defined. So, it is very important to notice that facial expressions, being a behavioral source in communication media, provide an important opening into the issues of non-verbal communication in pain. People express their pain in many ways, and this pain behavior is the basis on which most inferences about pain are drawn in clinical and research settings. Hence, to understand the roles of different pain behaviors, it is essential to study the properties. For the past several years, the studies are concentrated on the properties of one specific form of pain behavior i.e. facial expression. This paper represents a comprehensive study on pain assessment that can model and estimate the intensity of pain that the patient is suffering. It also reviews the historical background of different pain assessment techniques in the context of painful expressions. Different approaches incorporate FACS from psychological views and a pain intensity score using the PSPI metric in pain estimation. This paper investigates in depth analysis of different approaches used in pain estimation and presents different observations found from each technique. It also offers a brief study on different distinguishing features of real and fake pain. Therefore, the necessity of the study lies in the emerging fields of painful face assessment in clinical settings.

Keywords : facial action coding system (FACS), pain, pain behavior, Prkachin and Solomon pain intensity (PSPI)

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