Chapter 11
A Review on Vision-Based Hand Gesture Recognition and Applications

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ABSTRACT

In the present scenario, vision based hand gesture recognition has become a highly emerging research area for the purpose of human computer interaction. Such recognition systems are deployed to serve as a replacement for the commonly used human-machine interactive devices such as keyboard, mouse, joystick etc. in real world situations. The major challenges faced by a vision based hand gesture recognition system include recognition in complex background, in dynamic background, in presence of multiple gestures in the background, under variable lighting condition, under different viewpoints etc. In the context of sign language recognition, which is a highly demanding application of hand gesture recognition system, coarticulation detection is a challenging task. The main objective of this chapter is to provide a general overview of vision based hand gesture recognition system as well as to bring into light some of the research works that have been done in this field.

INTRODUCTION

Presently, vision based hand gesture recognition has become a highly developing research field for the purpose of human computer interaction. Such recognition systems are deployed to serve as a replacement for the commonly used human-machine interactive (HCI) devices such as keyboard, mouse, joystick etc. in real world situations. Recently, gestures have become an important segment of such HCI devices. A

Figure 1. Types of hand gestures
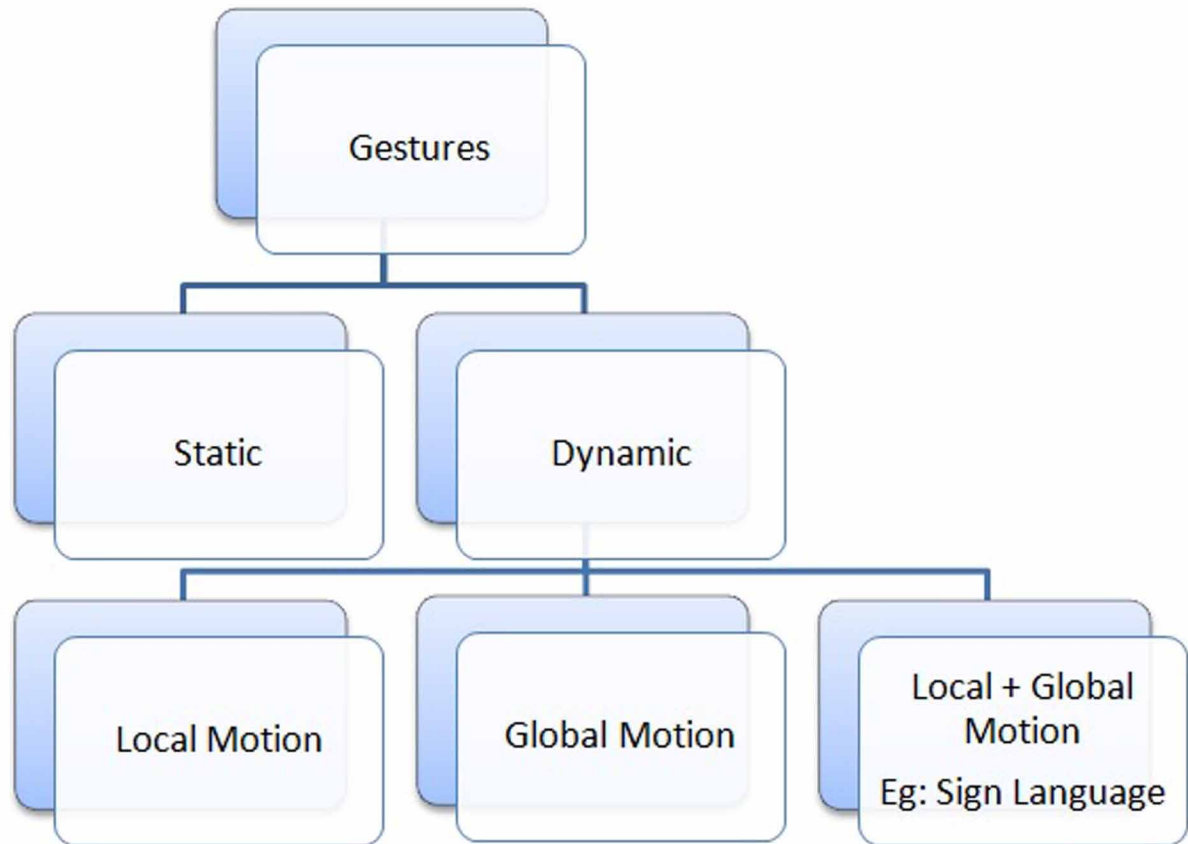
gesture may be defined as a physical movement of body parts such as hands, arms, head, face etc. to express some information or feelings (Murthy & Jadon, 2009). Gestures play an important role in our day to day communication. The ability of a computer or any processing system to understand the meaning of these gestures is referred to as gesture recognition. Among the various types of gestures, hand gestures are the most commonly used, as they are natural, easy to use and more convenient for communication. Hand gestures are basically of two types- static and dynamic (as shown in Figure 1). Static hand gestures do not involve any kind of hand movement in comparison to dynamic hand gestures, where either the entire hand moves (global motion) or only the fingers move (local motion) (Ahmeda, Alexanderb, & Anagnostopoulos, 2008).

There are mainly two approaches of hand gesture recognition: glove-based and vision-based. In glove-based method, the user needs to wear a sensor glove or a colored glove, which serves as an interface to communicate with the computer. Although, this approach gives accurate results, it affects the ease and naturalness with which the user interacts with the computer. Vision-based approach overcomes the drawback of glove based approach as it serves as a natural means of interaction. This method adopts computer vision and machine learning algorithms for recognizing the hand gestures. However, obtaining highly accurate results is a challenging task for vision based approaches (Rautaray & Agarwal, 2012).

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