

HUMAN BEHAVIOUR  
RECOGNITION,  
IDENTIFICATION,  
AND COMPUTER  
INTERACTION

Edited by

**Othman Omran Khalifa**, B.Sc., M.Sc., Ph.D.,  
International Islamic University Malaysia

**Shihab A. Hameed**, B.Sc., M.Sc., Ph.D.,  
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INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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# Chapter 11

## Feature Extraction: Hand Shape, Hand Position and Hand Trajectory Path

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### 11.1 Introduction

Vision-based hand posture detection and tracking is an important issue for Human to Computer Interaction applications. The performance of recognition system first depends on the process of getting efficient features to represent pattern characteristics [1]. There is no algorithm which shows how to select the representation or choose the features [2] so the selection of features will depend on the application. There are many different methods to represent 2-D images such as boundary, topological, shape grammar, description of similarity etc. [2-4]. Features should be chosen so that they are intensive to noise-like variation in pattern and keep the number of feature small for easy computation [5]. Hand posture shape features, motion trajectory feature and hand position with respect to other human upper body parts play an important role within the preparation stage of the gesture before recognition.

In this chapter, features have been extracted from hand posture closed contours, hand posture trajectory and hand position has been identified. Algorithms have been developed for extracting these features after segmenting the head and the two hands. These extracted features can be attached to a recognizer such as Support Vector machine, Hidden Markov Model, etc. for hand gesture recognition.

### 11.2. HEAD AND HAND SEGMENTATION

In order to segment human skin regions from non-skin regions based on colour, different approaches have been found that different human skin colours from different races fall in a compact region in colour spaces [6, 7]. However, it is not reliable to model a skin colour for people of different skin colours and under different lighting conditions. Limitations arise from the fact that human skin has common properties and that it can be defined in various colour spaces after applying colour normalization. So the model has to accept a wide range of