

# HUMAN BEHAVIOUR RECOGNITION, IDENTIFICATION, AND COMPUTER INTERACTION

Edited by

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

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INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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# Chapter 10

## COMPUTATIONAL INTELLIGENCE TECHNIQUES FOR HAND GESTURE RECOGNITION

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### 10.1. INTRODUCTION

Hand gesture is an approach that has gained much attention for real-time Human to Computer Interaction (HCI) applications. In this chapter, we provide a survey on Computational Intelligence Techniques (CIT) for hand gesture recognition for HCI applications in general and Hidden Markov Model (HMM) in particular. Many traditional methods exist in the field of pattern recognition to achieve hand posture and gesture recognition [1, 2] such as artificial intelligence techniques and statistical algorithms. However other types of self developed algorithms also exist, and are often referred to as non-traditional algorithms. For more details on both approaches used for visual human action recognition, readers can refer to the study by Michael et al. in [3]. Artificial Neural Network's (ANN) ability in finding patterns and versatility in training makes it popular learning method in gesture recognition. ANN and its variation such as have been used for SL gesture recognition in any forms as in [4]. Two noticed research work for gesture recognition using ANN where 3D Hopfield NN [5] and Time-Delay NN (TDNN) has been developed by [6]. Recently, ANN has been less used in the field of gesture recognition because of its greater computational burden, susceptibility to training data over-fitting and the huge number database it requires.

In the area of modeling and classifying dynamic gestures, HMM-based recognition has been a very popular technique, and mostly used in classification process because they offer dynamic time wrapping, a training algorithm, and a clear Bayesian semantics. Many HMM topologies have been extended from the conventional HMM approach such as Discrete HMM (DHMM), Continuous HMM (CHMM), Partial HMM (PHMM) and Parallel HMM (PaHMM) to handle more problems.