Chapter 8
Gesture and Posture Recognition by Using Deep Learning

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ABSTRACT

Sign language facilitates communication in the community with speaking and hearing problems. Those people communicate with one another using hand gestures and body movements. These techniques of human-computer interaction range from primary keyboard inputs to complex vision-based gesture detection systems. One of the fascinating HCI technologies is hand gesture recognition. The goal of gesture recognition is to construct a system to use as a communication medium in various applications. The application of gesture recognition has become popular in healthcare, robotics, etc. Posture recognition is deployed in several sectors, including medicine. Deep learning-based models are used to understand gesture and posture recognition results better. This chapter covers the challenges of gesture and posture recognition and how deep learning techniques are used to assist machines in overcoming these challenges more effectively. In addition, this chapter also discusses the applications in which gesture and posture recognition can be employed in detail.

DOI: 10.4018/978-1-7998-8892-5.ch008

INTRODUCTION

Gesture Recognition

A gesture is an example of nonverbal communication. When speaking, a gesture is a motion of the hand, arms, or other body part that is used to communicate or accentuate something. In other words, gestures are motions of the body that convey something (Alnaim, 2020). A wave of the hand, for example, is a typical gesture used to greet someone. Hands and face are the most prevalent. Some advancement in glove-based systems finally enabled the realisation of computer vision-based recognition without needing any sensors mounted to the glove (Praveen & Shreya, 2015).

The purpose of gesture recognition is to identify distinct human gestures, for which domestic & global research experts have sought to use deep neural networks. To capture data, early gesture recognition systems relied mostly on wired machinery and devices in direct contact with the hand, such as data gloves, accelerometers, and multi-touch displays (Abhishek et al., 2020). These sensors can detect the angle and position of fingers, joints, and arms, among other things.

Facial gesture recognition is another method for efficiently developing non-contact interfaces between humans and robots. Despite the many physical differences between users, the major goal of facial gesture recognition for robots is to capture emotions and communication indicators among people.

Posture Recognition

Posture refers to how human body is positioned when sitting, standing, or laying down. Posture is good when train the body on how to sit, stand, walk, and lay in such a way that muscles and ligaments are not overworked when moving or doing weight-bearing tasks.

Posture recognition is extensively used in a variety of sectors, including geriatric health care, environmental awareness, HCI (Human-Computer Interaction), surveillance, and physical training.

The posture recognition system is divided into two parts.

- The stage of training and assessment.
- The stage of deployment.

Posture Analysis

A good posture recognition result may be used to analyse and anticipate people's movement, which can be useful in the smart home, gaming entertainment, and motion analysis fields. People's lives will be made easier by incorporating posture detection into smart devices and services. Figure 1 shows hand gesture of human (SRC: Coldewey, 2019). In the future, posture recognition capabilities might be extended to a variety of smart gadgets, broadening the range of products and services available. The postures made by human are shown in Figure 2 (SRC: Ding, W et al., 2020).