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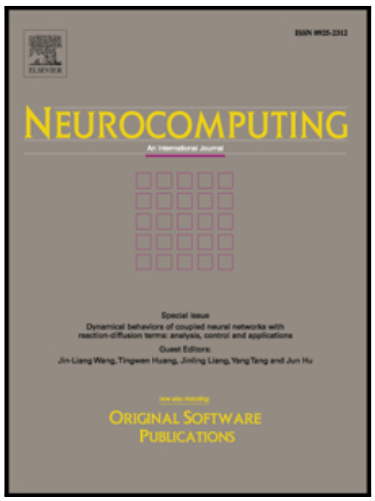

3D human gesture capturing and recognition by the IMMU-based data glove

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3D human gesture capturing and recognition by the IMMU-based data glove

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Abstract. Gestures recognition provides an intelligent, natural, and convenient way for human–robot interaction (HRI). This paper presents a novel data glove for gestures capturing and recognition based on inertial and magnetic measurement units (IMMUs), which are made up of three-axis gyroscopes, three-axis accelerometers and three-axis magnetometers. The proposed data glove has eighteen low-cost IMMUs, which are compact and small enough to wear. The gestures included the three-dimensional motions of arm, palm and fingers are completely captured by the data glove. Meanwhile, we attempt to use extreme learning machine (ELM) for gesture recognition which has not found yet in the relevant application. The ELM-based recognition methods **for both** static gestures and dynamic gestures are respectively presented. The experimental results of gestures capturing and recognition verify the effectiveness of the proposed methods.

Keywords: gestures recognition, capture, inertial and magnetic measurement unit, extreme learning machine

1 Introduction

Gestures are expressive, meaningful body motions involving physical movements of the fingers, hands, arms with the intent to convey meaningful information or to communicate with the environment. With the rapid development of computer technology, various approaches of human computer interaction have been proposed in these years. Human-computer interaction with hand gestures plays a significant role in these modalities. Therefore, hand-gesture-based methods stand out from other approaches by providing a natural way of interaction and communication.

Recently, various gesture capturing and recognition technologies have been proposed. These studies can be divided into two categories, based on their motion capture mechanism: vision-based or glove-based [1]. Vision-based techniques rely on image processing algorithms to extract motion trajectory and posture information. On the other hand, glove-based techniques rely on physical interaction with the user. Based on vision gesture method, users generally do not need to wear collection equipment

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