Gesture segmentation and classification using affine speed and energy

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Abstract-

The characterization and analysis of hand gestures are challenging tasks with an important number of applications in human–computer interaction, machine vision and control, and medical gesture recognition. Specifically, several researchers have tried to develop objective evaluation methods of surgical skills for medical training. As a result, the adequate selection and extraction of similarities and differences between experts and novices have become an important challenge in this area. In particular, some of these works have shown that human movements performed during surgery can be described as a sequence of constant affine-speed trajectories. In this article, we will show that affine speed can be used to segment medical hand movements and present how the mechanical energy computed in the segment is analyzed to compare surgical skills. The position and orientation of the instrument end effectors are determined by six video photographic cameras. In addition, two laparoscopic instruments are capable of measuring simultaneously the forces and torques applied to the tool. Finally, we will report the results of these experiments and present a correlation between the mechanical energy values, dissipated during a procedure, and the surgical skills.

Index Terms- Affine speed, hand gesture classification, energy, hand motion representation

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