Extraction of Personal Features from Surface Myoelectric Signals and its Application to Biometric Authentication MASTER THESIS

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ABSTRACT

Today, biometric authentication is used for identification in various situations in our daily lives. Familiar examples include facial recognition on smartphones and fingerprint authentication at banks. Biometric authentication is a personal authentication method that uses behavioral or physical characteristics. The most common methods of authentication using physical characteristics are those that capture information from a camera or scanner, such as the face or veins. These authentication methods are characterized by short registration and authentication times and high accuracy. On the other hand, these physical characteristics are superficial, so there is a risk of theft, and once the information is leaked, it cannot be changed. Therefore, in this study, we focused on body surface electromyograms, which are one of the signals inside the body.

In this study, we investigate the possibility of personal authentication using surface EMG (s-EMG). Five healthy male subjects in their twenties were measured with two different electrodes placed at 8 cm and 16 cm from their wrists joint. s-EMG waveforms were measured for three sets (60 seconds in total) for each subject, with a 10-second resting period and a 10-second exercise period using hand grips.

In previous studies, features were increased for waveforms cut at 0.1-second intervals, and features that contributed to improving the identification rate were selected from many feature parameters by random forests, and identification was performed by SVM. As a result, the maximum discrimination rate was 53.5%.

Therefore, in this study, the number of cutout seconds was changed to 0.5 seconds, and identification was performed under the same conditions. As a result, the maximum discrimination rate was 97.97%, which is about 1.83 times higher than that of the previous study. In addition, the number of subjects was increased by two, and five out of seven subjects were identified as one group for a total of 21 pairs using the same procedure. As a result, the possibility that five subjects who were easy to identify were gathered by chance was low, and the tendency of the feature values contributing to identification could be captured.