

Linkage Pattern Mining Method for ECG data

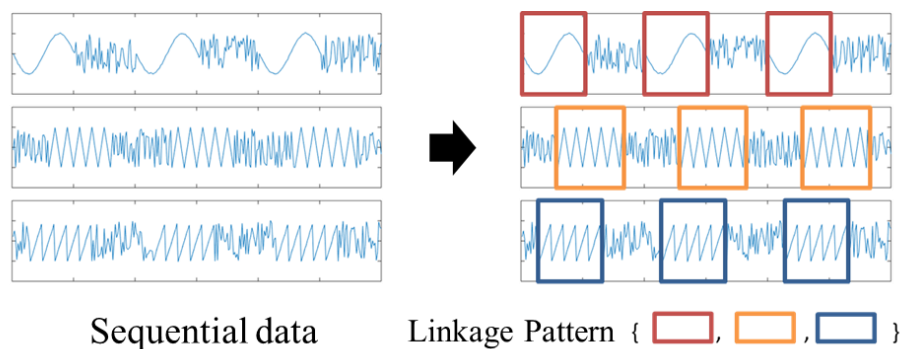
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○ Linkage pattern mining method for multiple sequential data

Linkage pattern mining is a data mining technique that finds frequent patterns that appear repeatedly across multiple sequential data. This technique does not assume similarity or correlation between the frequent patterns in a linkage pattern; thus, it is expected to be a promising approach for discovering causal association among events in multiple sensor data, such as physiological signals in different regions and crustal movements at different points. However, existing methods have focused only on detecting linkage patterns without noise/fluctuations in sequential data.

This study's objective is to develop a new noise-robust linkage pattern mining method. The proposed method excludes pseudo patterns derived from noise using closed itemset mining from interval graphs regarding frequent patterns such that only noiseless and maximal linkage patterns are extracted. The proposed method is applied to artificial sequential datasets with embedded linkage patterns. Experimental results show that this method can adequately detect embedded linkage patterns without noise and previously undetectable embedded linkage patterns with noise.



○ Application of linkage pattern mining to ECG data

The proposed method is applied to real ECG (electrocardiogram) data, and the performance is evaluated. In this experiment, an entropy-based discretization method is newly incorporated into the proposed method in order to deal with the peak in ECG data. As a result, it is shown that the proposed method can extract meaningful linkage patterns that are composed of waves crucial for diagnosis of heart disease. This suggests that the proposed method is available as a new abnormality detector for ECG data.

