(21)Hybrid hierarchical method for electrocardiogram heartbeat classification

1. **Preprocessing: Filtering & Segmentation**

DWT : Discrete Wavelet Transform

1. **Feature Extraction**

PCA : Principle Component Analysis

1. **Classification & Classifier**

* **Two strategies for classification, one versus one and one versus all**

Using : SVM : Support Vector Machine

1. **Accuracy**

-overall and average accuracies obtained by the first stage are 98.40% and 97.50% respectively

* For the second stage, 94.94% and 93.19% are the best overall and average accuracies obtained respectively
* The best results are achieved using SVM with one versus one

1. **Two Leads or One Lead ? In case of two leads .. how classification of two leads is merged to have final decision ?**

A new fusion step is introduced, where stacked generalization algorithm is applied and different types of classifiers have been examined.

- The new step has been examined and compared with the rejection method utilised by the existing studies

In addition, simplifying the classification process to a one versus one strategy achieved the best accuracies for both lead 1 and lead 2. Furthermore,

1. **Classes**

15 classes mapped to 5 categories