

Heartbeat classification using abstract features from the abductive interpretation of the ECG

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Abstract This paper aims to prove that automatic beat classification on ECG signals can be effectively solved with a pure knowledge-based approach, using an appropriate set of abstract features obtained from the interpretation of the physiological processes underlying the signal. **Methods:** A set of qualitative morphological and rhythm features are obtained for each heartbeat as a result of the abductive interpretation of the ECG. Then, a QRS clustering algorithm is applied in order to reduce the effect of possible errors in the interpretation. Finally, a rule-based classifier assigns a tag to each cluster. **Results:** The method has been tested with the MIT-BIH Arrhythmia Database records, showing a significantly better performance than any other automatic approach in the state-of-the-art, and even improving most of the assisted approaches that require the intervention of an expert in the process. **Conclusion:** The most relevant issues in ECG classification, related to a large extent to the variability of the signal patterns between different subjects and even in the same subject over time, will be overcome by changing the reasoning paradigm. **Significance:** This work demonstrates the power of an abductive framework for time series interpretation to make a qualitative leap in the significance of the information extracted from the ECG by automatic methods.

Palabras clave Heartbeat classification, Abductive reasoning, Knowledge based systems, Biomedical signal processing

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