

References for our algorithm's accuracy for detecting atrial fibrillation

Atrial fibrillation is one the most common type of arrhythmia. In the case of this heart condition the functioning of the sinoatrial node - which produces the impulse needed for the heart muscles to work – stops. This causes the atrias to generate rapid electrical discharges although most of these impulses do not result in a heart beat because of the atrioventricular node, since it has limited conduction velocity and that reduces the rate at which the impulses reach the ventricles during an episode of Atrial fibrillation.

One of the most common types of examination to detect Atrial fibrillation is the Electrocardiography. In this case two main things can indicate an Atrial fibrillation:

- The absence of the P waves which would indicate the normal functioning of the sinoatrial node
- The heart rhythm becomes very unstable and irregular

We tested the accuracy of our algorithm with 30 seconds long ECG recordings. For this we used approx. 5000 healthy and 5000 Atrial fibrillation signals from the following databases:

Recordings with Atrial fibrillation

- [PhysioNet\PhysioBank\ECG Databases\Long-Term AF Database](#)

Healthy recordings

- [PhysioNet\PhysioBank\ECG Databases\MIT-BIH Normal Sinus Rhythm Database](#)

The process of the test was the following:

- We evaluated the 30 seconds long recordings
- In each and every recording we measured the RR distances and made a Poincaré-graph
- We analysed the dispersion and the number of clusters
- Considering the above stated points the algorithm decides if the recording is from a healthy person or not

The results of the testing:

- In the Atrial fibrillation group there were 5194 True positive and 69 False negative, which translates into 98,69 % Sensitivity.
- In the healthy group there were 5216 True negative and 21 False positive, which translates into 99,59% Specificity.

Sensitivity means the correct determination of the unhealthy samples while Specificity means the correct determination of the healthy samples.

This means that we can detect Atrial fibrillation with our algorithm in 98,69 % of cases. Just for the record the accuracy of other, similar products are as follows:

- AliveCor, Inc. – Kardia – Sensitivity: 97 %
- Lohman Technologies – AfibAlert – Sensitivity: 94,6 %

The application and the algorithm within changed considering the evaluation of the ECG recordings. In the newer versions we also measure the P wave – check if it is significant or absent – and conclude an evaluation which takes this into account too. This means, that our algorithm became more precise and more flexible since we can detect Atrial fibrillation more accurately, but we can also check the heart rhythm's regularity in the recording.

Sanatmetal Ltd.