

Authentication system Based on ECG

TEAM: SC\_5



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Data Acquisition:

TB Diagnostic ECG Database

Data has been collected from <https://www.physionet.org/content/ptbdb/1.0.0/>

From 52 Healthy control subjects   
we selected only 4 for our system

Data preparation:

First, we got the signals and removed isoline drift.

By using high pass filter and moving average filter to get the corrected filter.

(corrected=filtered - baseline)

Then do segmentation to extract ECG segments.

Then split data with ratio 80/20

And save one segment from each person in text file to be used for testing

Used Butterworth filter of order 4 and band (2,40)

Feature Extraction:

Then extract features using three methods:

1. Discrete wavelet transform level 4 or 5 with db4 or sym4 symlet
2. Auto correlation /Discrete Cosine Transform (AC/DCT)
3. Pan Tompkins algorithm for ECG points detection

Classification:

Then used 3 classifiers:

1. Support vector machines (SVM): parms=linear kernel
2. Logistic Regression: parms= default
3. Linear Discriminant Analysis (LDA): parms= default

|  |  |  |  |
| --- | --- | --- | --- |
|  | Classifier | | |
| Feature extraction method | SVM | Logistic Regression | LDA |
| Wavelet | 100% | 100% | 100% |
| AC/DCT | 100% | 92.5% | 100% |
| Fiducial features /Pan Tompkins | 97.5% | 87.5% | 100% |

A picture containing screenshot, square, rectangle, diagram

Description automatically generated

Classification Results:

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A picture containing screenshot, square, rectangle, diagram

Description automatically generated

Pan Tompkins with SVM

Wavelet with LDA

A screenshot of a computer screen

Description automatically generated with low confidenceScreen Shots:

A screenshot of a computer

Description automatically generated with medium confidence

A screenshot of a computer screen

Description automatically generated with low confidence

Architecture of the ECG identification

ECG Signal

1. Preprocessing

Filtering

Segmentation

Remove isoline drift/wander Noise

2. Feature Extraction

AC/DCT

Wavelet Transform

Fiducial features**/**

Pan Tompkins

Person X

3. Classification

Logistic Regression

LDA

SVM

Features

Features

Features