



The Fourier Transformation

@PyDataVenice #12 #Meetup #PyData



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Data & Automation Specialist

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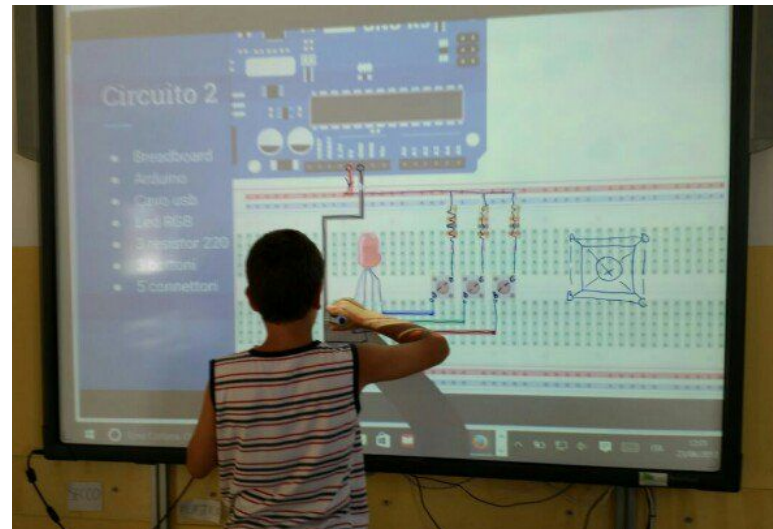
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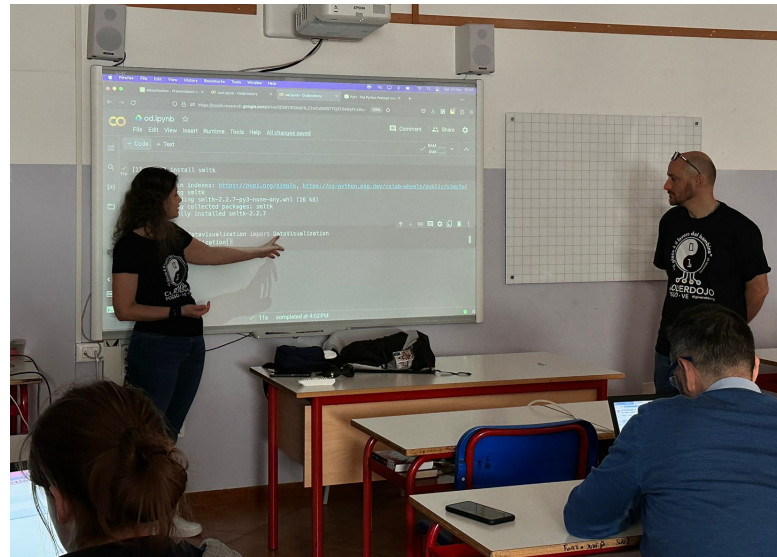
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Agenda

Goal

Challenge

Solutions

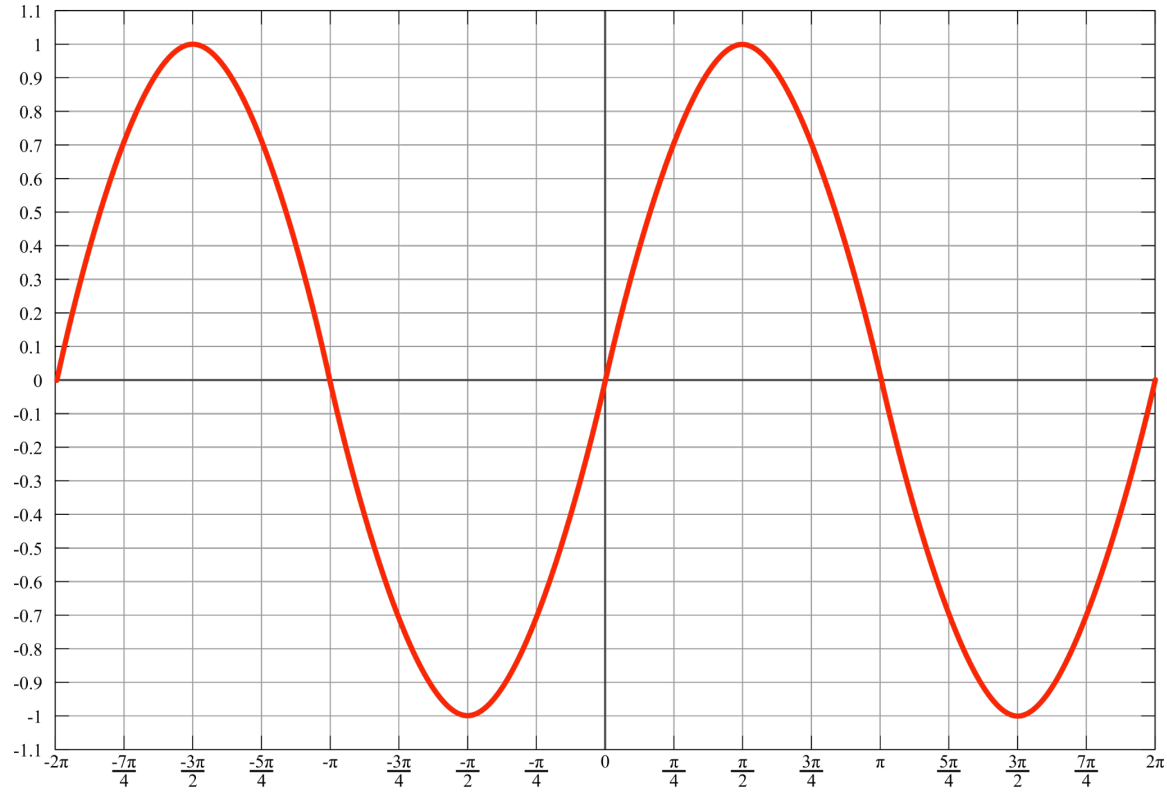
Results

Applications

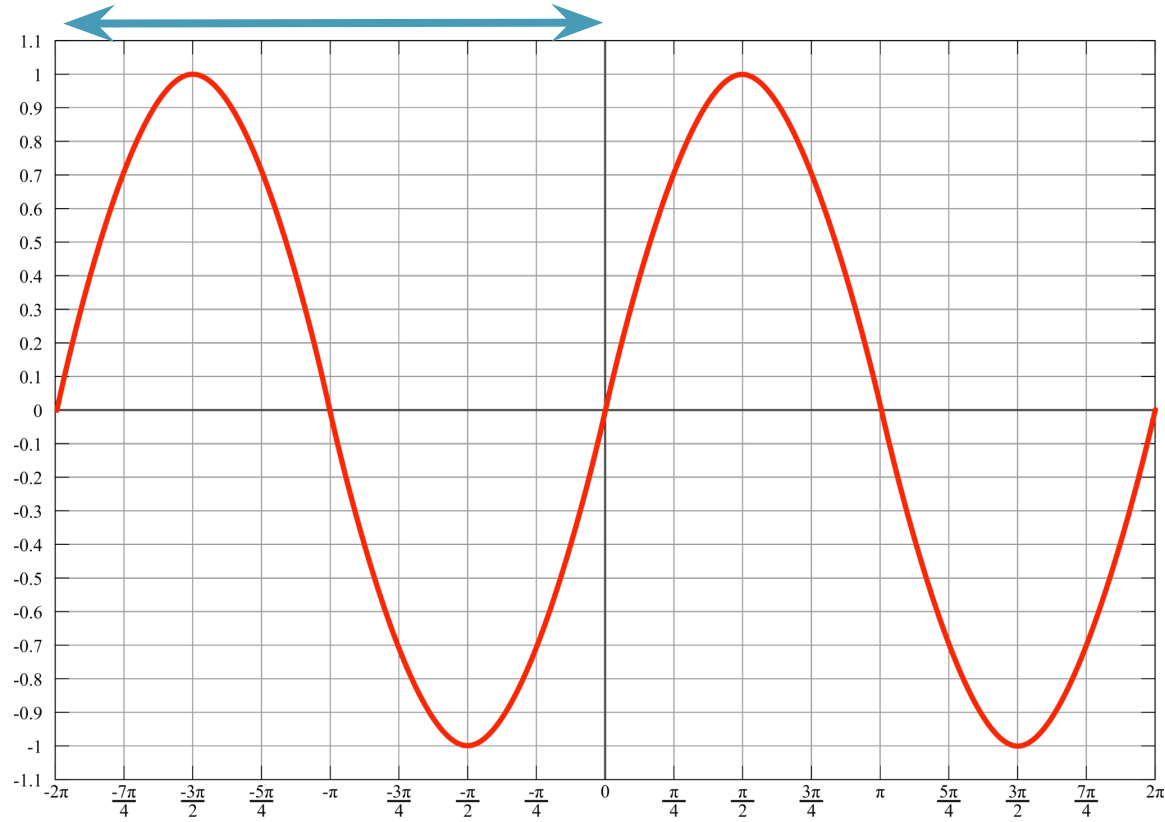
Goal



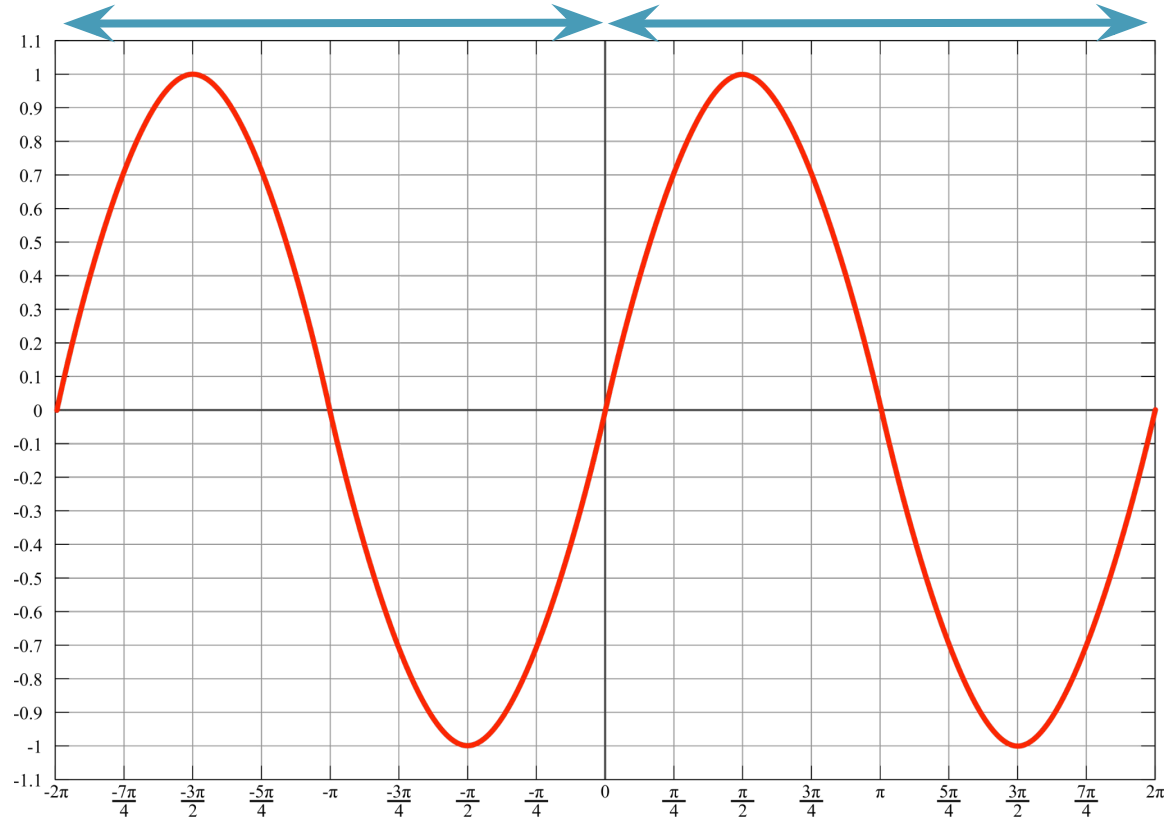
Goal



Goal



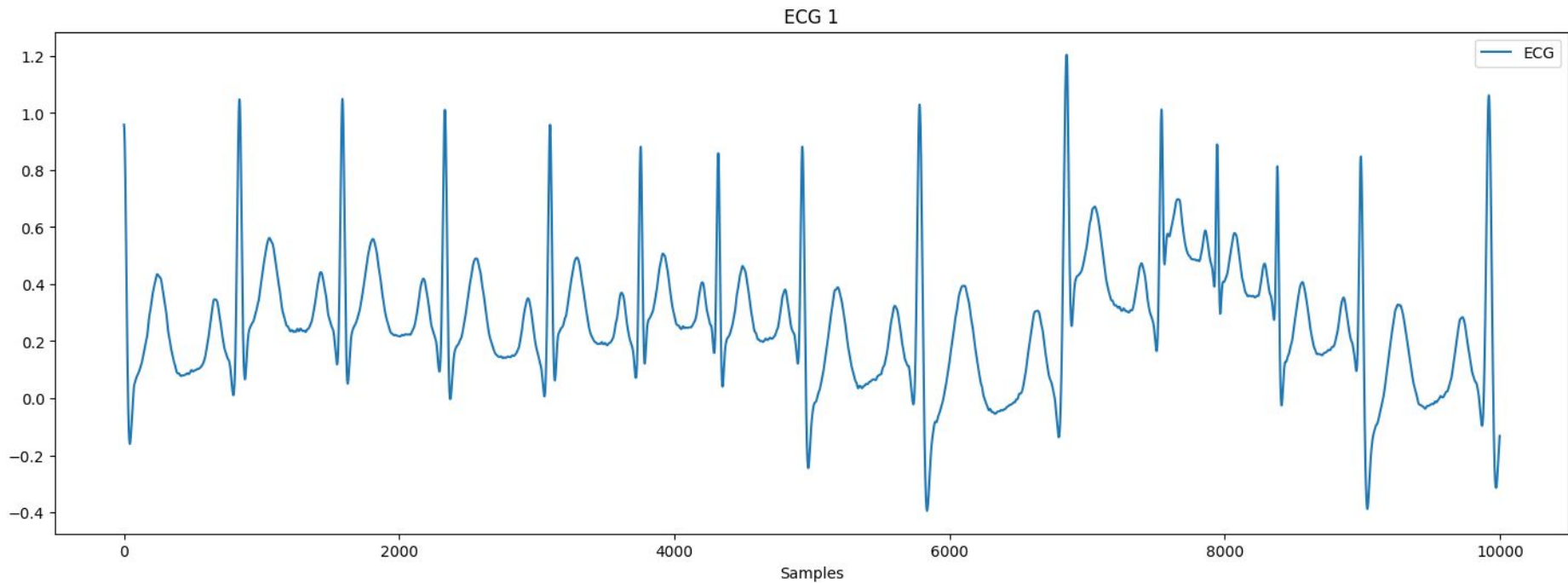
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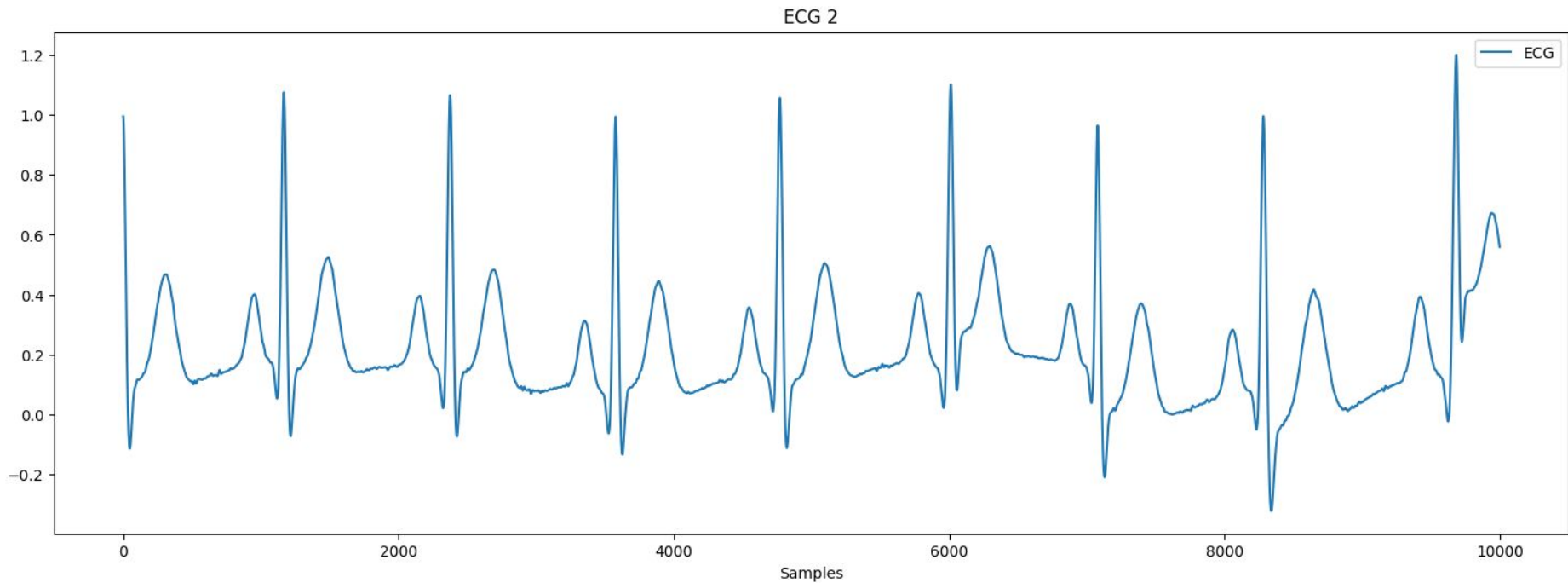
Challenge



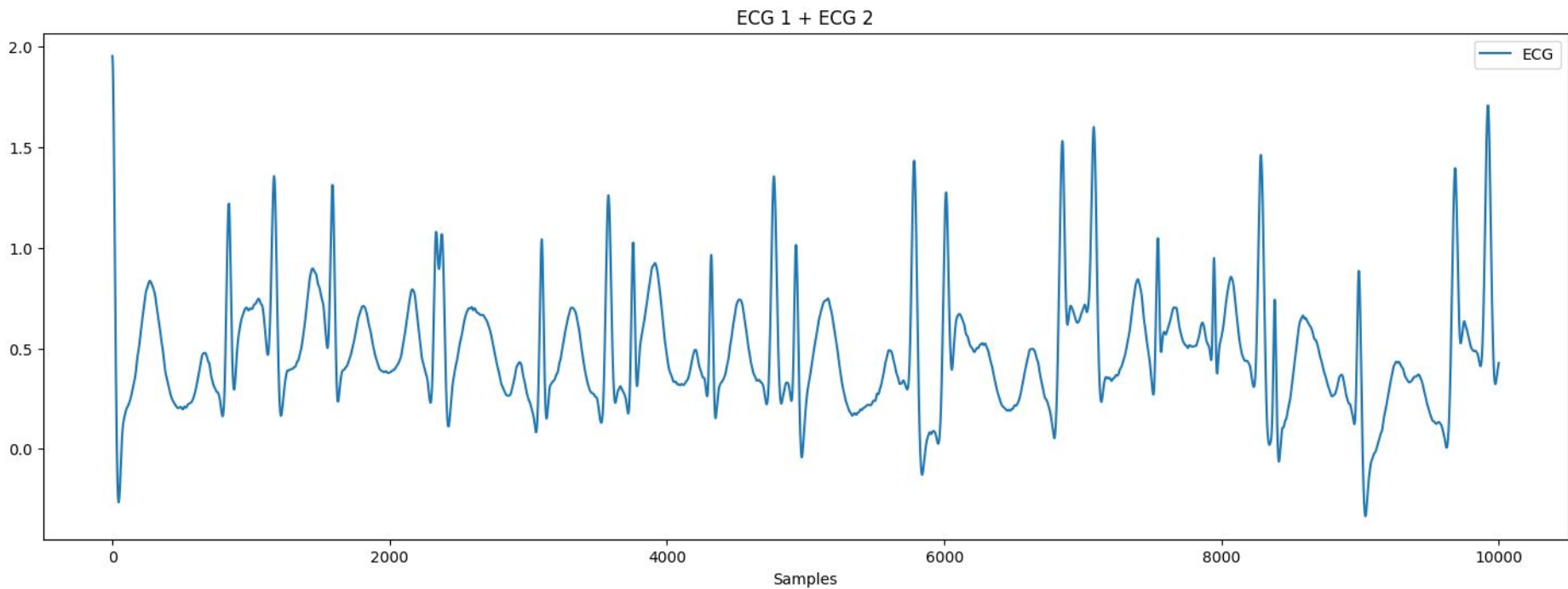
Challenge



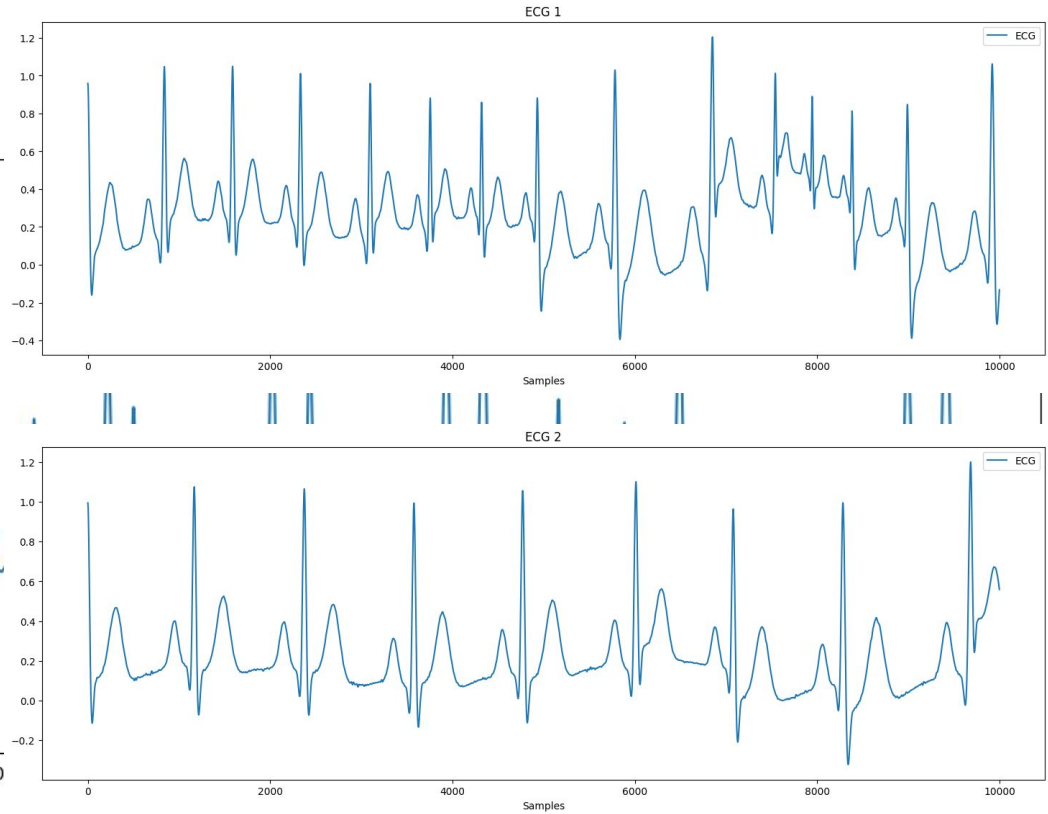
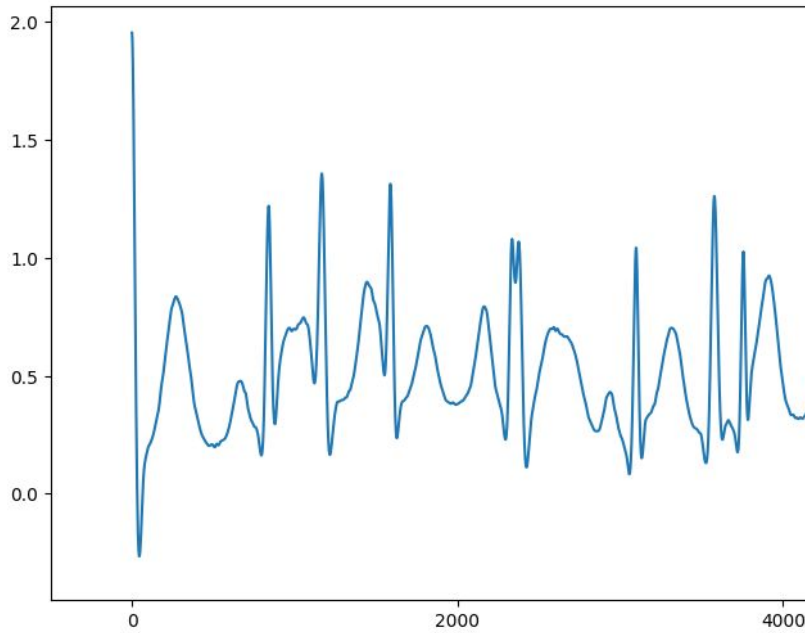
Challenge



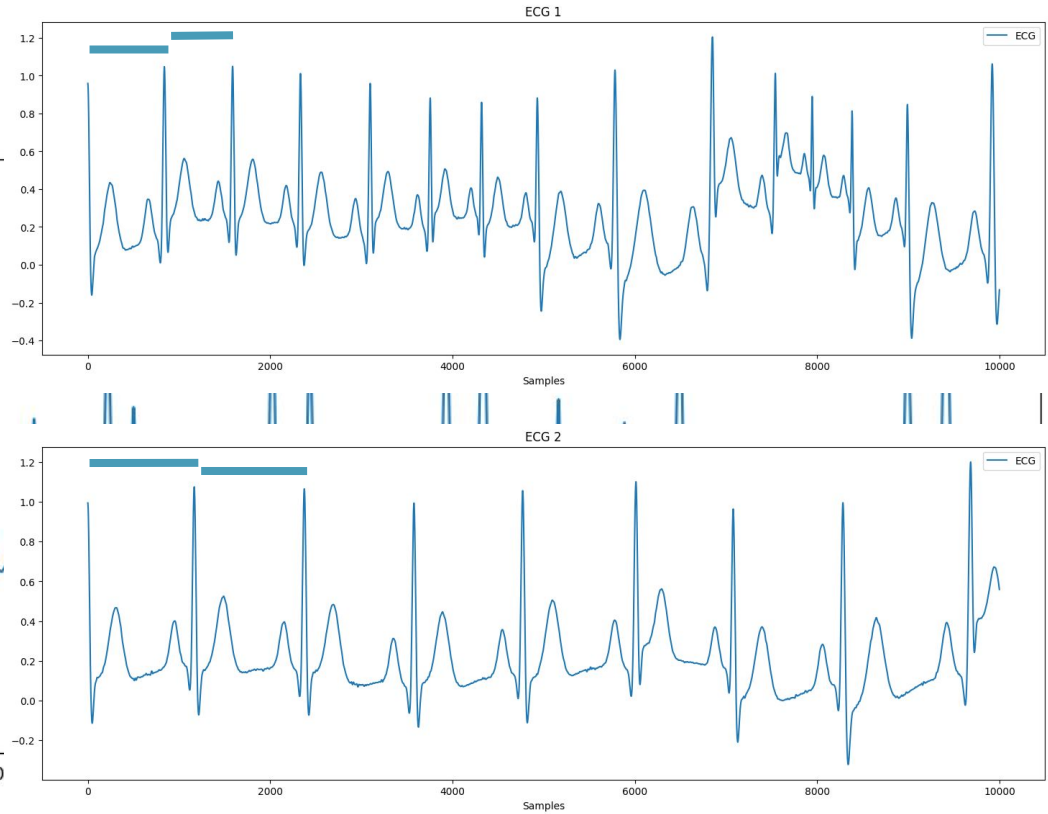
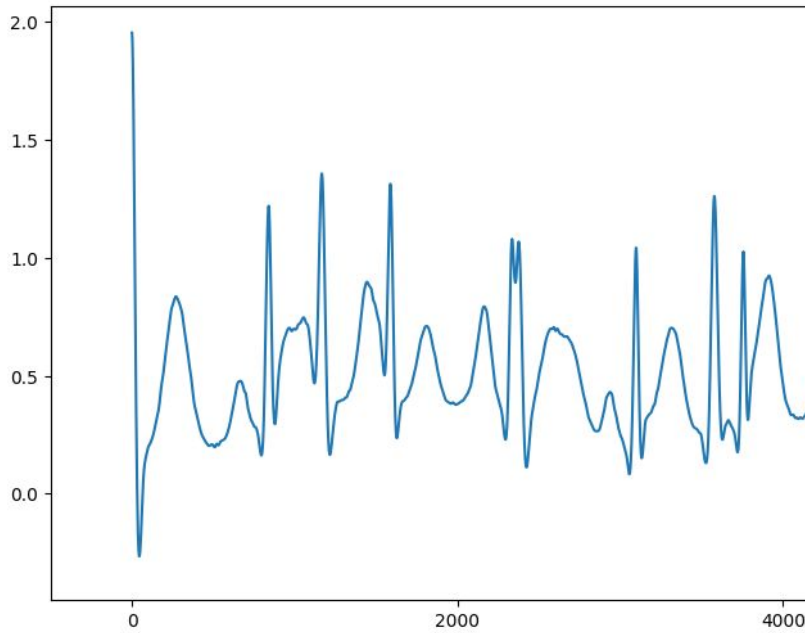
Challenge



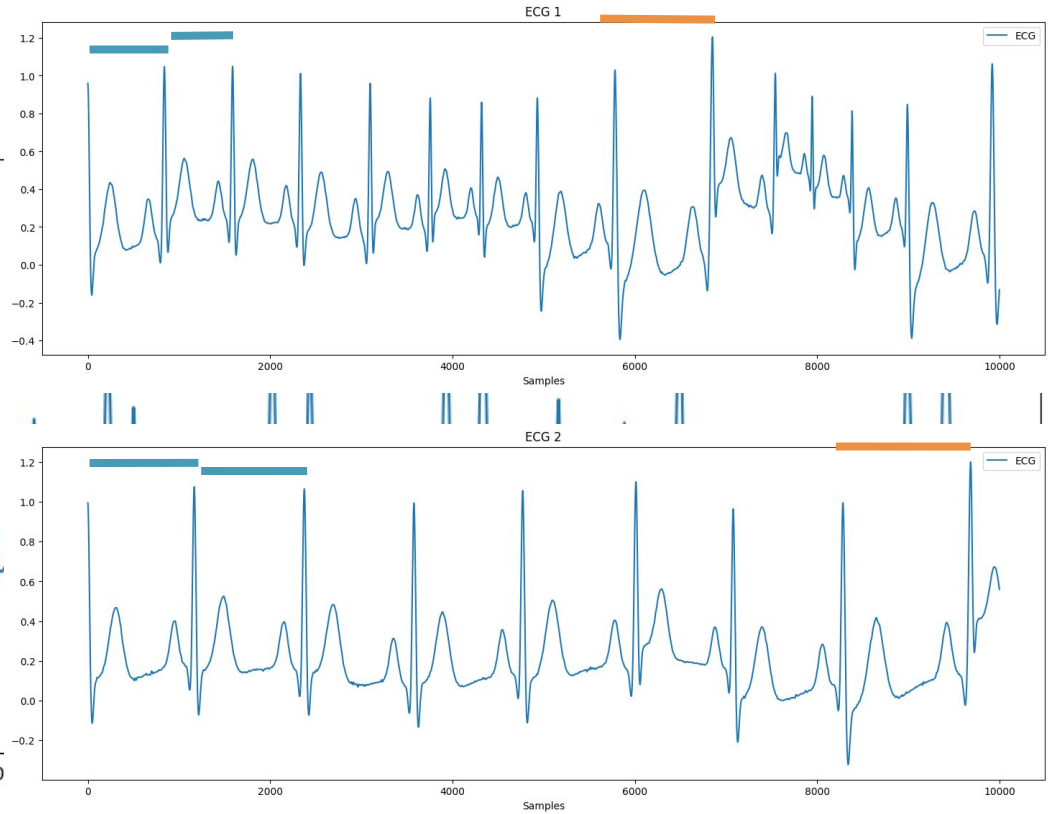
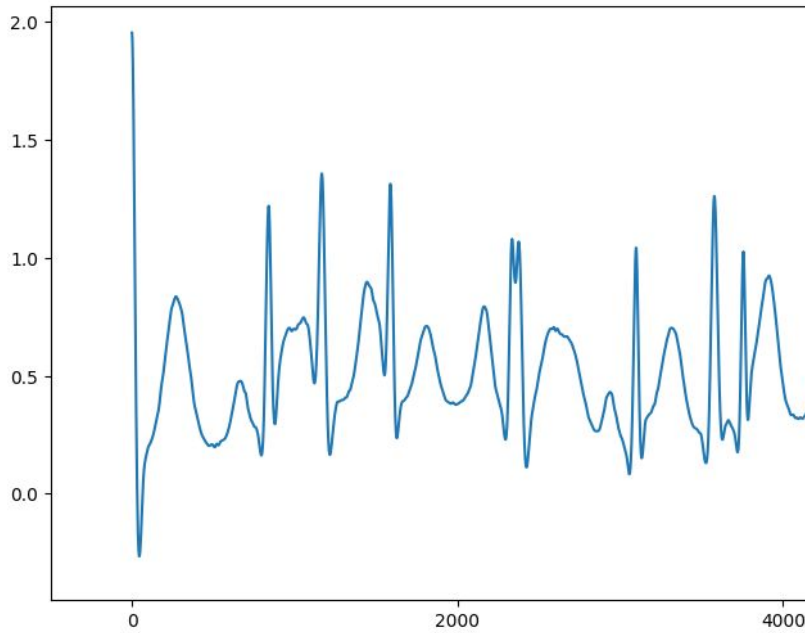
Challenge



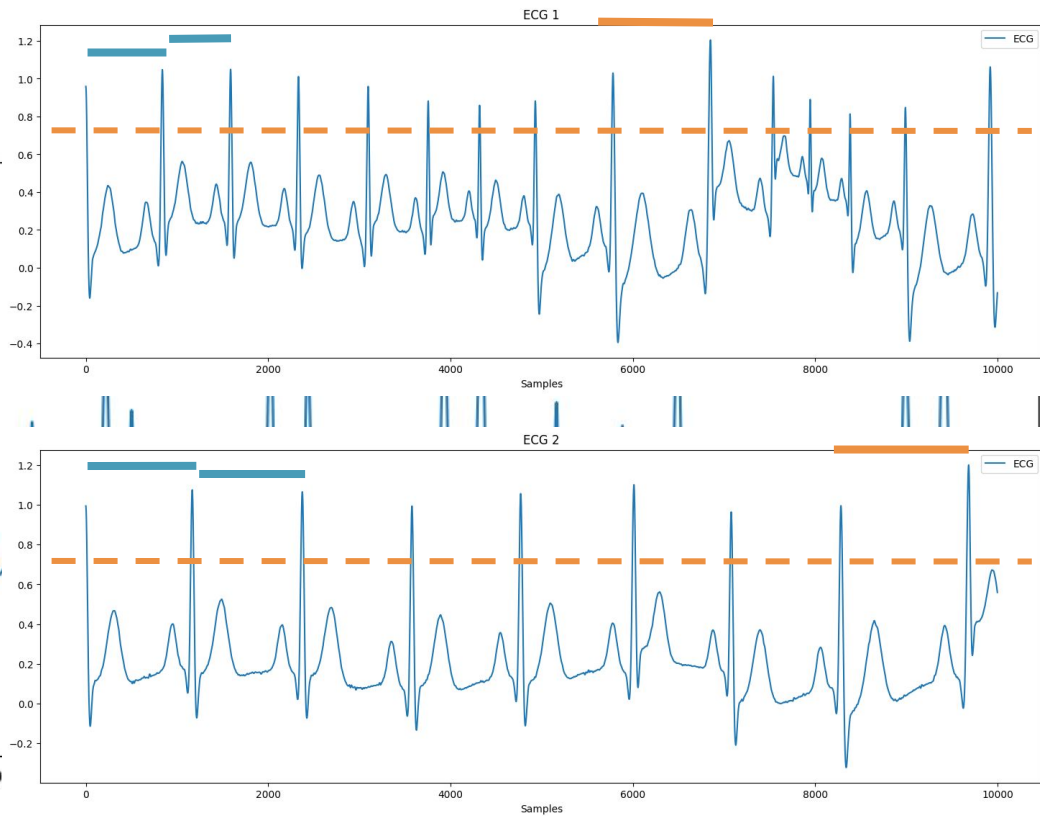
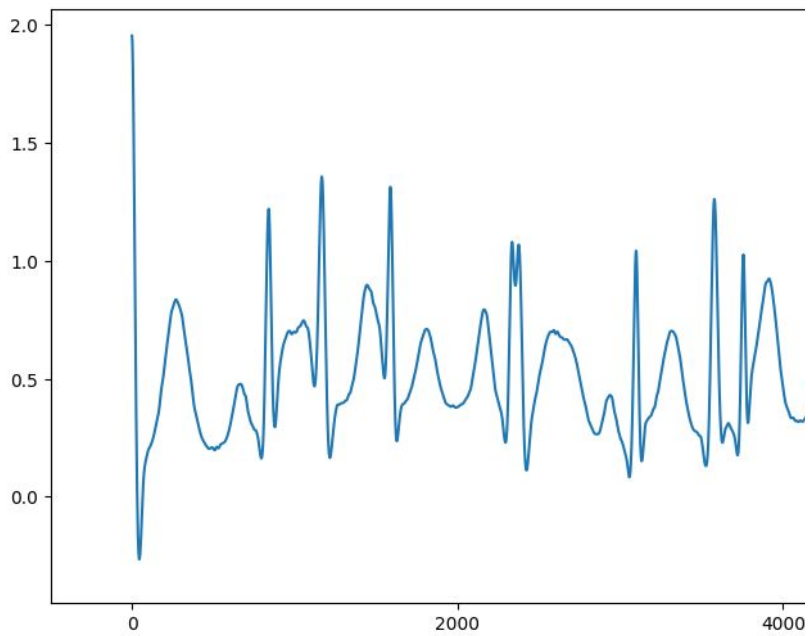
Challenge



Challenge



Challenge



Data simulation code

Solutions



Custom algorithm

Goal:

count periods

Challenge:

signal decomposition



Custom algorithm

Goal:

count periods

Challenge:

signal decomposition

- input
 - signal composition
- output
 - periods for each signal



The Fourier transformation

Goal:

count periods

Challenge:

signal decomposition



The Fourier transformation

Goal:

count periods

Challenge:

signal decomposition

- input
 - signal composition
- output
 - frequency
 - each signal

Signal decomposition code

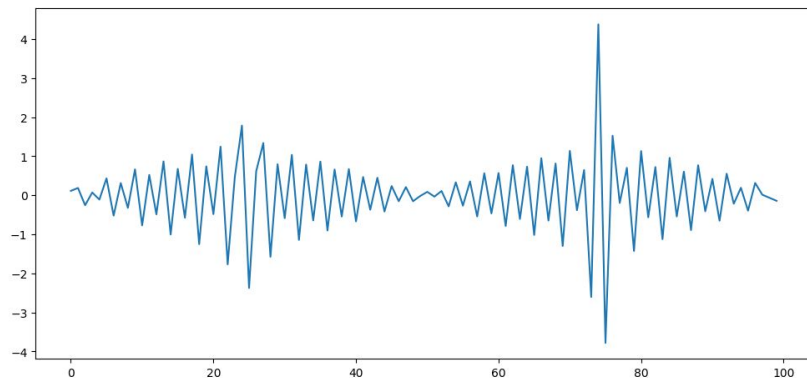
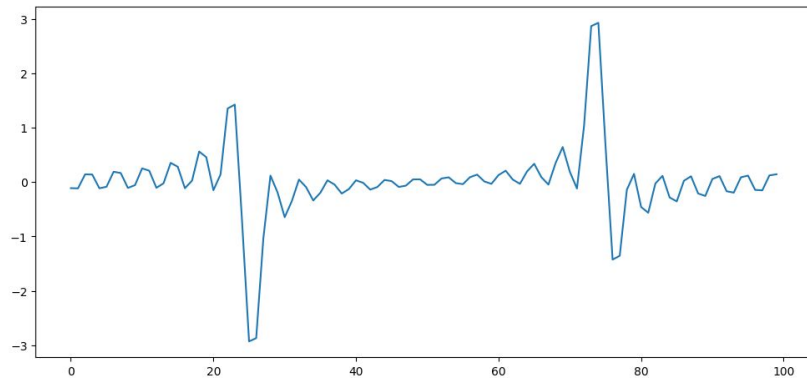
Results

- input
 - signal composition
- output
 - frequency
 - each signal

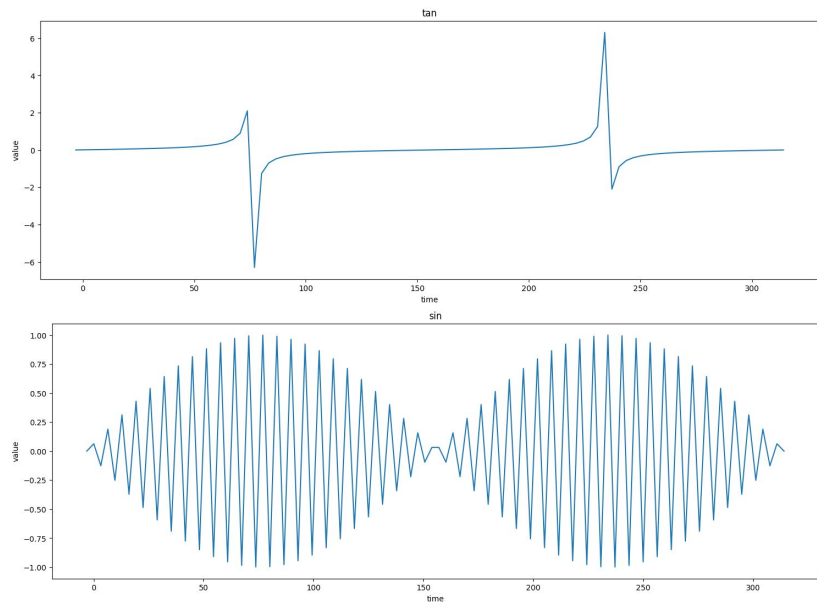
Results

- input
 - signal composition
- output
 - frequency
 - each signal

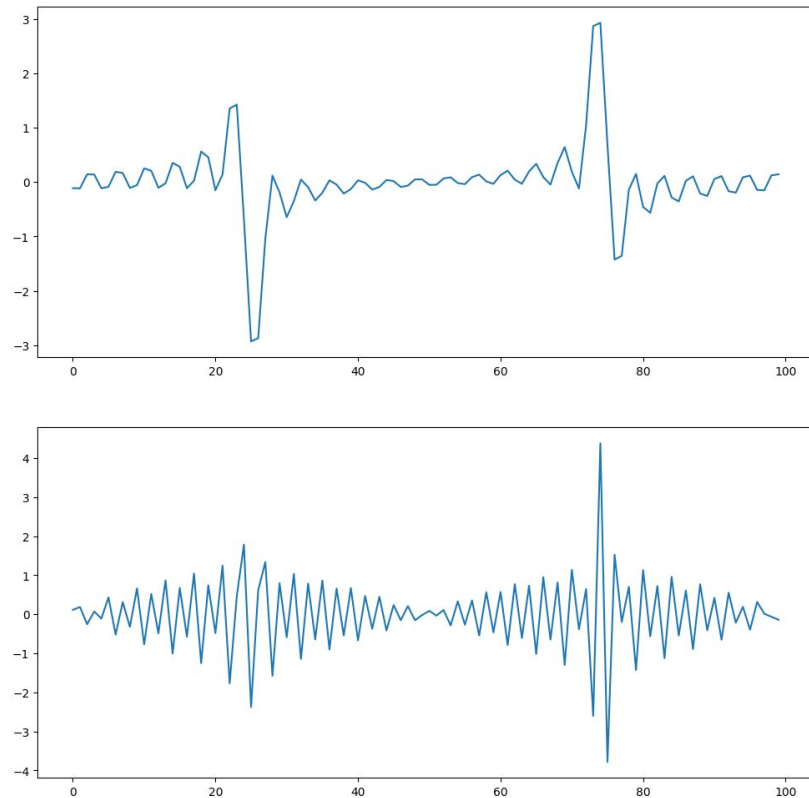
Decomposition of signal into 2 frequency bands



Results



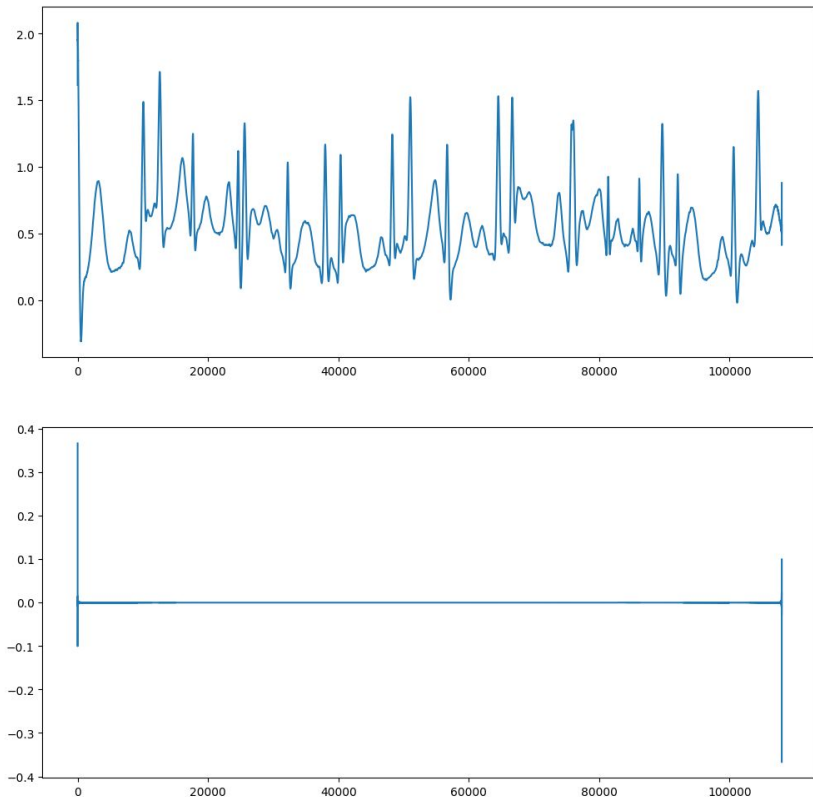
Decomposition of signal into 2 frequency bands



Results

- input
 - signal composition
- output
 - frequency
 - each signal

Decomposition of signal into 2 frequency bands





Machine Learning

Goal:

count periods

Challenge:

signal decomposition



Machine Learning

Goal:

count periods

Challenge:

signal decomposition

- training data
 - signal composition
 - blank for each signal
- inference data
 - signal composition
 - each signal

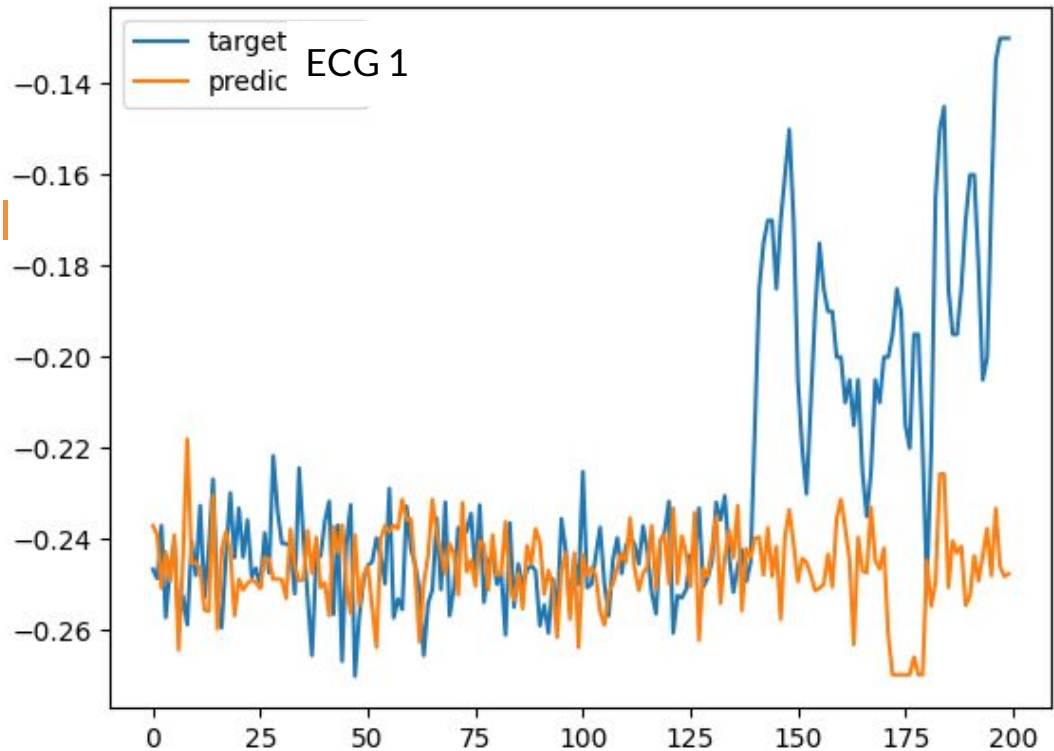
Signal decomposition code

Results

- training data
 - signal composition
 - blank for each signal
- inference data
 - signal composition
 - each signal

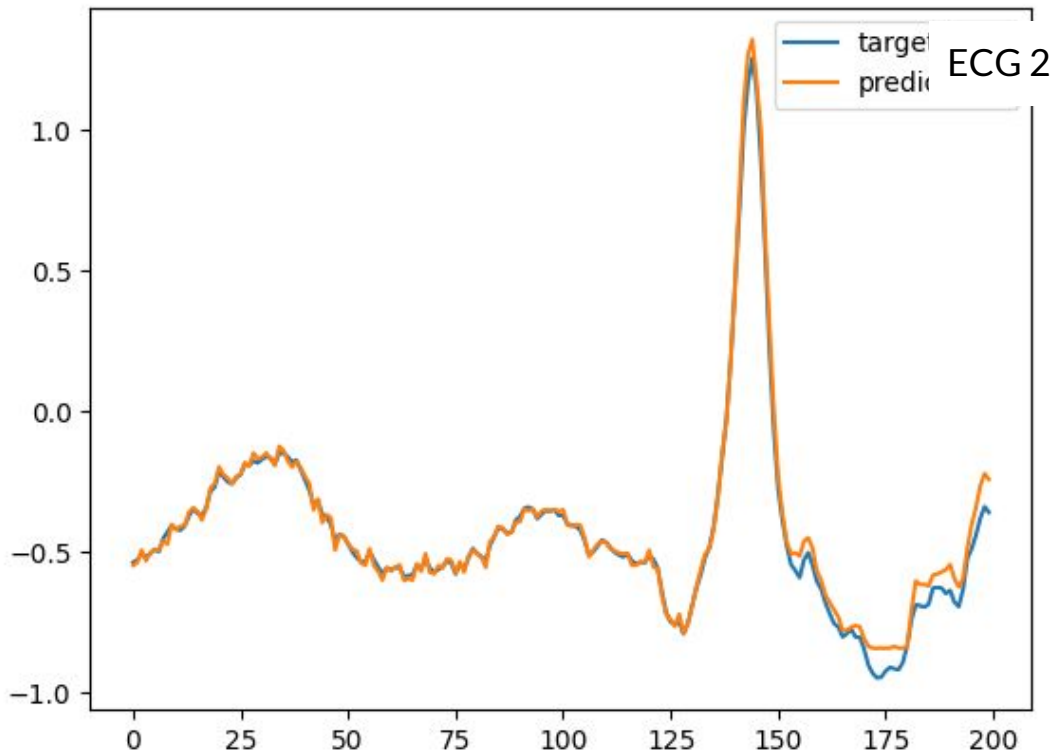
Results

- training data
 - signal composition
 - blank for each signal
- inference data
 - signal composition
 - each signal



Results

- training data
 - signal composition
 - blank for each signal
- inference data
 - signal composition
 - each signal





The Fourier transformation

Goal:

signal cleaning

Pay attention:

signal reduction



The Fourier transformation

Goal:

signal cleaning

Pay attention:

signal reduction

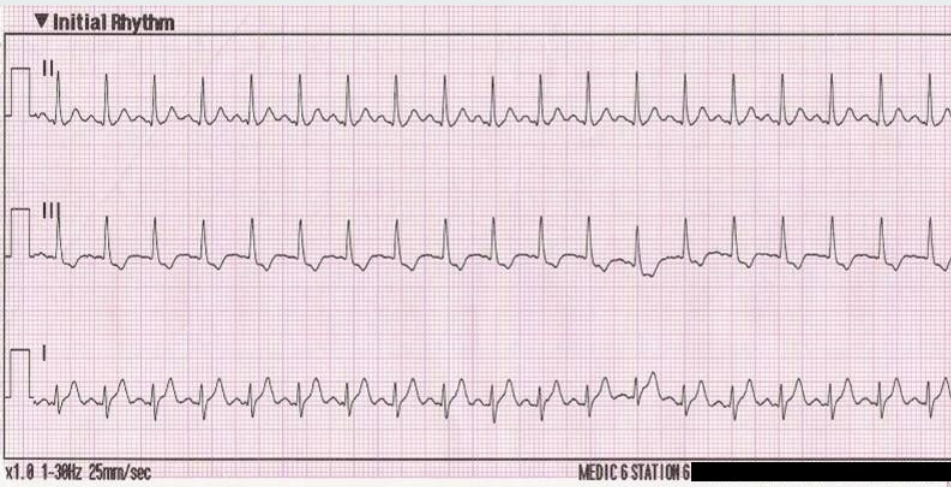
- input
 - signal composition
- output
 - frequency
 - signal
 - noise



Applications

Applications

- biomedical signal analysis

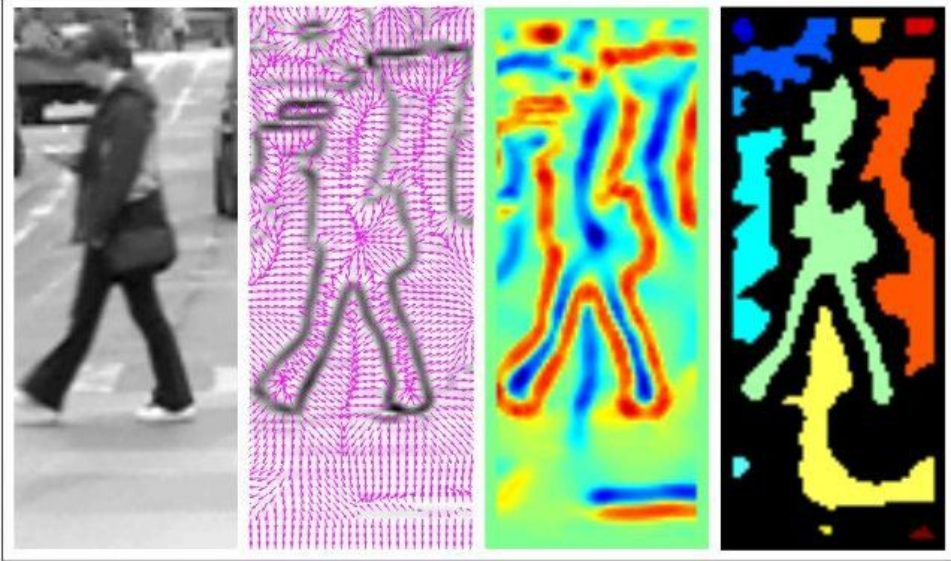


Applications

- biomedical signal analysis
- data compression



Applications



- biomedical signal analysis
- data compression
- pattern recognition

Applications



- biomedical signal analysis
- data compression
- pattern recognition
- audio processing

Applications



- biomedical signal analysis
- data compression
- pattern recognition
- audio processing
- vibration analysis



Thanks for listening.

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