

Senior Thesis Research Project Plan

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Title

Mathematical Modeling of ECG Abnormalities

Goal

Develop a simple, accurate, and automatized electrocardiographic analysis tool for the diagnosis of various forms of ischemic heart disease.

Major Tasks

- Scanning of paper-based ECGs of normal and abnormal heart beats
- Approximation of the obtained data by an appropriate method
 - Determine an appropriate method (Fourier Series, Fast Fourier Series, or similar)
 - Perform analysis of existence, uniqueness of solution, error estimates
- Creation of a comparison algorithm for normal and abnormal ECGs
 - Account for age, gender, etc
 - Use time and spacial comparisons, possibly almost-periodic functions
- Create a sufficient digital database of diagnosed ECGs
- Make automated diagnosis that may assist with a doctor's diagnosis

Plan

1. Literature analysis
2. Selection of proper software
3. Collecting ECGs
4. Scan paper-based ECGs
5. Analysis of digital ECGs
6. Find criteria for ECG abnormalities
7. Automate ECG comparison
8. Create database of ECG abnormalities
9. Develop software for automatic diagnoses
10. Analyse the resulting statistical data
11. Write and publish a scientific paper

References

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