American University of Central Asia

Applied Mathematics and Informatics Program

Mathematical Model in Acute Cardiac Ischemia Evaluation

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ABSTRACT

This abstract will be written once the paper is more finished.

Keywords: acute cardiac ischemia, ECG, mathematical modeling

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1 INTRODUCTION

1.1 Important Points

1.1.1 background and purpose

- ischemia and similar diseases are some of the most deadly and common diseases
- when it comes to ischemic heart disease (IHD), rapid decision making is important
- ECG is one of the most widely used diagnostic tools
- reading an ECG is very difficult, which leads to different results among different physicians
- to develop software that analyzes 12–lead ECG to detect IHD
- this could reduce the time it takes to diagnose IHD, which is crucial
- detect changes during myocardial ischemia, some of those remain invisible to physicians

1.1.2 goals

- create a 12–lead ECG analysis tool to diagnose IHD
- we will mathematically model the changes of the ECG compared to at–rest, nominal ECGs

1.1.3 questions, problematic, rationale

- the ECG is the most widely used method to assess heart conditions
- the QRST–wave complex changes when ischemia is present, enabling its detection
- a mathematical model could make the analysis of ECGs easier for doctors and speed up their diagnosis
- the model needs to work well for this to be possible
- such a tool would remove some of the problems that normally exist (mentioned above)

1.1.4 background, literature review

- heart disease is a significant medical issue
- one of the most deadly ones
- middle income countries like KG are hit harder
- health expenditure in KG is also one of the lowest
- IHD is the main killing disease
- for most treatment methods, the longer the treatment is delayed, the lower the chances of survival become
- if the necessary infrastructure is nonexistent, treatment times cannot be reduced to acceptable levels
- basically, in Kyrgyzstan most modern and good methods do not work because of the missing infrastructure and economic limits
- computers can help to analyze an ECG, which makes diagnosis easier

1.1.5 methods

- get 100 digitized ECGs from healthy volunteers
- from this a good model of healthy and stressed ECGs should be created
- maybe use FFT for the analysis
- use a Maplesoft Signal Processing Tool for wave analysis

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