

**DEVELOPMENT OF CLOUD COMPUTING ALGORITHM FOR
ARRHYTHMIA DETECTION AND HEART DISEASES**

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

DEVELOPMENT OF CLOUD COMPUTING ALGORITHM FOR ARRHYTHMIA DETECTION AND HEART DISEASES

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Cardiovascular disease in Indonesia has become one of the leading causes of death after complications from stroke and diabetes. Therefore, early detection of heart disease is important. Heart abnormalities can be detected using an electrocardiogram device. General electrocardiogram limits the patient's mobility due to being wired with the instrument. The existence of an electrocardiogram with smart devices that can support cardiac arrhythmia detection is an innovation expected to improve patient comfort. The purpose of this study is to apply telecardiology that can be used for detecting cardiac abnormalities and to classify electrocardiogram data via cloud computing. In this research, we use a dedicated server after it was proven to be able to run in localhost and Node JS as the runtime-environment for running the application. The test datasets that has been chosen are from MIT-BIH Arrhythmia and Normal Sinus Rhythm Database for the Heart Rate Variability parameters to be extracted which are average heart rate, standard deviation of average heart rate and root mean square of the average heart rate. Using linear regression method and testing with 95% confidence interval, it is found that there are significant correlation between heart rate variability increase and cardiac arrhythmia case where the value of the standard deviation of average heart rate being the most significant ($P < 0.05$). With this technology, it is expected to improve efficiency in proving cardiac arrhythmia and heart disease remotely.

Keywords: ECG, Telecardiology, Arrhythmia, Cloud Computing, Heart Rate.

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DEDICATION

I dedicate this work for my Mother and Brother.

Be it the last time I am wide awake, let the good in me be the one you take.

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“With men this is impossible, but with God all things are possible”

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Sincerely,

Samuel Andrew Setiawan

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LIST OF ABBREVIATION

AF – Atrial Fibrillation

PAC – Premature Atrial Contraction

PVC – Premature Ventricular Contraction

SVT – Supraventricular Tachycardia

VT – Ventricular Tachycardia

CVD – Cardiovascular Disease

HRV – Heart Rate Variability

ANN – Average N-N Interval/ Average Heart Rate (Successive Normal sinus to sinus rhythm)

SDANN – Standard Deviation of Average N-N Interval

rMSSD – Root Mean Square of Successive Difference (Successive Normal sinus to sinus rhythm)

bpm – Beats per Minute

CSV – Comma Separated Values

JSON – JavaScript Object Notation

ECG/EKG – Electrocardiograph / Electrocardiogram

AV Node – Atrioventricular Node

SA Node – Sinoatrial Node

CDN – Content Delivery Network

MIT-BIH – Massachusetts Institute Technology – Beth Israel Hospital

nsrdb – MIT-BIH Normal Sinus Rhythm Database

mitdb - MIT-BIH Arrhythmia Database