

ECG Heartbeat Classification: A Machine Learning Approach

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Abstract—This report is not using GPT or anything fancy, it's just a simple report about ECG Heartbeat Classification using Machine Learning. I will introduce you to the project, then I will talk about the background, the method, the results, the discussion, and the conclusion. I hope you enjoy it.

I. INTRODUCTION

This is the Introduction which I will write out the definition for things and introduce you to the project.

A. Heart

Heart is a pretty important organ in the human that we cannot live without. This is an essential organ in animals too. To be more scientific, a heart is a muscle that pumps blood to all parts of your body. (<https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/heart>)

B. Heartbeat

Heartbeat is the rhythmic contraction and relaxation of heart muscles. It's like a continuous drum that's hit all the time, sometimes fast and hard, sometimes slow and calm, but if it not beat anymore, you die. (<https://www.vedantu.com/evs/what-is-heartbeat>)

C. Heartbeat in Clinical Diagnosis

People (Doctors mostly) can use the heartbeat to diagnose the health of a person. The heartbeat can tell you if the person is healthy or not, if the person is stressed or not, if the person is in love or not. If it not beat, you die.

D. Machine Learning

It's the use and development of computer systems that are able to learn and adapt without following explicit instructions, by using algorithms and statistical models to analyze and draw inferences from patterns in data. (Oxford Dictionary)

E. Machine Learning in Heartbeat Classification

It's the use and development of computer systems that are able to learn and adapt without following explicit instructions, by using algorithms and statistical models to analyze and draw inferences from patterns in people's heartbeat for classification. (me, i guess)

F. What others do in Machine Learning for Heartbeat Classification

It takes time to do this, so I will do it later (hopefully).

G. State Problem

This is necessary, so we need to do this!!!

II. BACKGROUND

A. ECG

An electrocardiogram records the electrical signals in the heart. It's a common and painless test used to quickly detect heart problems and monitor the heart's health. (<https://www.mayoclinic.org/tests-procedures/ekg/about/pac-20384983>)

B. CNN

A Convolutional Neural Network, also known as CNN or ConvNet, is a class of neural networks that specializes in processing data that has a grid-like topology, such as an image. A digital image is a binary representation of visual data. It contains a series of pixels arranged in a grid-like fashion that contains pixel values to denote how bright and what color each pixel should be. (<https://towardsdatascience.com/convolutional-neural-networks-explained-9cc5188c4939>)

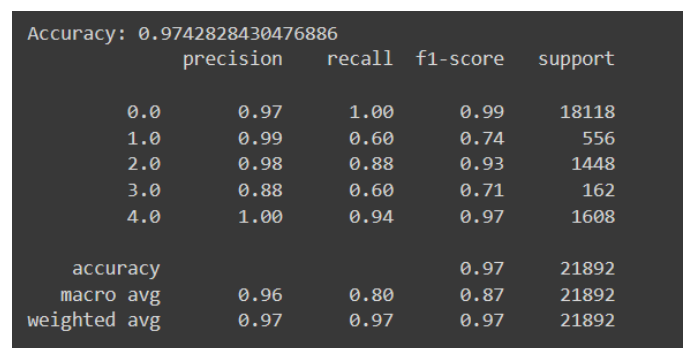
III. METHOD

I use Random Forest Model. It's a good model.

First I load the data, then I preprocess the data, then I train the model, then I evaluate the model.

IV. RESULTS

I don't know how to make a table in LaTeX, so here is a screenshot instead.



Accuracy: 0.9742828430476886				
	precision	recall	f1-score	support
0.0	0.97	1.00	0.99	18118
1.0	0.99	0.60	0.74	556
2.0	0.98	0.88	0.93	1448
3.0	0.88	0.60	0.71	162
4.0	1.00	0.94	0.97	1608
accuracy			0.97	21892
macro avg	0.96	0.80	0.87	21892
weighted avg	0.97	0.97	0.97	21892

Fig. 1. Accuracy

and here is the confusion matrix:

V. DISCUSSION

It's pretty good I suppose?

VI. CONCLUSION

Yay I'm done with the first pratical let me go to sleep now.

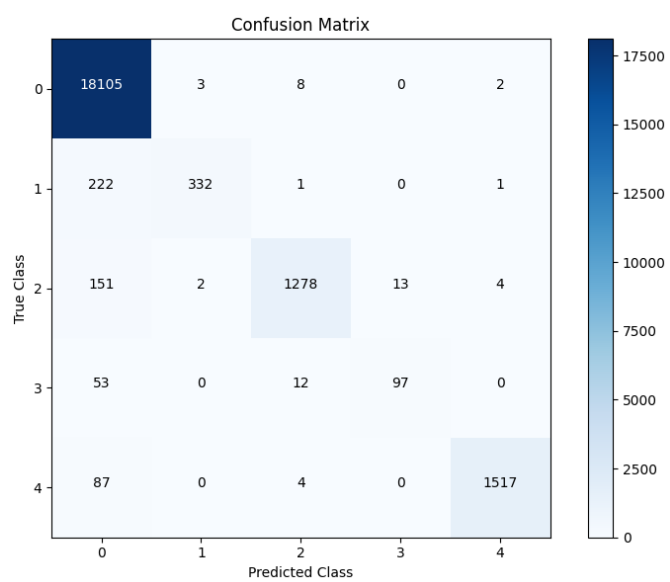


Fig. 2. Confusion Matrix