ECGML: Electrocardiography using Machine learning

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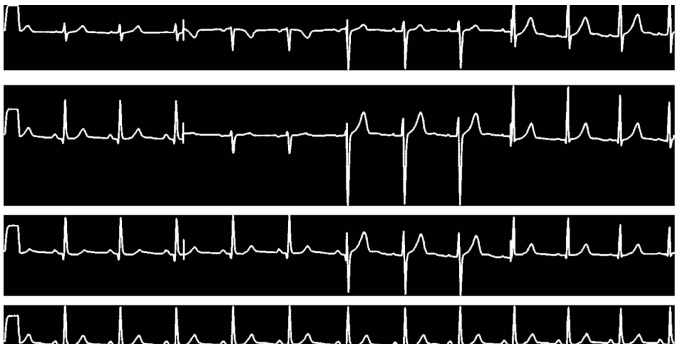
Abstract (300 word limit)

Electrocardiography (ECG) has been used extensively in the diagnosis and prediction of several diseases in healthcare facilities. However, existing ECG tools provides doctors with basic information related to the heart such as; enlargement of the heart, congenital heart defects involving the conducting (electrical) system, abnormal rhythm (arrhythmia) – rapid, slow or irregular heartbeats and damage to the heart, such as when one of the heart's arteries is blocked (coronary occlusion), those machines are also used to diagnose some diseases, however, the results are not applicable at best.

Therefore in this project, a new method for enhancing existing ECG tools is proposed. The method integrates existing ECG tools with machine learning and image processing. This will help improve patients diagnosis and care and it will also help to reduce the complexity of coming out with the diagnosis mentioned before.

The proposed method enhanced the performance of the typical ECG scanner by widening the area of its results and improving its accuracy. The results are not limited to a certain group of diseases since the neural network can learn to diagnose anything, given enough training data samples, and since it's a machine learning program, its accuracy gets better the more it's used. Using this technology, ECG can be used to not only show basic information about the heart but also to help to diagnose more than fifteen other arrhythmias precisely. Machine learning and a sample training data collected from MIT-BIH Database Distribution were used to create a program that - when trained enough - will be able to diagnose those arrhythmias in the most accurate way possible. It is an easier and faster way to be used in this field rather than the typical way because the typical way takes time and effort from a specialist, who is usually very busy, whereas a computer program can give results in a matter of seconds.

Image



Recent Publications (minimum 5)

1. WHO (2005) Preventing chronic diseases: vital investment. Global status report on Non-Communicable diseases 2013-2014, Geneva.
2. Mozaffarian Dariush (2016). Dietary and Policy Priorities for Cardiovascular Disease, Diabetes, and Obesity.
3. Mahmoodzadeh S., Moazenzadeh M., Rashidinejad H., Sheikhvatan M. (2011). Diagnostic performance of electrocardiography in the assessment of significant coronary artery disease and its anatomical size in comparison with coronary angiography.
   Agarwal S., Davies W., Bhar-Amato J. (2017). Ventricular Arrhythmia after Acute Myocardial Infarction: The Perfect Storm.
5. Stevenson W., Koplan B. (2009).Ventricular Tachycardia and Sudden Cardiac Death.
6. Pooja Bhardwaj, Rahul R Choudhary and Ravindra Dayama. Article: Analysis and Classification of Cardiac Arrhythmia Using ECG Signals. International Journal of Computer Applications 38(1):37-40, January 2012. Published by Foundation of Computer Science, New York, USA.



Biography (150 word limit)

Anas AbuZaitoun and Wala Awad are both computer engineering students at An Najah National University. They will be graduating in less than 2 years, and they have a great interest in new technologies and machine learning in particular.

Anas AbuZaitoun is not the typical type of students, he has been the organizer of GDG - Nablus

branch for two years so far, and he is an active IEEE member. He is an Android developer, and he worked on many projects before, including mobile apps and desktop apps. He also attended Google's I/O festival in San Jose this year.

Wala Awad is an active member in both GDG and IEEE. She is also the IEEEXtreme Palestine Section Leader as well as IEEEmadC ambassador, and she is an Android developer as well. She is willing to get her masters degree on machine learning as soon as she graduates.

They have been participating in technical competitions that will employ both hardware and software.

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