**Will a Computer Diagnose Your Next Heart Attack?**

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Article:

*You are working in your house, going about your normal routine when suddenly the pain hits. You chest starts to throb and your left arm begins to ache. Without hesitation you rush to the hospital, dreading your worst fear has become an reality – you are having a heart attack. Upon arrival, physicians, nurses, and other medical staff begin frantically testing, probing, and prodding nearly every part of your body. Then run more tests than you can keep track of and begin shouting orders for new tests and other members of the team. The physician is carefully watching the monitors hooked up by your bedside, puzzled by the results they are seeing. He turns to consult an expert on the signals your heart is emitting but instead of a person they turn to a computer.*

Everyday more than 2,000 people have heart attacks. Of these, over 400 people do not receive treatment in time. While advancements have been made in heart attack detection the underlying methods are unchanged from a century ago. Currently physicians use the same electrocardiograms (ECGs) developed early last century to monitor the electrical activity of the heart. Depending on the location and severity of the heart attack certain regions of the ECG may change. However, these changes are small, unreliable, and only include a small portion of the entire electrical signals of the heart.

To improve electrocardiogram measurement techniques we utilized recent developments in computer science to “teach” computers to read cardiac electrical signals. With the incorporation machine learning, electrocardiograms are telling us more than ever before about your heart.

Machine learning is a technique developed by researchers to “teach” computers to identify unique features in datasets that are not distinguishable by the naked eye. The computer is given multiple sets of categorized data with different, often unnoticeable to humans, features. The computer then “learns” which features within the dataset differentiate it into variable categories. These features detected by the computer are often subtle and complex and may not be distinguishable by humans. Once the computer has “learned” which features correspond to different categories it can apply it’s “knowledge” to determine the category a new dataset belongs to.

We have used machine learning to detect changes in the cardiac signal that indicate the first signs of a heart attack. Our approach isolates the electrical signals from the heart and examines changes before, during, and after simulated heart attacks. The computer then reads these signals and categorizes the data. The two categories the computer isolates are “having a heart attack” and “not having a heart attack.” Compared to traditional human metrics the computer performs 10% faster in determining when you are having a heart attack. The computer is also more accurate and correctly detected the early signs of a heart attack 32% more often.

Using machine learning to help physicians detect heart attacks is a huge advancement in the field of cardiology. This advancement provides physicians and healthcare workers another tool to better detect and treat you during one of life’s most dire circumstances. This work, in conjunction with others, could hold the key to understanding and detecting heart attacks, making death from heart attacks a thing of the past. Next time you visit your physician for chest pain check who their partner is, it may just be a computer.