**Intro**

Atrial fibrillation (AF) is one of the most common types of arrhythmias, which are irregular heart rhythms [1]. AF occurs when the upper chambers of the heart (atria) beat out of rhythm and as a result, blood is not pumped efficiently to the rest of the body, causing an unusually fast heart rate, quivering, or thumping sensations in the heart [2]. Often episodes of AF are actually asymptomatic [3]. AF is the most common sustained cardiac arrhythmia and as of 2020, 33 million people are affected by this disease worldwide [4]. AF patients are at moderate-to-high risk of stroke and the disease is a common factor of heart failure [5]. As such, establishing an effective monitoring system for early AF detection along with an effective approach to treating AF is essential [5].

AF is often transient or paroxysmal in nature, and the correct diagnosis of AF can be challenging in patients with paroxysmal AF [6]. The main characteristic of AF disorder is the irregular rhythm of the heartbeat or more specifically when a varying period is observed in ECG signal between R–R peaks [7]. The disease is hard to diagnose, since patients suffering from AF may not have symptoms at early onset, and there is spontaneous termination of arrhythmia. Thus using machine learning to detect AF can be very beneficial.

Heart disease prediction using machine learning has become common in the last few decades. There are numerous studies using deep learning techniques to detect heart arrhythmias in general and AF in particular.

We based our project on a study that aims to detect Atrial Fibrillation using short-term memory network (LSTM) with RR interval signals [8]. The goal of this study is to reduce workload of the clinicians and enable a robust diagnosis support system for AF. Their proposed Computer-Aided Diagnoses (CAD) system can be used for long-term monitoring of the human heart. The system achieved 98.5% accuracy with 10-fold cross-validation (2- subjects) and 99.77% accuracy with blindfold validation (3 subjects).

תרומה של כל מאמר??

לפרט על החסרונות שאנחנו נתייחס אליהם (רוני – מה זה אומר?)

\*\* צריך להבין מה להכניס כאן ומה להכניס בmethod כי יש הגדרות חופפות באתר הקורס

**Methods**

[1] - <https://www.nhlbi.nih.gov/health-topics/atrial-fibrillation>

[2] - <https://www.medtronic.com/us-en/patients/conditions/atrial-fibrillation-afib.html>

[3] - Munger, TM; Wu, LQ; Shen, WK (January 2014). ["Atrial fibrillation"](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3904170). *Journal of Biomedical Research*.

[4] - Chung, MK; Eckhardt, LL; Chen, LY; Ahmed, HM; Gopinathannair, R; Joglar, JA; Noseworthy, PA; Pack, QR; Sanders, P; Trulock, KM; American Heart Association Electrocardiography and Arrhythmias Committee and Exercise Cardiac Rehabilitation, and Secondary Prevention; Committee of the Council on Clinical Cardiology; Council on Arteriosclerosis, Thrombosis and Vascular Biology; Council on Cardiovascular and Stroke Nursing; Council on Lifestyle and Cardiometabolic Health (March 2020). ["Lifestyle and Risk Factor Modification for Reduction of Atrial Fibrillation: A Scientific Statement From the American Heart Association"](https://doi.org/10.1161/CIR.0000000000000748).

[5] [- Atrial Fibrillation Recurrence and Peri-Procedural Complication Rates in nMARQ vs. Conventional Ablation Techniques: A Systematic Review and Meta-Analysis](https://www.frontiersin.org/articles/10.3389/fphys.2018.00544/full)

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