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Analysis of Blood Pressure Waveform for Detection and Diagnosis of Cardiovascular Anomalies

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TEAMS

Abstract

Cardiovascular diseases are the leading cause of mortalities worldwide as well as in the United States. Early diagnosis and prediction of these diseases is critical to mitigate the risks to the patient. The most common method to assess a person's heart health is through the use of cuff type oscillometric devices placed on the arm of the patient. As the pressure in the cuff is increased it blocks the flow in brachial artery then when the pressure is reduced the blood starts flowing again causing disturbances in the cuff pressure which are measured using pressure transducers. Modern devices often use proprietary algorithms to provide the systolic and diastolic pressures using the cuff pressure fluctuations. Hullender and Brown developed a model which is able to estimate the entire blood pressure waveform using the same cuff pressure fluctuations. The blood pressure waveform can be analyzed to assess the cardiovascular health of a patient in detail. The performance and accuracy of the model is tested with different measurement noise parameters and varying rates of cuff pressure change. Then an algorithm is developed to continuously monitor the important blood pressure waveform characteristics which can be used to detect cardiovascular anomalies. The algorithm also uses standardized values and compares them to values extracted from the waveform to diagnose high blood pressure along with hypertension severity, arrhythmia, atrial fibrillation, tachycardia and bradycardia.