

Monitoring Blood Pressure Using Regression Techniques

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Abstract : Blood pressure helps the physicians greatly to have a deep insight into the cardiovascular system. The determination of individual blood pressure is a standard clinical procedure considered for cardiovascular system problems. The conventional techniques to measure blood pressure (e.g. cuff method) allows a limited number of readings for a certain period (e.g. every 5-10 minutes). Additionally, these systems cause turbulence to blood flow; impeding continuous blood pressure monitoring, especially in emergency cases or critically ill persons. In this paper, the most important statistical features in the photoplethysmogram (PPG) signals were extracted to estimate the blood pressure noninvasively. PPG signals from more than 40 subjects were measured and analyzed and 12 features were extracted. The features were fed to principal component analysis (PCA) to find the most important independent features that have the highest correlation with blood pressure. The results show that the stiffness index means and standard deviation for the beat-to-beat heart rate were the most important features. A model representing both features for Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) was obtained using a statistical regression technique. Surface fitting is used to best fit the series of data and the results show that the error value in estimating the SBP is 4.95% and in estimating the DBP is 3.99%.

Keywords : blood pressure, noninvasive optical system, principal component analysis, PCA, continuous monitoring

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