Blood Pressure Classification by Analyzing the behavior of Heart Rate Variability in Poincare Plot

Shahab Rezaei[1], Keivan Maghooli[2]

[1] Islamic Azad University, Central Tehran Branch, Tehran, Iran
[2] Islamic Azad University, Science and Research Branch, Tehran, Iran

Background:

Blood pressure is the pressure of circulating blood on the walls of blood vessels. It is one of the vital signs, along with respiratory rate, heart rate, oxygen saturation, and body temperature. Since the noninvasive continuous recording of blood pressure is not available, in this article it is measure and detect using features extracted from heart rate variability. HRV can be recorded continuous and noninvasive, so it is a good tool for blood pressure detection.

Methods:
Sixty subjects with high (n = 20), low (n=20) and normal (n = 20) blood pressure participated in the test. Electrocardiogram was recorded for five minutes and the blood pressure was recorded at the end of the experience. HRV signal extracted and then the extracted features of Poincare plot used for analyzing and distinguishing three groups of blood pressure. Global features are based on counting number of points above, below, and on the identity line in Poincare plot. Furthermore, local features are based on point to point variations relative to the identity line (i.e., temporal information in Poincare plot).

Result:
Performance of features in classification of blood pressure was evaluated using *k*-nearest neighbor, self-organizing map, and multilayer perceptron neural network. The mean accuracy of classifiers on test set was respectively 85%, 70%, and 91%.

Discussion:
The results show that HRV is a good tool for detection and classification of blood pressure in three groups of high, low and normal pressure.