

Abstract

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Sound analysis and machine learning in noninvasive classification of neurological conditions

Machine learning and signal analysis are widely used to assist medical practice. Modern medicine is in constant search for effective noninvasive methods for diagnostics. Unfortunately, many of the developed automatic methods are prone to noise and disturbances and have high computational complexity. A transcranial Doppler (TCD) is a noninvasive and reliable device that can monitor the blood flow rate in the brain and can help neurologists to diagnose many brain problems like edema, trauma, hemorrhage, and aneurysm. The proposed algorithm is a blend of statistical and machine learning tools that are used in Big Data analysis. The algorithm's goal is monitoring the TCD signals in the real-time for detection of cerebral vasospasms, which produces enormous amounts of data. We handled the data by carefully Selected time and frequency domain features which allowed designing classifiers with the desired sensitivity and specificity. In addition, the proposed convergence of digital sound analysis and medical fields could prove to be useful in the future modeling of various brain disorders.