Development of a Novel Machine Learning Algorithm to Monitor Vascular Tissue Transfers Using Speech Recognition Techniques

Kanevsky, Ariel (School: Harmony School of Nature)

A pencil doppler is the primary tool used in detection of devastating vascular tissue transfer-related ailments through analysis of vascular flow. However, the doppler is ineffective because of a manual, time-consuming interface. The goal of this study was to construct a machine-learning system, with the ability to automatically detect and classify audio emitted from the doppler as either normal or abnormal. Data collected from various doppler devices was labeled using Waveform, and down-sampled in Python. The frequency vectors from each data sample were categorized onto a time-frequency and separated into our labels. Viterbi segmentation was applied to the HMM to identify paths with the highest probability of reaching an end state. A contingency table was calculated to determine the effectiveness of the algorithm, and the statistical significance of the diagnoses. Our research resulted in a 95.6% detection rate with a p = .044 significance. This diagnostic system can potentially increase efficiency in medical centers and decrease tissue failures resulting from late diagnosis.

Awards Won:

First Award of $5,000