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Identification of Gender from Acoustic characteristics of Sinhala vowels

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Speech is a pressure wave generated in air. When air is pushed through the vocal folds with sufficient pressure, the vocal fold vibrates and produces voice with the help of articulators. Inside the vocal tract, air is resonated, and these resonances are known as formants in acoustic phonetic. Formant is the most significant parameter used in speech sound analysis. Speech acoustic characteristics are not only different from person to person but also from language to language. In this study, formant analysis of Sinhala vowel sounds is done to investigate the correlation between speaker gender and acoustic characteristics. Randomly selected 66 native Sinhala speakers of 31 males and 35 females of age range between 19 to 36 years were used in the study. Twelve Sinhala vowels were used as the speech material. Audio files were recorded by using a smart phone having a sampling rate of 44 kHz in a quiet room (25 dB). Recorded MPEG 1 Audio Layer III files were converted to wave files and fed to *Praat* software. The first three formants, f_1, f_2 and f_3 the most stable in each vowel were determined by analyzing the respective spectrograms. R and SPSS software were used for statistical analysis. The estimated discriminant equation of f_1 and f_2 is $f_2 = -1.36f_1 + 2486.36$. The statistical measures of the performance of a binary classification, the hit ratio, sensitivity and specificity were 90.8%, 96.6% and 86.1% respectively. This strong separation justify that the gender parameter is grouped with the f_1 and f_2 variables. Therefore, formant analysis can be used to predict the gender of an unknown speaker, even for telephone conversations.

Keywords: Acoustic Characteristics, Discriminant Analysis, Formants, Gender, Sinhala vowel

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