

A preliminary study on age-based formant analysis of Sinhala vowels

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The human voice signal helps to identify some details about the individuals using a formant structure. Formants are resonance frequencies generated according to the human vocal tract length. The uniqueness of the vocal tract reveals unique formant structures. This study is mainly relying on the individuality of formants (Formant1 & Formant 2) in different age ranges. The vocal readings were taken from randomly selected 180 people grouping into 6 age ranges ("4-10", "11-20", "21-30", "31-40", "41-50", "50+") with male and female categories separately so that each age range consists of 15 males and 15 females. The speech material consisted of four Sinhala vowels ("අ", "ආ", "ඊ", "උ"), recorded using a smartphone of "Samsung Galaxy J7" in a quiet environment of nearly 25 dB. The other necessary information was collected via a questionnaire. The Praat software was used for the vocal analysis process, and RStudio and Origin software was used for statistical analysis. Correlations among parameters were tested by using Pearson's Correlation theory and Anova tests. This study reveals that the average formant values between young (4-20 yrs.) and adults (>20 yrs.) have 80% of deviation, and it is significant. Generally, formant values decrease with age from 4 to 50+. Furthermore, eight equations were derived for every four letters considering the gender separately. Those equations can be used in human identification software after supplementary researches.

Keywords: *Formant analysis, sinhala vowels, vocal tract, gender, age*

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