

Preliminary Study on the Potential of Voice Characterization Using S-Transformation

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Abstract

Voice characterization is a crucial topic in voice recognition systems, the biomedical field, and other areas. Each person's voice is unique and can reflect their mental and physical state. Various transformations have been applied in voice characterization, including Fourier, STFT, Wavelet, CW, and Gabor. S-Transformation, introduced in 1996, is a relatively new technique that has seen limited use in the acoustic field. This study investigates the potential of S-Transformation for voice characterization using MATLAB software, with results verified against data from Praat software. Using a custom-developed MATLAB code, any sound file in “Wav” format was transformed to generate spectrograms. Fourteen different sound files from 14 speakers, each saying “Hello” in a recording approximately one second long, were used for comparison of inter-speaker voice characteristics. Additionally, five sound files from a single speaker were analysed for intra-speaker variations. For all audio signals, spectrograms were generated, and the pitch and first four formant patterns were manually extracted. The data from the 14 different speakers were plotted and compared with the patterns generated by Praat. The pitch patterns closely matched those generated by Praat, and the first two formants were nearly identical. The other two formants showed some discrepancies, likely due to the lower accuracy of data extraction, leading to some lost data. Intra-speaker variations showed slight differences in patterns but were generally consistent across multiple recordings of the same word. This research concludes that S-Transformation can be used effectively in voice characterization with good accuracy. With improvements in automated data extraction, this method could be valuable in various fields, including acoustics and biomedical applications.

Keywords: *Acoustics, Inter-speaker, Intra-speaker, S-Transformation, Voice characterization*