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Research Letter

Open Quotient Measurements Based on Multiscale Product of Speech Signal Wavelet Transform

Aicha Bouzid¹ and Noureddine Ellouze²

¹Institut Supérieur d'Electronique et de Communication de Sfax, Route Menzel Chaker, km 0.5, BP 868, Sfax 3018, Tunisia

²Department of Electric Engineering, National School of Engineering of Tunis, BP 37, Le Belvédère, Tunis 1002, Tunisia

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Abstract

This paper describes a multiscale product method (MPM) for open quotient measure in voiced speech. The method is based on determining the glottal closing and opening instants. The proposed approach consists of making the products of wavelet transform of speech signal at different scales in order to enhance the edge detection and parameter estimation. We show that the proposed method is effective and robust for detecting speech singularity. Accurate estimation of glottal closing instants (GCIs) and opening instants (GOIs) is important in a wide range of speech processing tasks. In this paper, accurate estimation of GCIs and GOIs is used to measure the local open quotient (Oq) which is the ratio of the open time by the pitch period. Multiscale product operates automatically on speech signal; the reference electroglottogram (EGG) signal is used for performance evaluation. The ratio of good GCI detection is 95.5% and that of GOI is 76%. The pitch period relative error is 2.6% and the open phase relative error is 5.6%. The relative error measured on open quotient reaches 3% for the whole Keele database.