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Conference Details

Communication Type: Oral Presentation | Date:12/13/2017-12/15/2017

Total Expense (USD): 3000 | Location: Florence, Italy

Conference Title: 10th International Workshop on Models and Analysis of Vocal Emissions for Biomedical Applications (MAVEBA)

Communication Title: A Method for Analysis of the Vocal Fold Vibrations in Connected Speech using Laryngeal Imaging

ABSTRACT

Voice disorders usually reveal during communication in connected speech. Thus, it is essential to perform instrumental functional voice assessment in running speech. Laryngeal imaging is one of the main techniques for instrumental voice assessment. The currently employed laryngeal imaging clinical gold standard is videostroboscopy, mainly done during production of sustained vowels. Although videostroboscopy can be used in running speech, its utility is limited to assess only the gross laryngeal movements and does not provide detailed intra-cycle vibratory information about the vocal folds. High-speed videoendoscopy (HSV) has been successfully demonstrated as a unique and powerful tool that overcomes such limitation and enables the recording of vocal fold vibrations with high temporal resolution. Recent technological and methodological advancement made it possible to perform HSV during connected speech, which creates huge datasets. It is an urgent need and absolute necessity to develop automated algorithms and methodologies for big-data analysis to extract clinically relevant information from the HSV data. To this end, this study proposes an algorithm for segmentation of the vibrating vocal folds during connected speech for the first time. The segmentation consists of three stages: temporal segmentation, motion compensation, and spatial segmentation. The temporal segmentation determines the time locations of the vibrating vocal folds across the HSV frames. The motion compensation allows for removing unwanted motion of the tissues. The spatial segmentation employs an active contour analysis, which is based on energy optimization and describes analytically the edges of the vocal folds during vocalization. The results suggest the success of temporal segmentation and motion compensation in detecting the temporal and spatial locations of vibrating vocal folds. Consequantly, the active-contour algorithm was successful in extracting the vocal fold edges. Providing an analytical description of the vocal fold edges can be used for extracting vibratory features of the vocal folds to describe the laryngeal mechanisms of voice production.

Application must not exceed two pages and must be submitted as a pdf file to pda@grd.msu.edu
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COMMUNICATION OUTCOMES

The candidate, Dr. Maryam Naghibolhosseini, is a Research Associate in the Voice and Speech Lab. The research of the lab is focused on using different novel objective techniques to study voice production mechanisms in humans. The candidate's research is on the use of an state-of-the-art high-speed videoendoscopy system to study vocal fold function in connected speech. The long-term goal of the candidate's proposed line of research is to create clinically applicable quantitative methods for functional voice assessment using innovative laryngeal imaging, an approach that could significantly advance clinical voice assessment and treatment practice. The candidate received the 2017 "Sataloff Young Investigator Award", bestowed by Elsevier annually to one voice scientist around the world, for her findings in laryngeal imaging in connected speech. Attending the 10th International Workshop on Models and Analysis of Vocal Emissions for Biomedical Applications (MAVEBA), Dec. 13-15 2017, would help the candidate to develop her career as a voice scientist in several ways.

Attending this conference would provide the candidate the opportunity to present her most recent findings to a broad audience from different fields of engineering, computer science, and biomechanics. This would provide the candidate the opportunity to meet internationally well-known voice researchers and professionals and to receive their scientific feedback and viewpoints about her research. This could initiate interdisciplinary collaboration with scientists or clinicians in other institutes around the world.

Due to the novelty and significance of the candidate's research, presentation of her work in this international conference would be valuable in impacting the research in the area of voice science. This would encourage more quantitative scientists to use their mathematical and modeling skills toward using high-speed videoendoscopy to enhance clinical voice practice.

Furthermore, attending this conference would help the candidate be recognized by her peers as a voice researcher whose research is an urgent need for the field of voice science. To provide an example of the benefits of getting such exposure is that the candidate has been recently invited to give a talk in a special session at the 176th meeting of the Acoustical Society of America in 2018. This invitation was received after the candidate did a successful presentation of her work at the International Conference on Advances in Quantitative Laryngology, Voice, and, Speech Research. The aim of this special session on "Recent Advances in Experimental, Computational, and Clinical Research in Voice Production" is to provide a venue for discussion on recent advances in voice production research. The candidate has been invited to this prestigious meeting to give a presentation about her research on laryngeal imaging.