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Inverse Frequency Compression for Audio Resynthesis of Band-Limited Speech

A novel digital signal processing technique significantly improves consonant recognition in hearing aid users by recoding high-frequency speech information to enhance the perceptual differences between commonly confused sounds, outperforming current commercial alternatives.

With conventional hearing aid processing, individuals who have severe to profound mid- to high-frequency hearing loss still have great difficulty perceiving important speech information. Alternative processing strategies that move inaudible high-frequency information to lower frequency regions where hearing loss is less severe have been proposed; however, they all have a common flaw in that they tend to increase confusion between certain sounds, especially 's' and 'z'. The seriousness of this problem is illustrated by the fact that these sounds constitute about 8 percent of all spoken consonants in the English language.

Purdue University researchers have developed a unique digital signal processing technique that recodes high-frequency speech information in a way that enhances perceptual differences between commonly confused speech sounds. In preliminary testing, the algorithm has worked better than commercially available alternatives, especially for the consonants 's', 'sh', 'ch', 'j', 't', 'k', and 'z'. No degradation in vowel recognition has been observed. The efficacy of using this technology for a broader range of hearing losses, including those with cochlear implants, is currently being tested.

Advantages:

-Improved identification of consonants

-Vowel degradation has not occurred

-Preliminary testing shows improvement over current commercial alternatives

Potential Applications:

Technology ID

66072

Category

Artificial Intelligence & Machine Learning/Audio Sensing & Signal Processing

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View online

-Medical/Healthcare

-Heath Loss Technology

TRL: 6

Intellectual Property:

Provisional-Patent, 2012-05-31, United States | Utility Patent, 2013-05-30, United States | CON-Patent, 2015-09-01, United States

Keywords: digital signal processing technique, high-frequency hearing loss, speech information recoding, enhanced perceptual differences, consonant identification improvement, severe to profound hearing loss, alternative processing strategies, cochlear implants, hearing loss technology, mid- to high-frequency hearing loss