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Extending the Bandwidth and Enhancing the Quality of Voice Communication

Most modern speech compression (coding) algorithms, for example those used in cell phones, deliver narrowband (=3200Hz) telephone (near toll) quality speech. This limits the naturalness and intelligibility of the speech signal. Although wideband coding technology is available for most networks, the cost of renewing the entire infrastructure to support them is prohibitive. Efforts to increase the bandwidth of the signal while using existing infrastructure are thus very desirable.

Researchers at Arizona State University have proposed a novel bandwidth extension method that enhances significantly the quality and intelligibility of speech while operating with existing infrastructure. This method makes use of new psychoacoustic concepts to determine and "fill in" the perceptually relevant high band content. This optimization based method allocates bits using a perceptual model only to specific frames in the high bandwidth region. This concept of having a prediction model combined with encoded information makes the method unique and efficient.

Experimental results show that the system performance is at a lower average bit rate when compared to other similar methods while maintaining a high quality/high intelligibility signal. The method can be essentially used to "retro-fit" existing narrowband algorithms that work with existing infrastructure. Additionally, this method works without any compromise in the quality of the audio signal.

Potential Applications

- Cellular phones
- Voice over-IP and Internet Telephony
- Teleconferencing
- Hearing aids
- Entertainment applications such as mp3 players
- Defense communications

Benefits and Advantages

- Significant reduction in cost as a result of implementation and use with existing infrastructure
- Improves the naturalness and intelligibility of speech in voice communications
- Does not affect the quality of the audio signal

