A demonstration of a single channel blind noise reduction algorithm with live recordings

Narimene Lezzoum, Ghyslain Gagnon and Jérémie Voix
École de technologie supérieure Université du Québec, Montréal (Qc) Canada

1- Background

Noise Reduction

Noise reduction algorithms are nowadays used in multiple areas such as hearing aids, cochlear implants, telecommunication systems and human/robot interaction devices.

Issues with most of the current single channel noise reduction algorithms:

- The use of a priori information for the estimation of the signal-to-noise ratio (SNR) or the noise parameters.
- Noise reduction at each frequency bin (in the spectral domain), which introduces musical noise and artefacts which are in some cases perceptually more annoying than the background noise itself.

2- The proposed blind noise reduction method

Idea

In [1], a dynamic range compression (DRC) based on the use of a frequency-band dependant and time-varying gain function. This concept can be used in some audio processing systems such as noise reduction.

3- Objective Quality Assessment

1- Database used

30 speech signals from the NOIZEUS database [2], corrupted by “car” and “babble” noises in 5, 0, and -5 dB SNR.

2- Evaluation Metric

The PESQ (Perceptual Evaluation of Speech Quality) metric is used for the objective evaluation of the proposed method [3].

3- Benchmark Algorithm

The proposed method is compared to the band-pass modulation filtering algorithm proposed in [4].

4- Results

5- Conclusions

- Signal quality improvement.
- Noise reduction with the least of musical noise generation.

Originality

- The proposed method does not require a priori information or noise parameters estimation.
- The use of a time-varying and frequency-band dependant gain function reduces the background noise and enhances the quality of the signal.

6- References