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T42: NEURAL NETWORK BASED SPEECH ENHANCEMENT APPLIED TO COCHLEAR IMPLANT CODING STRATEGIES

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Traditionally, algorithms that attempt to significantly improve speech intelligibility in noise for cochlear implant (CI) users have met with limited success, in particular in the presence of a fluctuating masker.

Motivated by previous intelligibility studies of speech synthesized using the ideal binary mask [1] and its estimation by means of machine learning [2], we propose a framework that integrates a multi-layer feed-forward artificial neural network (ANN) into CI coding strategies.

The algorithm decomposes the noisy input signal into time-frequency units, extracts a set of auditory-inspired features and feeds them to the ANN to produce an estimation of which CI channels contain more perceptually important information (higher signal-to-noise ratio, (SNR)). This estimate is then used accordingly to suppress the noise and retain the appropriate subset of channels for electrical stimulation, as in traditional N-of-M coding strategies.

Speech corrupted by speech-shaped and BABBLE noise at different SNRs is processed by the algorithm and re-synthesized with a vocoder. Evaluation has been performed in comparison with the Advanced Combination Encoder (ACE) in terms of classification performance and objective intelligibility measures. Results indicated significant improvement in Hit – False Alarm rates and intelligibility prediction scores, especially in low SNR conditions.

These findings suggested that the use of ANNs could potentially improve speech intelligibility in noise for CI users and motivated the collection of pilot data from CI users and simulations with normal-hearing listeners. The results of this ongoing study will be presented together with the objective evaluation.

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