ICA BASED SINGLE MICROPHONE BLIND SPEECH SEPARATION TECHNIQUE

USING NON-LINEAR ESTIMATION OF SPEECH

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1. MOTIVATION

- From a single microphone input, we create 2 input signals to perform ICA for separating 2 sources of speech and noise.
- One input signal is the noisy speech signal.
- The second input is created by an initial estimate of speech from the noisy signal using a non-linear estimator and minimization of mean square error of log magnitude spectrum.
- The two input ICA is then performed followed by a LogMMSE stage to obtain improved speech enhancement.

2. CHOICE OF SPEECH ESTIMATOR

- Determining which method of speech estimation is suitable for enhancing the performance of ICA by using mutual information

3. PROPOSED METHOD

\[ x(n) = s(n) + d(n) \]

\[ SCSE \rightarrow \hat{s}_2(n) \rightarrow ICA \rightarrow \hat{s}_3(n) \rightarrow LogMMSE \]

- We use our best choice of Single Channel Speech Enhancement (SCSE) to estimate speech and give it as one input to ICA and noisy speech as the other.
- This decomposition helps to preserve the integrity of speech from noisy speech \( x(n) \).
- LogMMSE Speech Enhancement technique is used to reduce the residual noise in the second stage.

4. EXPERIMENTAL RESULTS

- Machine
- Traffic
- Martial
- Basketball

- Time in seconds
- Frequency

5. SPECTRAL COMPARISON

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KEY REFERENCES


http://www.utdallas.edu/ssprl/