
Acoustic Target Identification

Configure

Train
- Determine recognition templates
- Parameter optimization

Training Data
- Target specific enrollment data

Offline collection

Gore, Chakrabartty (2007)

Autonomously search and identify acoustic targets of interest – speakers, animal species, vehicular signatures.

High Energy efficiency and low false rejection rate (FRR) are the key specifications.
Conventional Architecture

- Consists of an Analog-to-digital converter, followed by a feature extractor and a classifier – implemented on a DSP.
- Can achieve very low false rejection rate but at the expense of low energy efficiency.
- ADC and Feature extractors are the most power hungry sub-systems.
Coarse-Fine Architecture

Digital Features/Bearing estimates/Super-resolution sources

- Analog-to-feature converter directly produces digitally encoded features without an intermediate data conversion step.
- Coarse but low-power feature extractor which can be used with a more accurate but power hungry A/D converter + DSP approach – similar to attention based signal processing
- More energy efficient without sacrificing performance (FRR).
Source Localization
Gore, Fazel, Chakrabartty (TCAS-I 2009)
Source separation
Gore, Fazel, Chakrabartty (TSP 2009)
Source Identification

- YOHO speaker verification corpus.
- 10 speakers were chosen and an SVM was trained on the features.
- Speech played through NI data acquisition card to the $\Sigma\Delta$ converter.
- Comparison metric EER: when false positive rate equals true negative rate