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Multichannel Maximum-Likelihood Method: Towards a Multisource Detection and Wave Parameters Estimation Using Deep Learning

Thursday, 22 June 2023 09:00 (1 minute)

We present an improvement to the multichannel maximum-likelihood (MCML) method. This approach is based on the likelihood function derived from a multi-sensor stochastic model expressed in different frequency channels. Using the likelihood function, we determine, for the detection problem, the generalized likelihood ratio with a p-value threshold to discriminate signal of interest and noise. For the estimation of the slowness vector, we determine the maximum likelihood estimation. Comparisons with synthetic and real datasets show that MCML, when implemented in the time frequency domain, outperforms state of the art detection algorithms in terms of detection probability and false alarm rate in poor signa to noise ratio scenarios. However MCML cannot account for interfering coherent signals in the same time frequency band. Different deep learning architectures are being explored to predict the number of sources in a given time frequency window. We illustrate the potential of such approach on synthetics and real data from the International Monitoring System to estimate multiple wave parameters associated with overlapping coherent signals from different sources.

Promotional text

We present an improvement to the multichannel maximum-likelihood method in a multisource case. For this purpose, a deep leaning approach is used to estimate the number of sources.

E-mail

benjamin.poste@cea.fr

Oral preference format

in-person

Primary author: Mr POSTE, Benjamin (Commissariat à l'énergie atomique et aux énergies alternatives (CEA))

Co-authors: CHARBIT, Maurice (Telecom-ParisTech); Mr LE PICHON, Alexis (Commissariat à l'énergie atomique et aux énergies alternatives (CEA)); Mr LISTOWSKI, Constantino (Commissariat à l'énergie atomique et aux énergies alternatives (CEA)); Mr ROUEFF, François (Institut Mines-Telecom, 91120 Palaiseau); Mr VERGOZ, Julien (Commissariat à l'énergie atomique et aux énergies alternatives (CEA))

Presenter: Mr POSTE, Benjamin (Commissariat à l'énergie atomique et aux énergies alternatives (CEA))

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