Separation Performance Evaluation

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Introduction

This script reproduces the result of the experiment described in Section 5.2. of Reference [1].

Download impulse response dataset

Please download Impulse_response_Acoustic_Lab_Bar-Ilan_University_(Reverberation_0.160s)_3-3-3-8-3-3-3.zip and place it in your current directory.

Run

```
% unzip dataset
if ~exist("Impulse_response_Acoustic_Lab_Bar-
Ilan_University_(Reverberation_0.160s)_3-3-3-8-3-3-3","dir")
    unzip("Impulse_response_Acoustic_Lab_Bar-
Ilan_University_(Reverberation_0.160s)_3-3-3-8-3-3-3.zip")
end

% install BSS-eval
if ~exist("bss_eval-master\","dir")
    unzip("https://gitlab.inria.fr/bass-db/bss_eval/-/archive/master/bss_eval-
master.zip")
end
addpath("bss_eval-master\v3.0\")

% Build MEX files to accelerate the experiment
addpath(genpath("IVA"));
[x,s,fs] = util_reproduceExperiment1Mixture(1, 1);
buildmex_IVA_FastADMM(x);
buildmex_IVA_ADMM(x);
buildmex_IVA_PDS(x);
buildmex_IVA_AuxIP(x);
buildmex_IVA_AuxISS(x);
buildmex_IVA_AuxIP2(x);

% Run and evaluate all the 224 mixtures
SDRi = nan(4*56,6);
mixtureIdx = 0;
count = 0;
wb = waitbar(count);
```

```
for mixingSystemIdx = 1:4
    for sourcePairIdx = 1:56
        mixtureIdx         = mixtureIdx + 1;
        [x,s,fs]           = util_reproduceExperiment1Mixture(mixingSystemIdx,
sourcePairIdx);

        SDRi(mixtureIdx,1) = util_calcSDRi(s,x,runmex_IVA_FastADMM(x));
        SDRi(mixtureIdx,2) = util_calcSDRi(s,x,runmex_IVA_ADMM(x));
        SDRi(mixtureIdx,3) = util_calcSDRi(s,x,runmex_IVA_PDS(x));
        SDRi(mixtureIdx,4) = util_calcSDRi(s,x,runmex_IVA_AuxIP2(x));
        SDRi(mixtureIdx,5) = util_calcSDRi(s,x,runmex_IVA_AuxISS(x));
        SDRi(mixtureIdx,6) = util_calcSDRi(s,x,runmex_IVA_AuxIP(x));

        waitbar(count/224,wb,count+" / 224");
        count = count + 1;

        boxchart(SDRi);
        xticklabels(["FastADMM","ADMM","PDS","IP","ISS","IP2"]);
        ylabel("SDRi [dB]");
        drawnow
    end
end
close(wb)

% visualize the result
boxchart(SDRi);
xticklabels(["FastADMM","ADMM","PDS","IP","ISS","IP2"]);
ylabel("SDRi [dB]");
```

Reference

1. Hiroko Watarai, Kazuki Matsumoto, Kohei Yatabe, "Fast and flexible algorithm for determined blind source separation based on alternating direction method of multipliers" (2025).