Separation Performance Evaluation

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Introduction

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

Download dataset

Please download the 'Impulse_response_Acoustic_Lab_Bar-Ilan_University_(Reverberation_0.160s)_3-3-3-8-3-3-3.zip' [2] and place it in your current directory.

Note: because of the file's large size, you will need to access the link above and download the file **manually**.

Run

```
% unzip dataset
if ~exist("Impulse_response_Acoustic_Lab_Bar-
Ilan_University_(Reverberation_0.160s)_3-3-3-8-3-3-3","dir")
    mkdir Impulse_response_Acoustic_Lab_Bar-
Ilan_University_(Reverberation_0.160s)_3-3-3-8-3-3-3
    unzip("Impulse_response_Acoustic_Lab_Bar-
Ilan_University_(Reverberation_0.160s)_3-3-3-8-3-3-3.zip",...
          "Impulse_response_Acoustic_Lab_Bar-
Ilan_University_(Reverberation_0.160s)_3-3-3-8-3-3-3")
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(fullfile("bss_eval-master","v3.0"))

% run
addpath(genpath("IVA"));
util_loadSampleMixture; % download SiSEC
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,run_IVA_FastADMM(x));
        SDRi(mixtureIdx,2) = util_calcSDRi(s,x,run_IVA_ADMM(x));
        SDRi(mixtureIdx,3) = util_calcSDRi(s,x,run_IVA_PDS(x));
        SDRi(mixtureIdx,4) = util_calcSDRi(s,x,run_IVA_AuxIP2(x));
        SDRi(mixtureIdx,5) = util_calcSDRi(s,x,run_IVA_AuxISS(x));
        SDRi(mixtureIdx,6) = util_calcSDRi(s,x,run_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. H. Watarai, K. Matsumoto, and K. Yatabe, "Fast and flexible algorithm for determined blind source separation based on alternating direction method of multipliers," Acoustical Science and Technology (under review) (2025).
2. E. Hadad, F. Heese, P. Vary, and S. Gannot, “Multichannel audio database in various acoustic environments”, in International Workshop on Acoustic Signal Enhancement (2014).