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function [W,H,iteration] = nnmf4decon(Matrix)
% -----
% Deconvolution of 2 peaks using a nonnegative matrix factorization
% -----
% This function deconvolutes 2 peaks of a given matrix into 2 single peak
% vectors and a noise vector using a nonnegative matrix factorization.
%
% input :
% * Matrix :      [time x wavelength]-matrix
%                  the sum spectra may only contain the double peak
%                  embedded in noise
%
% outputs :
% * W :          [time x 3]-matrix as result of the nnmf
%                  W(:,1) and W(:,2) are single peak vectors
%                  and W(:,3) contains the noise
% * H :          [3 x time]-matrix as result of the nnmf
%                  W*H ~ Matrix
% * iterations:  number of nnmf to fulfill the given criteria

%% remove negative entries
Matrix(Matrix<0) = 0;

%% determine the noise range (noise in the first part of the sum spectra)
dummy = pickpeaks(sum(Matrix'),2);
noiserange = floor(min(dummy)/2);
threshold = mean(sum(Matrix(1:noiserange,:))');

%% get the initial matrix factorization
%nnmf with 3 factors
factors = 3;
[W,H] = nnmf(Matrix,factors);
for i = 1:factors
    FACTOR(:,i) = sum((W(:,i)*H(i,:))');
end

% set the noise to column factors
maxima = max(FACTOR);
[~,id] = sort(maxima,'descend');
W = W(:,id);
H = H(id,:);

%determine the 2 highest peaks in each vector of the result
for i = 1:factors
    picks(:,i) = pickpeaks(FACTOR(:,i),2);
    picksheight(:,i) = FACTOR(picks(:,i),i);
end

% set the test value for the threshold (for substance 1 and 2 just on peak
% is accepted and the noise should contain no peak)
threstest = [min(picksheight(:,1)) min(picksheight(:,2)) max(picksheight(:,3))];

%start value to count the iteration steps
iteration = 1;

%%Iteration: while the maxima of the test value is bigger than two-times of
%%the threshold a new nnmf is necessary
while max(threstest) > threshold * 3
    %nnmf with 3 factors
    [W,H] = nnmf(Matrix,factors);
    for i = 1:factors
        FACTOR(:,i) = sum((W(:,i)*H(i,:))');
    end

    % set the noise to column factors
    maxima = max(FACTOR);
    [~,id] = sort(maxima,'descend');
    W = W(:,id);
    H = H(id,:);
    %determine the 2 highest peaks in each vector of the result
    for i = 1:factors
        picks(:,i) = pickpeaks(FACTOR(:,i),2);
    end
end

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        picksheight(:,i) = FACTOR(picks(:,i),i);
    end
    % set the new test value for the threshold
    threstest = [min(picksheight(:,1)) min(picksheight(:,2)) max(picksheight(:,3))];
    % count the iteration steps
    iteration = iteration + 1 ;
end
```