
Decompositions.GraphDecomp.ZhouLaplacian

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Returns the adjacency matrix and laplacian matrix of a graph corresponding to the decomposition of the input hypergraph according to Dengyong Zhou.

Syntax

[adjMat, lapMat] = ZhouLaplacian(HG);

Input

HG - hypergraph object with incidence matrix property obj.IM

Output

- adjMat - adjacency matrix of the decomposed hypergraph
- lapMat - graph Laplacian matrix of the decomposed hypergraph

Disclaimer

The definition of Bolla's Laplacian from a hypergraph was taken from the below paper.

Zhou, D., Huang, J., & Schölkopf, B. (2005). Beyond pairwise classification and clustering using hypergraphs (Technical Report 143). Max Plank Institute for Biological Cybernetics, Tübingen, Germany.%% Code

```
function [adjMat, lapMat] = ZhouLaplacian(HG)
%ZHOULAPLACIAN Summary of this function goes here
% Detailed explanation goes here
H = HG.IM;
de=sum(H,1)';
H=H(:,de>1); % remove edges which represent self loops or empty
eW = HG.edgeWeights;
de=sum(H,1)';

dv=H*eW;
dv(dv==0)=Inf; % convention
Dvinv=sparse(1:length(dv),1:length(dv),1./
sqrt(dv),length(dv),length(dv));%diag(1./sqrt(dv))
Deinv=sparse(1:length(de),1:length(de),1./de,length(de),length(de));%diag(1./
de);
W=sparse(1:length(eW),1:length(eW),eW,length(eW),length(eW));%diag(eW);
```

```
lapMat=eye(size(H,1))-Dvinv*H*W*Deinv*H'*Dvinv;  
adjMat=H*W*Deinv*W*H';  
end
```

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