Computations.hypergraphEntropy

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Computes the entropy score of a uniform hypergraph based on the generalized singular value decomposition of the Laplacian tensor of that hypergraph.

Syntax

```
entropy = hypergraphEntropy(HG, false)
```

Input

- HG - Hypergraph object. HG must represent a k-uniform hypergraph.
- normalized - bool, indicated whether to normalize the Laplacian matrix or not. **Default**: false.

Output

- entropy - Entropy score for the hypergraph.

References

- Can Chen and Indika Rajapakse. 10/2020. "Tensor Entropy for Uniform Hypergraphs." IEEE Transactions on Network Science and Engineering, 7, 4, Pp. 2889-2900.

Code

```
function entropy = hypergraphEntropy(HG, normalized)
if nargin < 2
    normalized = false;
end
H = HG.IM;
H(sum(H, 2)==0, :) = [];
D = diag(sum(H, 2));
E = diag(sum(H, 1));
if normalized
    L = eye(size(H, 1))-(D^(-1/2)*H*E^(-1)*H'*D^(-1/2));
else
    L = D-H*E^(-1)*H';
end
eigValues = eig(L);
```

```
nonzeroEigVal = eigValues(eigValues>1e-8);
normalizedEig = nonzeroEigVal/sum(nonzeroEigVal);
entropy = -sum(normalizedEig.*log(normalizedEig));
end
```

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