

# Package ‘BipartiteModularityMaximization’

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**Title** Partition Bipartite Network into Non-Overlapping Biclusters by Optimizing Bipartite Modularity

**Version** 1.22.415.2

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**Description** Function bipmod() that partitions a bipartite network into non-overlapping biclusters by maximizing bipartite modularity defined in Barber (2007) <doi:10.1103/PhysRevE.76.066102> using the bipartite version of the algorithm described in Treviño (2015) <doi:10.1088/1742-5468/2015/02/P02003>.

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**Encoding** UTF-8

**LazyData** true

**LinkingTo** Rcpp

**Imports** Rcpp

**RoxygenNote** 7.1.2

**Depends** R (>= 2.10)

**Suggests** testthat

**NeedsCompilation** yes

**Repository** CRAN

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bipmod	<i>Partition bipartite network into non-overlapping biclusters, by optimizing bipartite modularity.</i>
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### Description

This function partitions a bipartite network into non-overlapping biclusters by optimizing bipartite modularity defined in Barber (2007) using the bipartite version of the algorithm described in Treviño (2015).

### Usage

```
bipmod(incid_mat, ITER = 10)
```

### Arguments

incid_mat	Incidence matrix of a bipartite network.
ITER	A positive integer representing the number of iterations used to maximizing modularity, (default=10).

### Details

The function takes as input a bipartite network represented as an incidence matrix (using a matrix or a data frame) with non-negative values (the row sums and column sums must be positive, to ensure there are no disconnected nodes). The function partitions the rows and columns into non-overlapping submatrices (biclusters), and outputs the membership of rows and columns to a partition, and modularity (Q) representing the quality of the partitioning.

### Value

MODULARITY Modularity value (Q).

ASSIGN Integer labels representing partition of rows followed by columns in same order as incidence matrix.

### References

Barber, M. J. (2007). Modularity and community detection in bipartite networks. *Physical Review E*, 76(6), 066102. <doi:10.1103/PhysRevE.76.066102>

Trevino, S., Nyberg, A., Del Genio, C. I., & Bassler, K. E. (2015). Fast and accurate determination of modularity and its effect size. *Journal of Statistical Mechanics: Theory and Experiment*, 2015(2), P02003. <doi:10.1088/1742-5468/2015/02/P02003>

### Examples

```
data(example_data)  
bipmod(example_data)
```

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`example_data`*Example dataset of a bipartite network.*

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**Description**

A dataset consisting of anonymized patients ( $n=798$ ) and symptoms ( $d=8$ ), where each patient has one or more symptoms.

**Usage**`example_data`**Format**

A data frame with 798 rows and 8 binary variables:

**Symptom\_1****Symptom\_2****Symptom\_3****Symptom\_4****Symptom\_5****Symptom\_6****Symptom\_7****Symptom\_8**

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\* **datasets**

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