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School of Information Sciences

INDIANA UNIVERSITY

SCHOOL OF LIBRARY AND INFORMATION SCIENCE

Mendeley Group as a New Source of Interdisciplinarity Study

How Do Disciplines Interact on Mendeley?

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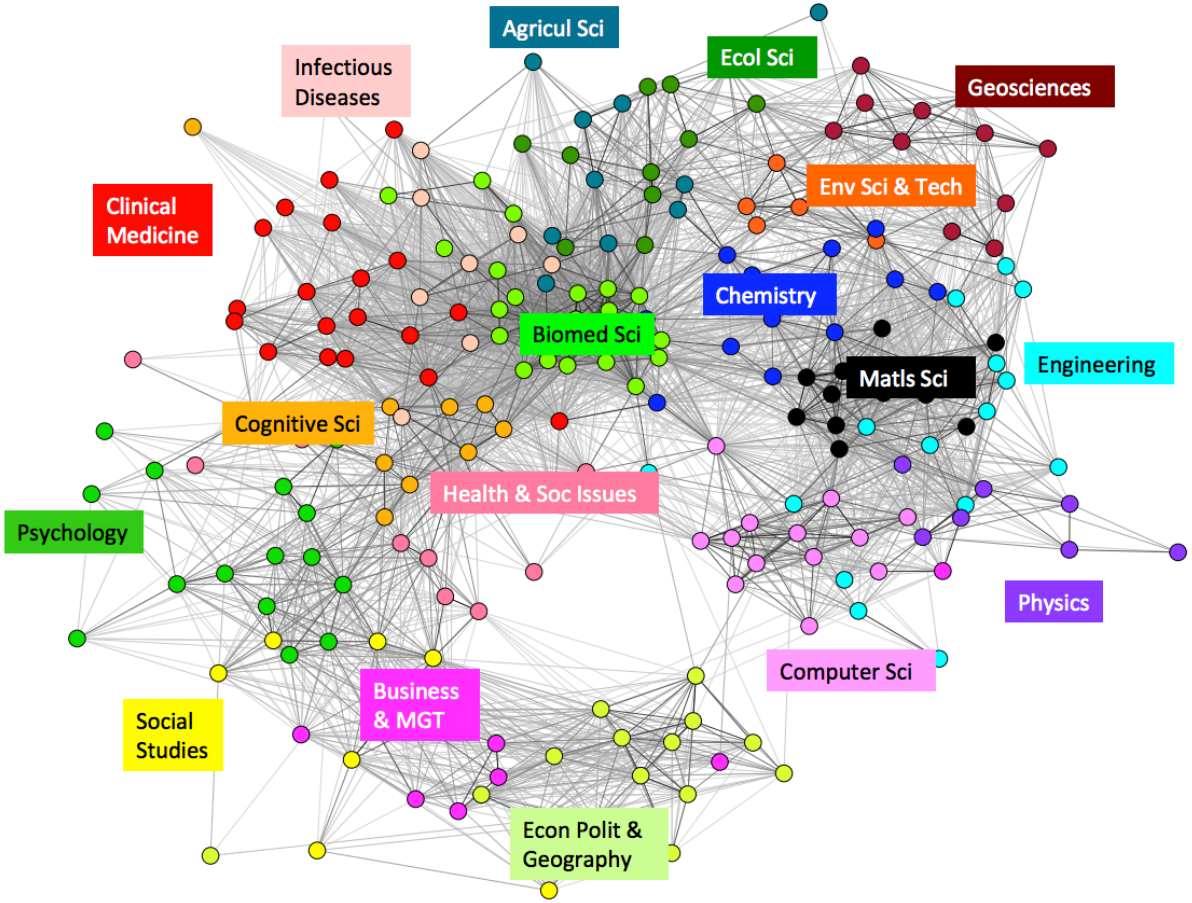
BACKGROUND

- **Relational bibliometric analysis**
  - Studying intellectual structure of science by connections of entities.
- **Example: global science map based on citing similarities**
  (Rafols, Porter & Leydesdorff 2010, JASIST)



BACKGROUND

- **Recent trends: using web 2.0 data**
  - Scientometrics 2.0 *(Priem & Hemminger 2010, First Monday)*
  - Altmetrics *(Priem, Taraborelli, Groth et al. 2010, "altmetrics: a manifesto")*

- **Related studies so far are mostly for evaluative purpose**
  - Evaluative bibliometric analysis
    - e.g. which article has better quality? which author has higher impact? which journal has better reputation?
  - Certain correlation between altmetrics and citation *(Eysenbach 2011)*

- **Very few relational bibliometric analysis using web 2.0 data**
  - Journal & author clustering using CiteULike *(Jiang, He & Ni 2011, JCDL)*
  - "Knowledge domain" (actually 25 articles from 5 topics) visualization using Mendeley *(Kraker, Korner, Jack et al. 2012, WWW workshop)*

MOTIVATION

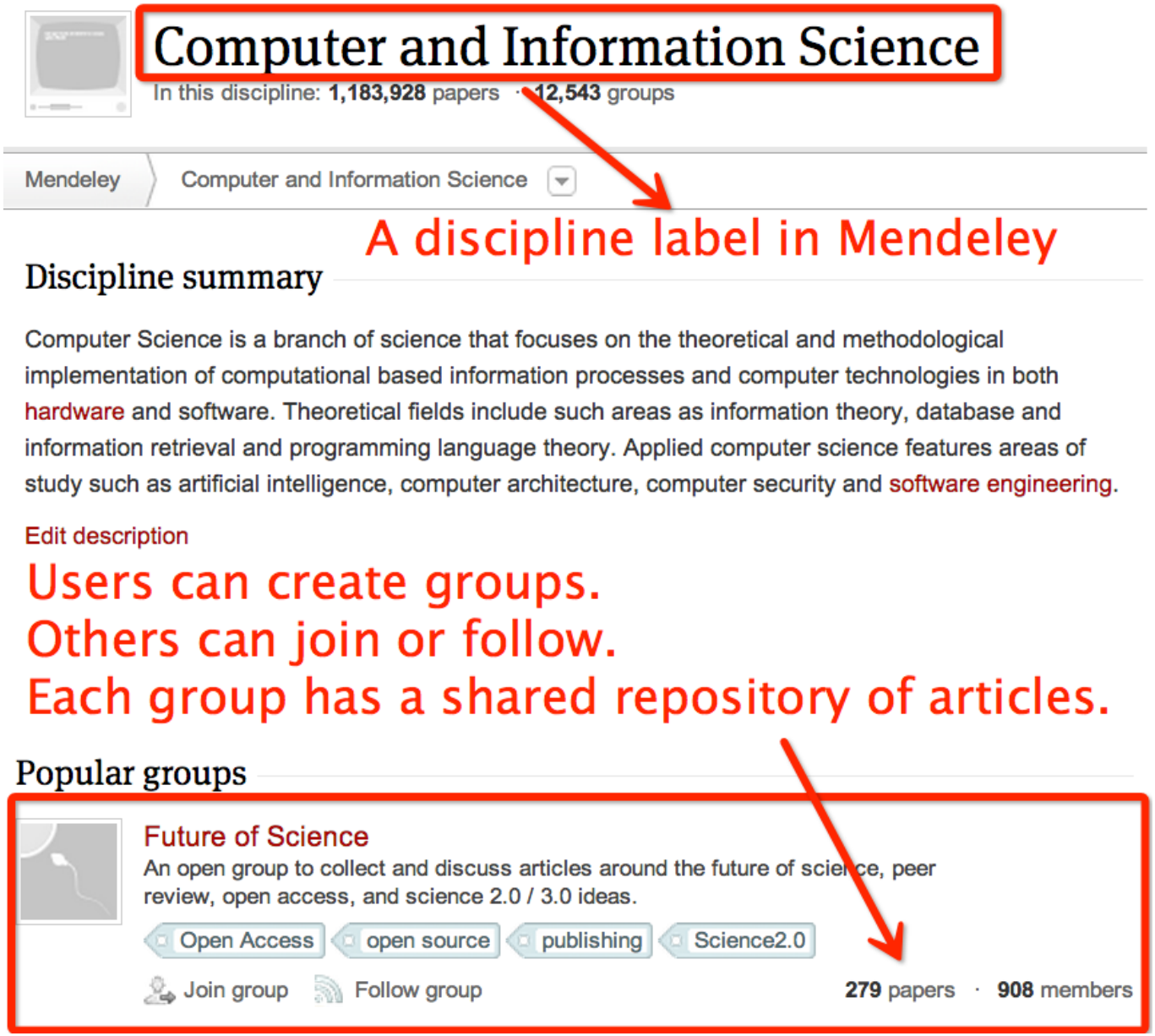
- **Can we use web 2.0 data for relational bibliometric analysis?**
  - Mendeley online groups
  - Each group has a discipline label
  - Cluster groups (disciplines) by shared members/followers

- **Possible difference (compared to citation)**
  - Informal scholarly communication

OUTLINE

- Background & Motivation
- *Mendeley Online Groups*
- Method & Datasets
- Results

MENDELEY ONLINE GROUPS



MENDELEY ONLINE GROUPS

- **One can either join or follow a group.**

- **Group members**
  - Share resources with others
  - Get notified when others share resources to the group

- **Group followers**
  - Browse all shared resources
  - Get notified when others share resources to the group
  - Anyone can follow

- **Each group was assigned to a discipline label in Mendeley**

OUTLINE

- Background & Motivation
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- ***Method & Datasets***
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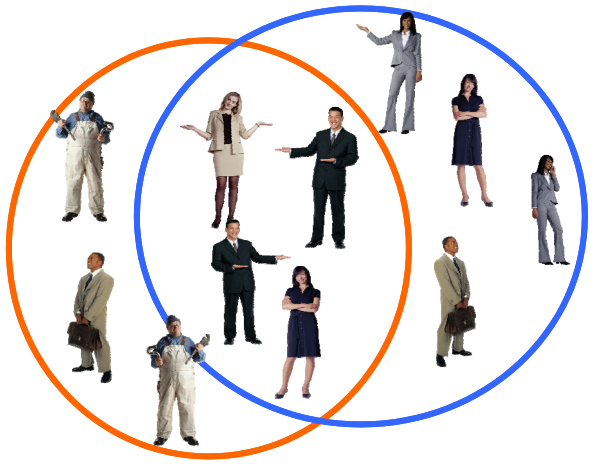
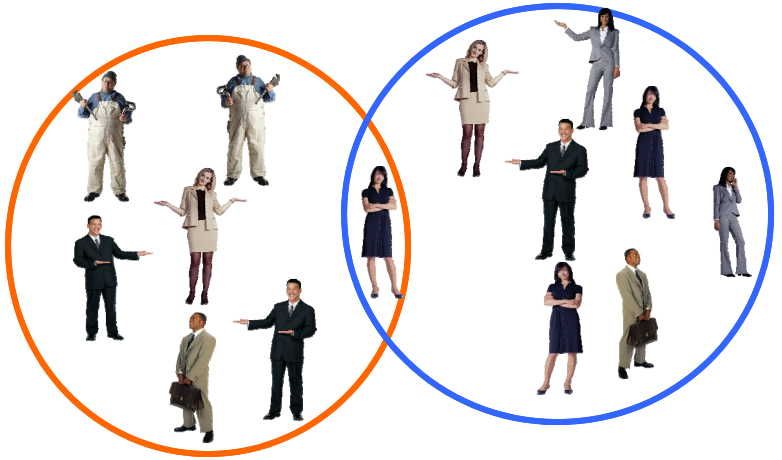
METHOD

- **Key ideas**
  - Related Mendeley groups have similar communities of members and/or followers.
  - Clustering of online groups indicates disciplinary and inter-disciplinary structures.

Related groups: high overlap of members and/or followers



Unrelated groups: low overlap of members and/or followers



DATASETS

- Collected in April 2012
- 25 discipline labels
- 34,838 open groups
- 54,703 unique members
- 12,268 unique followers
- 61,257 unique users

OUTLINE

- Background & Motivation
- *Mendeley Online Groups*
- *Method & Datasets*
- **Results**
  - ***Who are the group members and followers?***
  - Why do users join or follow groups?
  - Structure of groups

GROUP MEMBERS & FOLLOWERS

- **A categorization of users' position by matching keywords**
  - 13.37% of the members and 27.09% of the followers provided detailed position information.
  - The majority are very likely scholars in academia.

Category	Examples in Mendeley	% of members	% of followers
Research scientists	"researcher fellow", "research associate", "research scientist"	28.77%	25.83%
Doctoral student	"PhD student", "doctoral student"	26.72%	28.69%
Faculty	"assistant professor", "lecturer"	24.11%	21.83%
Postdoc	"postdoc", "postdoctoral fellow"	8.03%	8.23%
Other students	"master student", "student"	6.36%	9.14%
Industrial employee	"software engineer", "consultant", "project manager"	2.79%	2.97%
Librarian	"librarian"	2.27%	1.54%
Other positions		0.94%	1.77%

> 80%

GROUP MEMBERS & FOLLOWERS

- **A categorization of users' position by matching keywords**
  - Other users are probably who will consume scientific literatures.

Category	Examples in Mendeley	% of members	% of followers
Research scientists	"researcher fellow", "research associate", "research scientist"	28.77%	25.83%
Doctoral student	"PhD student", "doctoral student"	26.72%	28.69%
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Librarian	"librarian"	2.27%	1.54%
Other positions		0.94%	1.77%

≈ 10%

GROUP MEMBERS & FOLLOWERS

- **Unclear difference between members and followers**
  - **13.37%** of the members and **27.09%** of the followers provided detailed position information.
  - Similar category proportions (p = 0.23, chi square test)
    - *Members may more likely be senior researchers*
    - *Followers may more likely be junior researchers & consumers*

Category	Examples in Mendeley	% of members	% of followers
Research scientists	"researcher fellow", "research associate", "research scientist"	**28.77%**	25.83%
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OUTLINE

- Background & Motivation
- *Mendeley Online Groups*
- *Method & Datasets*
- **Results**
  - Who are the group members and followers?
    - *A combination of scholars (the majority) and pure consumers of academic information.*
    - *Citation & co-authorship: pure scholars*
  - ***Why do users join or follow groups?***
  - Structure of groups

MOTIVATIONS OF GROUPS

- **Three possible motivations identified from group descriptions**
  - Descriptions are edited by group administrators.
  - Assuming members & followers agree with these descriptions.

Motivation	Users	Example Group & Description
collaboration	owner, member	Bioimaging@KAIST: "This is ***collaborative research group at KAIST*** focusing on biophotonics and biomedical imaging."
sharing	owner, member, **follower**	Machine Learning Basics: "***collection of papers*** describing basic algorithms and topics in machine learning …"
networking	owner, member	Onomastics Switzerland: "***A communication platform*** for onomastic science in Switzerland. Use this Mendeley group to stay connected with other scientists of this topic …"

OUTLINE

- Background & Motivation
- *Mendeley Online Groups*
- *Method & Datasets*
- **Results**
  - Who are the group members and followers?
    - *A combination of scholars (the majority) and pure consumers of academic information.*
  - Why do users join or follow groups?
    - *For collaboration, sharing, and networking*
  - ***Structure of disciplines***

WHAT WE KNOW SO FAR ….

- **# of group members**
  - Degree of activity in collaboration & networking
- **# of shared members between two groups**
  - How many people collaborate with members of both groups

- **# of group followers**
  - # of consumers for the group's knowledge repository
- **# of shared followers between two groups**
  - How many scholars are interested in knowledge of both groups

SIZE OF DISCIPLINES

- By # of groups, unique members, and unique followers
- Three largest Mendeley disciplines: computer & information science, biological science, and medicine

Discipline	groups		unique members		unique followers	
	#	rank	#	rank	#	rank
Com Inf Sci	**5,392**	**2**	**11,692**	**1**	**3,932**	**1**
Biological Sci	**6,181**	**1**	**8,660**	**2**	**1,828**	**2**
Medicine	**3,764**	**3**	**6,354**	**3**	**1,744**	**3**
Engineering	2,410	4	5,007	4	892	10
Education	1,655	6	3,620	5	1,010	7
Management Sci	702	16	2,942	8	982	8
Physics	1,253	11	2,571	9	454	16
Chemistry	1,353	8	2,398	10	436	17
Mathematics	420	18	2,338	12	903	9
Humanities	664	17	2,333	13	1,012	6
Psychology	1,291	9	2,270	14	610	11
Philosophy	231	22	1,416	17	578	12
Economics	825	13	1,372	18	323	20
Earth Sciences	798	14	1,328	19	282	21
Linguistics	339	21	815	20	464	15

SIZE OF DISCIPLINES

- **Disciplines whose groups focus more on collaboration and networking (comparatively more members than followers): Engineering, Physics, Chemistry**

Discipline	groups		unique members		unique followers	
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SIZE OF DISCIPLINES

- **Disciplines whose groups focus more on knowledge sharing (comparatively more followers than members): Mathematics, Humanities, Philosophy, and Linguistics**

Discipline	groups		unique members		unique followers	
	#	rank	#	rank	#	rank
Com Inf Sci	5,392	2	11,692	1	3,932	1
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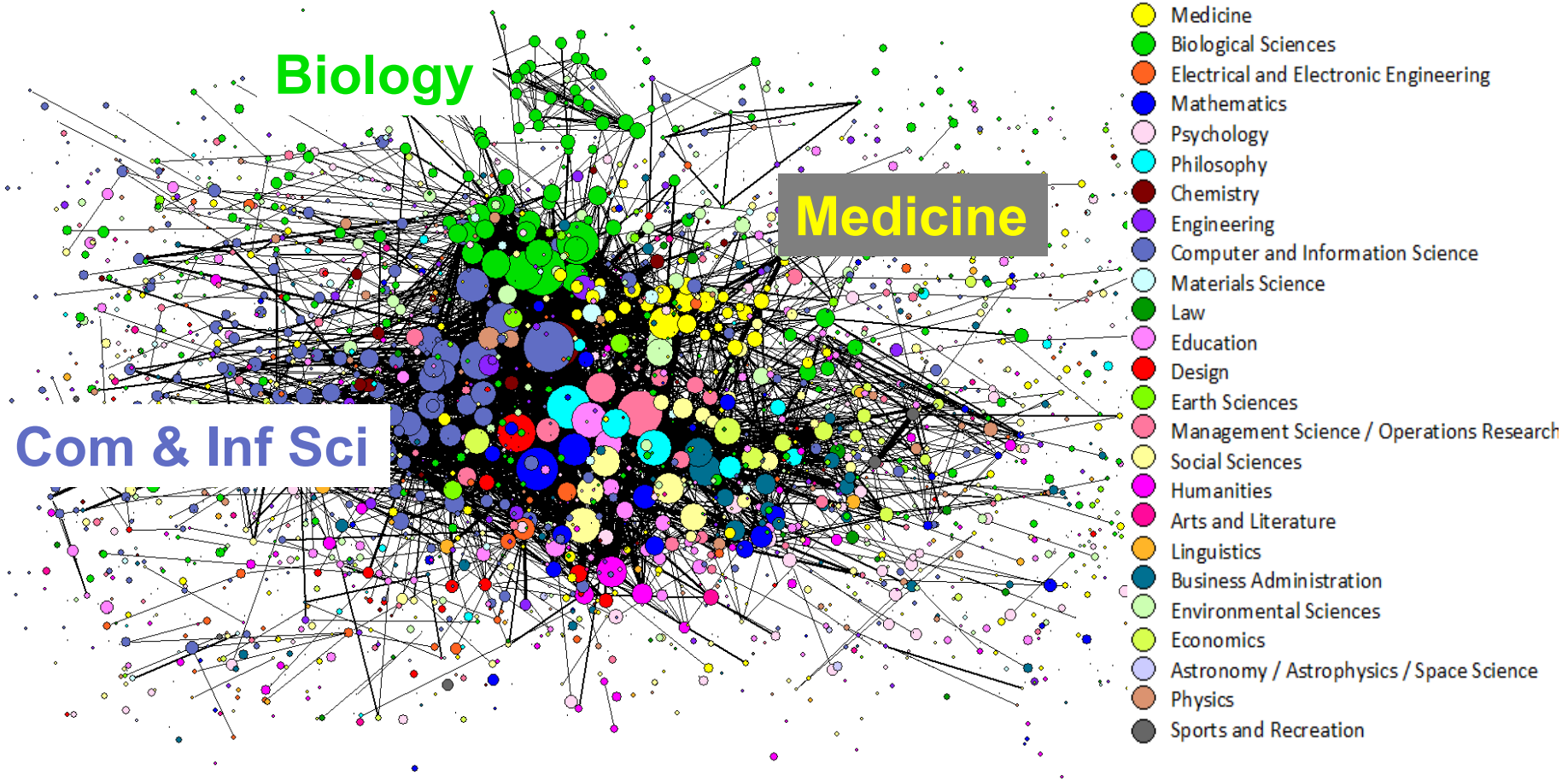
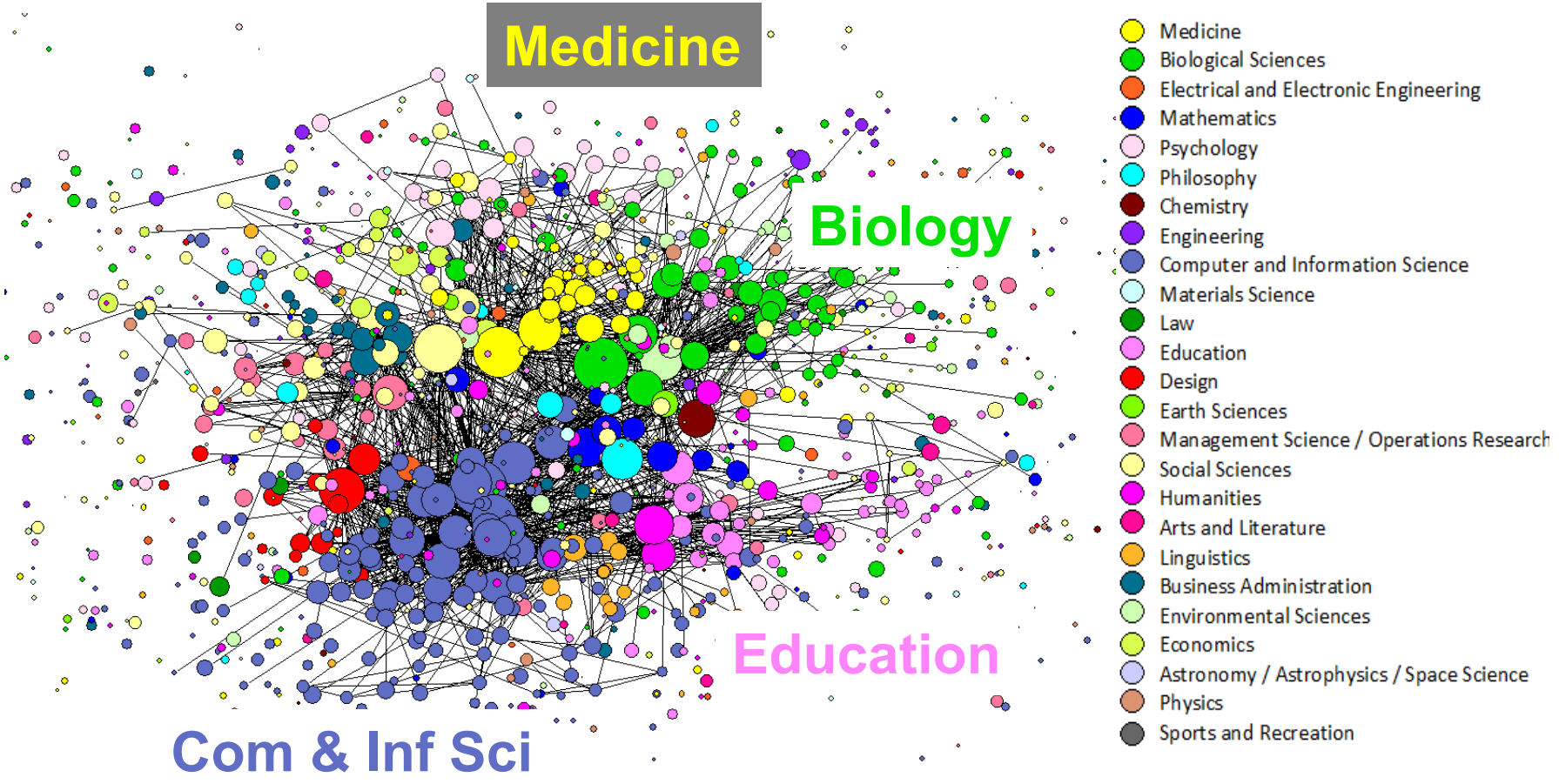
GROUP-MEMBER-COUPLING NETWORK

- Node: groups with 5 or more members
- Edge: the # of shared members (edges < 5 were removed)
- Layout: Kamada-Kawai (free) layout in Pajek



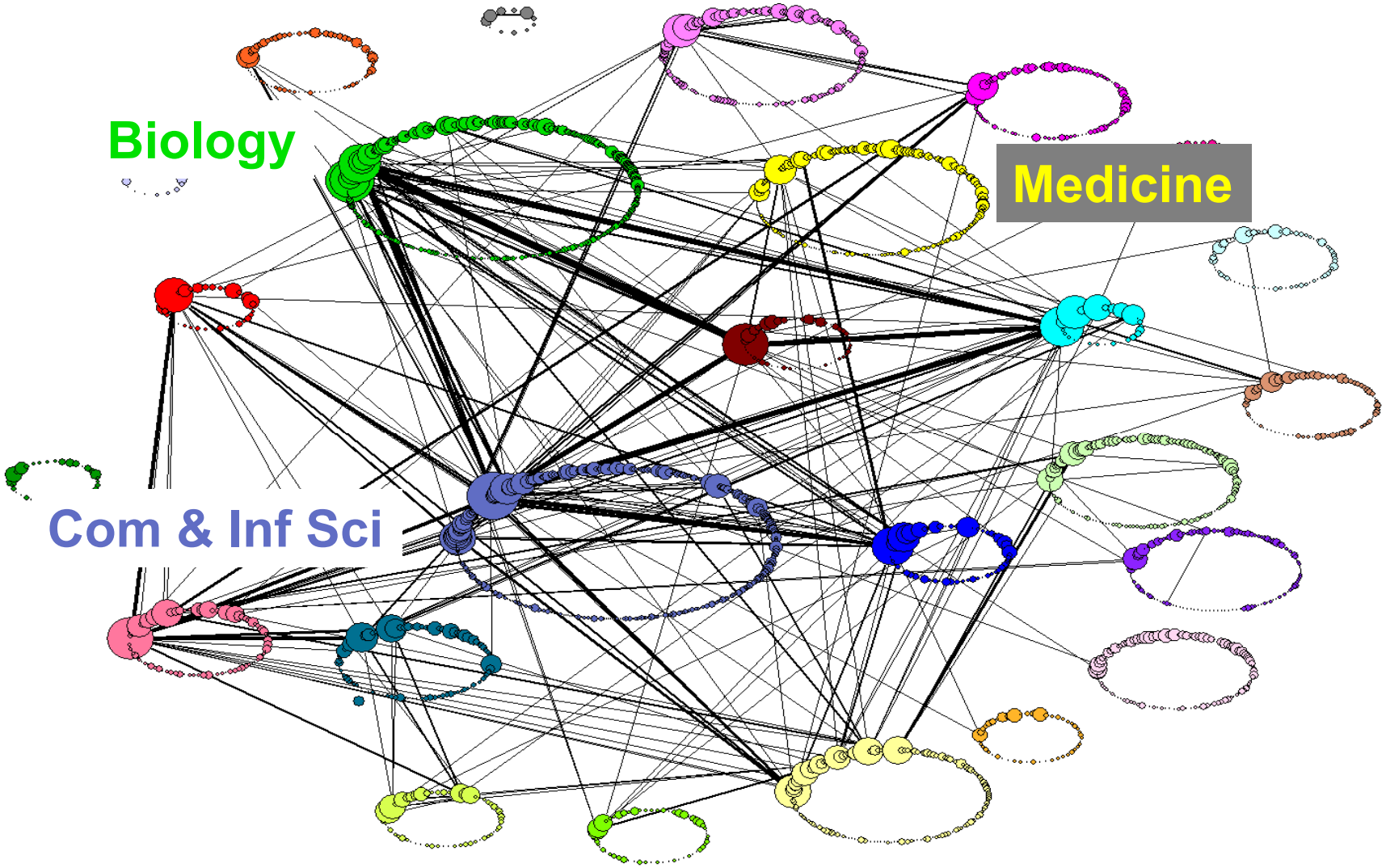
GROUP-FOLLOWER-COUPLING NETWORK

- Node: groups with 5 or more followers
- Edge: the # of shared followers (edges < 5 were removed)
- Layout: Kamada-Kawai (free) layout in Pajek



GROUP-MEMBER-COUPLING NETWORK

- Layout: circular layout using partition in Pajek



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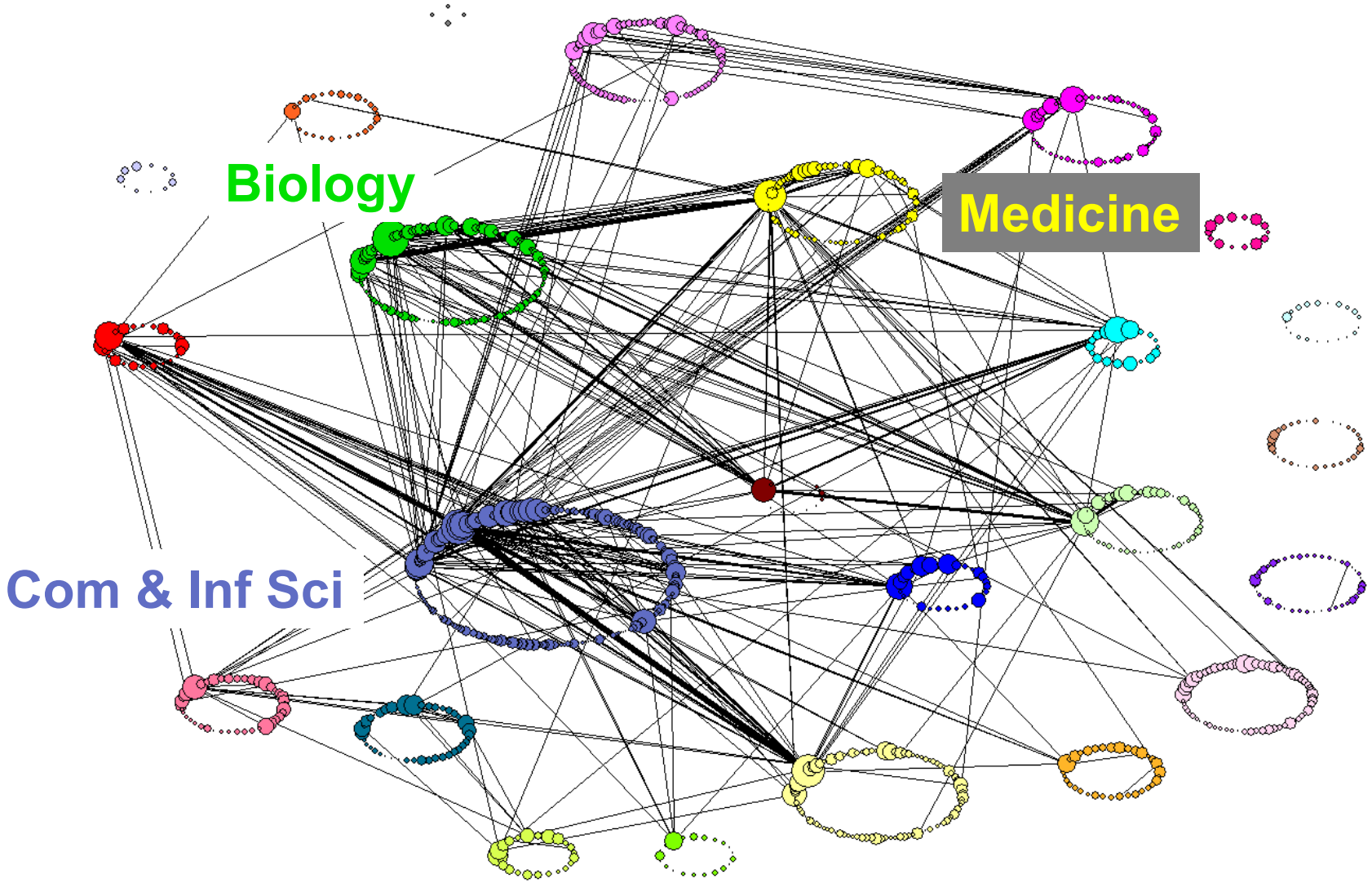

WRAP UP

- **Our results show connections of Mendeley groups show certain structures with disciplinary characteristics**

- **However, full explanation of the results relies on studies of**
  - Mendeley user populations
  - User motivations for joining and following groups

- **Future studies & unsolved issues**
  - User identity and motivation
  - Data biasness (e.g. on certain disciplines etc.)
  - Comparison with studies using conventional data source

Questions?