

Exploring network structure in academic social networking sites

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Background

Academic social networking sites (SNS) are websites which allow users to create a profile and make connections with others [1], and are explicitly aimed at the academic community. Academic SNS are an emerging area of digital scholarship, with several academic SNS having been developed in recent years [2].

Previous studies of academic SNS have focused upon analysing profile contents [3,4], or the nature of group formation [5,6]. However, to our knowledge no work has been carried out to elucidate the network structure of the social networks facilitated by academic SNS.

Current academic SNS, their size and relative popularity are shown in Figure 1, demonstrating a cluster of highly ranked sites with around 2 million users, after which the number of users falls with decreasing rank.

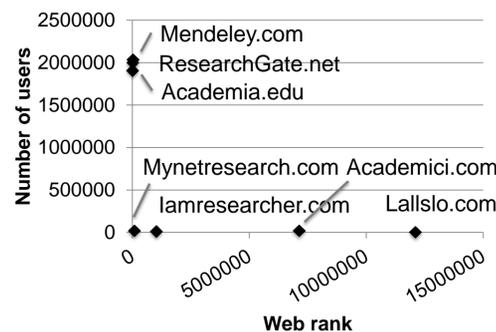


Figure 1. Number of users plotted against web rank (according to the Alexa website) of academic SNS. Data collected 2012-11-23.

Data collection & analysis

This study analysed the structure of the network of academics from one UK University (the Open University) across three of the largest academic SNS: Academia.edu (1045 profiles), Mendeley.com (70) and Zotero.org (115).

The three sites demonstrate heavy-tailed degree distributions (Figure 2), a classic characteristic of social networks.

OU-affiliated academics were selected as it is the authors' home institution, allowing the possibility for qualitative research activities in the future to follow up on trends in the network data.

Where possible, data was collected from profiles relating to academic position and discipline, and then coded into categories to allow comparisons to be drawn across the three sites.

Despite having the functionality to make connections, 89% of the profiles in the Zotero sample had zero degree, so analysis focused upon Academia.edu and Mendeley.

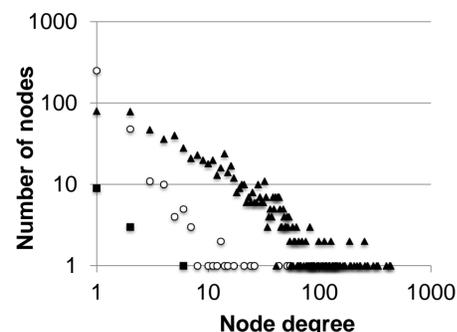


Figure 2: Degree distribution of Zotero (square), Mendeley (circles), and Academia.edu (triangles).

Research questions

What is the structure of academic social networks?
To what extent do different academic SNS foster similar networks?
Do factors such as discipline or position correlate with network structure?

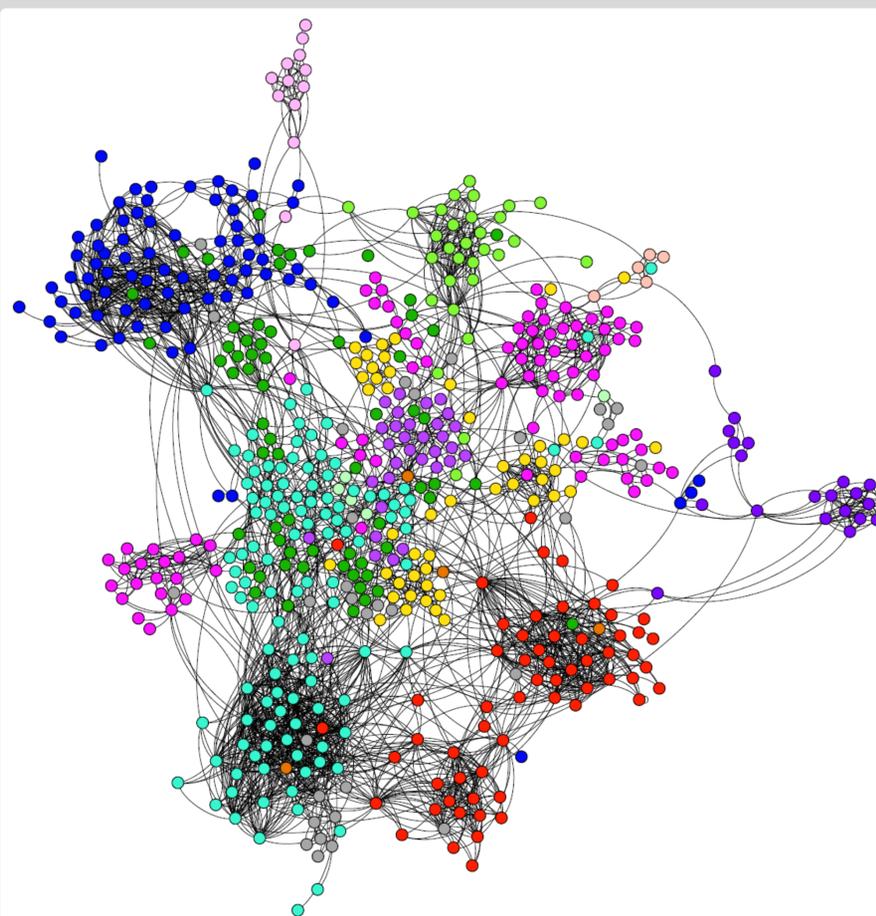


Figure 3. Network of connections between OU-affiliated academics in the giant component of the Academia.edu sample graph, colour-coded according to subject area ('Unknown' shown in grey).

Results

In both the Mendeley and Academia.edu network graphs, academic discipline appeared to be influential in community formation (Academia.edu shown in Figure 3). Centrality of nodes varied significantly according to discipline in both networks at the 95% level (Table 1).

Differences within both networks were also found in terms academic seniority.

More senior academics have a greater number of connections and are more central in the network, while students were less connected and more peripheral (Table 1).

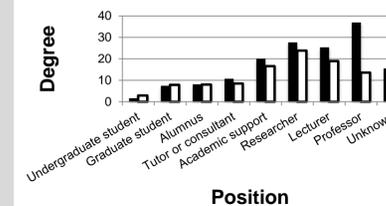


Figure 4. Mean average 'in degree' (black) and 'out degree' (white) of nodes in the Academia.edu dataset according to academic position.

Table 1. Summary of Kruskal-Wallis tests.

Site and factor	Degree	Centrality
Academia.edu, discipline	$\chi^2(14, N=1045)=61.41, p=.000$	$\chi^2(14, N=1045)=95.70, p=.000$
Mendeley, discipline	$\chi^2(8, N=70)=19.58, p=.012$	$\chi^2(8, N=70)=24.57, p=.002$
Academia.edu, position	$\chi^2(8, N=1045)=244.89, p=.000$	$\chi^2(8, N=1045)=328.15, p=.000$
Mendeley, position	$\chi^2(6, N=70)=13.15, p=.041$	$\chi^2(6, N=70)=16.70, p=.010$

Being directed, the Academia.edu network offered the opportunity to explore this in terms of both in- and out-degree.

While more senior academics have a greater degree overall, a disparity between in degree and out degree emerges with increasing seniority (Figure 4).

Conclusions

In comparing the network of academics from a single institution across three different academic SNS, trends in structure have been identified, including differences based upon academic discipline and seniority. The reasons behind the structures observed, and implications for academic practice, are the subject of further qualitative research activities.

The main research project will draw upon the findings of differences in terms of discipline and position in order to explore in detail the role of academic SNS (amongst other tools) in developing researchers' digital identities. The findings will have significance for academic staff development.

References

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