

# Mapping the U.S. Political Blogosphere: Are Conservative Bloggers More Prominent?

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## *Abstract*

Weblogs are now a key part of online culture, and social scientists are interested in characterising the networks formed by bloggers and measuring their extent and impact in areas such as politics.

However, researchers wishing to conduct quantitative social science analysis of the blogging phenomenon are faced with the challenge of using new methods of data collection and analysis largely derived from fields outside of the social sciences, such as the information sciences. This paper presents an overview of one new approach for collecting and analysing weblog data, and illustrates this approach in the context of a preliminary quantitative analysis of online networks formed by a sample of North-American “A-list” political bloggers. There are two aims to this paper. First is to assess (using different data and methods) the conclusion of Adamic and Glance (2005) that there are significant differences in the behaviour of liberal and conservative bloggers, with the latter forming more dense patterns of linkages. We find broad support for this conclusion, and empirically assess the implications of differences in conservative/liberal linking behaviour for the online visibility of different political messages or ideologies. The second aim is to highlight the role of web mining and data visualisation in the analysis of weblogs, and the opportunities and challenges inherent in this new field of research.

*Keywords:* web mining, network analysis, data visualisation

## 1 Introduction

Political weblogs represent a growing influence in U.S. politics, exerting significant influence on the content of media coverage and guiding media commentators in their interpretation of political news. There is already a significant body of research focusing on political bloggers with contributions from political science and communication science (see, for e.g., Drezner and Farrell, 2004; Gill, 2004), and the information sciences (see, for e.g., Adamic and Glance, 2005).

This paper outlines a new approach for collecting and analysing weblog data, and presents a preliminary quantitative analysis of the networks formed by a sample of North-American “A-list”

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political bloggers. The approach is an adaptation to weblogs of methods developed by Ackland and Gibson (2004, 2005) for analysing the extent and impact of political party networks on the World Wide Web (WWW), and these methods are embodied in new research software, *uberlink* (Ackland, 2005).<sup>1</sup> The linking behaviour of 40 prominent conservative and liberal bloggers studied by Adamic and Glance (2005) is analysed and their overall conclusion that conservative bloggers are more active in their linking behaviour is broadly supported. This is important since we use different data sources, time frame of analysis and methods to those used by Adamic and Glance (2005), and the conclusion is that this is a “real” phenomenon that has important implications for the online visibility or prominence of different political ideologies.

The second main aim of this paper is to highlight the fact that weblogs present both significant opportunities and major challenges to researchers interested in the networking behaviour of organisations and individuals. The opportunity stems from the fact that bloggers are on a daily-basis creating gigabytes of useful data pertaining to online networking that is currently freely-available to anyone with the tools to collect it. However, as this paper will show, there are significant challenges inherent in both the collection and analysis of weblog data.

## 2 Data collection and analysis

A *political blogger connectivity database* (PBCD) was constructed using *uberlink* in early April. The following sections provide brief detail on the process of constructing the connectivity database (see Ackland and Gibson (2004, 2005); Ackland and Gray (2005) for more details on constructing connectivity databases in other contexts) and a preliminary analysis of data in the PBCD.

### 2.1 Identifying seed pages

The first step in constructing a connectivity database is choosing seed pages that will be subsequently crawled to find the hyperlinks contained within the pages. The seed pages obviously depend on the research context: in Ackland and Gibson (2005), the seed pages are homepages of political parties from six countries while Ackland and Gray (2005) use pages returned from Google using the keywords ‘migration’ and ‘Australia’. For this paper, the top-20 conservative- and top-20 liberal-leaning weblogs listed in Adamic and Glance (2005, Tables 1 and 2) were used as the source of seed pages. In particular, the aim was to seed the connectivity database with all unique webpages in syndication feeds from these weblogs during a particular period of time. The study by Adamic and Glance (2005) analysed the political blogosphere during the 2004 U.S. Presidential Election and their analysis is based on blog data from October and November 2004. For the present study we used blog data that is (currently) freely-available from Bloglines, a company that provides a weblog aggregation and search service.<sup>2</sup> As Bloglines is a new entity, their database only contains blog syndication feeds<sup>3</sup> dating back to March 2005 and so it is not possible to replicate the time period studied by Adamic and Glance (2005). However, the aim of this paper is not to challenge

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<sup>1</sup>This approach has also been used in the analysis of online information available for migrants (Ackland and Gray, 2005).

<sup>2</sup>[www.bloglines.com](http://www.bloglines.com).

<sup>3</sup>Note that a syndication feed, which can be based on either the RSS or Atom protocols (among others), is used to notify of changes to the content of the site.

the methods or findings of Adamic and Glance (2005), but rather to see whether their overall conclusion about differences in linking behaviour of liberal and conservative bloggers “hold up” when assessed using different data and methods. For this paper, the connectivity database was seeded with all unique webpages in syndication feeds from these weblogs in the seven days between 4th and 10th of April 2005.

A user can access syndication feeds from Bloglines (updated on an hourly basis) for a customised list of weblogs, either manually using a web browser to access the Bloglines website or via the Bloglines application programming interface (API). The API interface is a unique service that allows programmers to efficiently harvest results from the Bloglines’ aggregation engine. Note, however, that the API (apparently) only allows access to the URLs of syndication feeds stored in the Bloglines databases, not the pages themselves (these need to be accessed directly from the weblog sites themselves). `uberlink` uses a Perl implementation of the Bloglines API, `WebService::Bloglines`<sup>4</sup>, which is discussed in detail in Lerner (2005a,b).

Before using the Bloglines API, it was first necessary to enter URLs of the 40 weblogs into the “my feeds” tab in the Bloglines account - Bloglines refers to this as ‘subscribing’ to feeds. For this paper, the subscription was created manually, although Bloglines offer a facility to allow users to import/export subscription lists in OPML format.<sup>5</sup> In the process of subscribing weblog feeds, it quickly became apparent that six months is a long time in the blogosphere - it was not possible to subscribe to feeds from two of the 40 blogsites in Adamic and Glance (2005). The domain `www.allahpundit.com` is no longer operating as a weblog (the person(s) behind this weblog may be using a new domain, but it was not possible to locate this domain) and while `blog.johnkerry.com` is still accessible, it is (for obvious reasons) no longer an active blogsite and Bloglines could not pick up a feed from this site. There was no choice but to omit these two sites from the study. For another site, the domain `timblair.spleenville.com` is still operational, but there is a message stating that the site ceased to be maintained in December 2004. However, there is a link to the new domain (`timblair.net`) and this was used in the present analysis. The above exemplifies one of the challenges facing weblog researchers - the data are rapidly changing.

There was a problem with the syndication feed for another blog on the Adamic and Glance (2005) list - `dailykos.com`.<sup>6</sup> Many of the Daily Kos feeds stored in the Bloglines database had incorrect dates (they are dated December 1969) and since the date of the feed is used to determine whether the feed URL is included as a seed page in the connectivity database, the decision was made to exclude Daily Kos from the analysis. Via the Bloglines API, `uberlink` queried the Bloglines database and collected, for the remaining 37 selected weblogs, all syndication feeds that were stored in the Bloglines database in the seven days between 4th and 10th of April 2005. As shown in Table 1, there are three blogsites that issued zero feeds during this period (`belmontclub.blogspot.com`, `realclearpolitics.com`, `americablog.blogspot.com`). For these three sites, it is important to establish whether the zero feeds recorded by Bloglines during the 4-10 April is a “real” result i.e. they did not issue posts on their sites during this period, or whether it reflects a technical problem

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<sup>4</sup>This Perl module was written by Tatsuhiko Miyagawa - see <http://search.cpan.org/~miyagawa/WebService-Bloglines/>.

<sup>5</sup>Note that Bloglines help the process of manually adding sites to the subscription by providing “subscribe buttons” that can be used with different browsers - while logged onto the Bloglines account, the user can surf the web and add blogs to the subscription with a few clicks of the button.

<sup>6</sup>Note that it is not clear whether this is due to a technical problem at Bloglines or at Daily Kos.

with feeds from the sites. Inspection of `belmontclub.blogspot.com` showed that this appeared to be a real result i.e. there did not appear to be any posts on the site during the period of analysis, and for this reason, this blogger was kept in the sample. However, there were posts on `realclearpolitics.com` and `americablog.blogspot.com` during the week of analysis, which (presumably for a technical reason) did not result in syndication feeds being sent to Bloglines. These sites will be omitted from the analysis.

## 2.2 Syndication feed activity

The final sample for the analysis is 35 sites: 18 conservative and 17 liberal. The 35 sites issued a total of syndication 1609 feeds during the week of analysis (column 2 of Table 1 and Table 2). The minimum number of feeds in the week of analysis was for `belmontclub.blogspot.com` (0 feeds), the maximum was for `instapundit.com` (151 feeds), and the average number of feeds issued during the week was 46. Conservative sites issued an average of 47 feeds per site, while liberal sites were only slightly less active, issuing an average of 45 feeds per site during the week. Note that `instapundit.com` exerts significant influence on the feed average coming from conservative sites, and the median feeds for the two groups are almost identical (43.5 - conservatives, 43 - liberals).

## 2.3 The political blogger connectivity database

Based on syndication feed activity, there does not appear to be a discernable difference between the conservative and liberal blogsites. Can we detect a difference in the linking behaviour of these two groups? To find this out, `uberlink` was used to crawl the URLs listed in the syndication feeds from the 35 blogsites.

In their syndication feeds, most blogsites issued references to either PHP or HTML pages. Of the 1609 feeds from the 35 blogsites, 1545 were to unique web pages (note that discussed further below, URLs containing *placeholders* for two different parts of the same page are considered to be unique for the purposes of our data collection). The 64 feeds from `http://www.prospect.org/weblog` are references to the same page (`http://www.prospect.org/weblog/archives/2005/04/index.html`) that contains all posts for April 2005 - the 63 duplicate feeds were ignored. `www.hughhewitt.com/` issued 53 feeds, but of these, only 16 were references to pages on that blogsite - the rest were references to pages on other sites (e.g. `news.bbc.co.uk` and `www.amazon.com`). For `www.hughhewitt.com`, it was decided to only crawl the 16 pages that were hosted on the blogsite (note: all other blogsites in the sample only issued syndication feeds containing references to pages on their own sites), and the other 37 pages were ignored.

The remaining 1509 pages that were crawled by `uberlink` form the *seed set* of the connectivity database. It should be finally noted that many of the blogsites in the sample issued feeds with references to identical pages but where the URL contained different *placeholders*. For example, the following two URLs were in two feeds from `http://atrios.blogspot.com`:  
`http://atrios.blogspot.com/2005_04_10_atrios_archive.html#111318960501876644` and  
`http://atrios.blogspot.com/2005_04_10_atrios_archive.html#111318466508716361` - these are hyperlinks to different parts of the same page. For the purposes of seeding the connectivity database, these URLs were treated as two separate pages (even though they are in fact the same

Table 1: Conservative political weblogs

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
URL	#feeds	#pages	#links out	#links in	auth.	hub	Overall ranking auth.	Overall ranking hub	Group ranking auth.	Group ranking hub
powerlineblog.com	71	71	219	22	0.095	0.101	1	10	1	9
instapundit.com	151	151	500	17	0.086	0.372	3	2	3	2
littlegreenfootballs.com	84	84	787	16	0.093	0.687	2	1	2	1
www.hughewitt.com	53	16	257	8	0.058	0.122	9	9	8	8
www.andrewsullivan.com	15	15	33	10	0.044	0.021	17	29	14	17
www.captainsquartersblog.com	45	45	514	10	0.077	0.143	7	7	6	7
wizbangblog.com	69	69	660	6	0.054	0.351	12	3	11	3
www.indcjournal.com	16	16	137	4	0.038	0.024	23	28	17	16
michellemalkin.com	33	33	265	15	0.081	0.153	6	6	5	6
www.blogsforbush.com	45	45	154	5	0.035	0.032	25	26	18	15
www.allahpundit.com	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
belmontclub.blogspot.com	0	0	0	9	0.041	0.000	21	n.a.	16	n.a.
realclearpolitics.com	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
volokh.com	42	42	156	9	0.051	0.059	14	22	12	14
timblair.net	27	27	139	7	0.055	0.088	10	12	9	11
www.windsofchange.net	37	37	498	9	0.076	0.196	8	5	7	5
vodkapundit.com	11	11	372	7	0.054	0.251	11	4	10	4
www.rogerlsimon.com	32	32	369	12	0.084	0.096	5	11	4	10
www.deanesmay.com	62	62	272	7	0.046	0.070	15	19	13	13
mypetjawa.mu.nu	53	53	238	4	0.041	0.078	20	15	15	12
Total	846		5570	177	1.11	2.84				
Average (18 conservative sites)	47.0		309.4	9.8	0.062	0.158				
Median (18 conservative sites)	43.5		261.0	9.0	0.055	0.099				
Total (All 35 sites)	1609		9385	322	1.628	3.695				
Average (All 35 sites)	45.9		268.1	9.2	0.047	0.106				
Median (All 35 sites)	43.0		255.0	9.0	0.045	0.074				

Table 2: Liberal political weblogs

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
URL	#feeds	#pages	#links out	#links in	auth.	hub	Overall ranking auth.	hub	Group ranking auth.	hub
dailykos.com	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
www.talkingpointsmemo.com	74	74	143	16	0.052	0.025	13	27	2	12
atrios.blogspot.com	96	96	314	8	0.020	0.073	29	17	10	5
www.washingtonmonthly.com	55	55	591	18	0.085	0.137	4	8	1	1
www.wonkette.com	17	17	51	10	0.042	0.014	19	31	4	14
www.juancole.com	21	21	49	3	0.011	0.011	31	32	13	15
yglesias.typepad.com	43	43	384	11	0.037	0.083	24	13	6	2
crookedtimber.org	28	28	316	9	0.031	0.075	27	16	8	4
www.mydd.com	36	36	136	9	0.024	0.036	28	25	9	11
www.oliverwillis.com	39	39	185	10	0.044	0.048	18	24	4	10
blog.johnkerry.com	n.a.	n.a.	n.a.	n.a.						
www.pandagon.net	51	51	306	7	0.016	0.050	30	23	11	9
talkleft.com	69	69	353	11	0.045	0.081	16	14	3	3
digbyblog.blogspot.com	15	15	228	4	0.008	0.060	35	21	16	8
politicalwire.com	57	57	141	2	0.014	0.016	31	30	12	13
www.j-bradford-delong.net	35	35	38	7	0.032	0.009	26	33	7	16
www.prospect.org	64	1	308	11	0.040	0.070	22	18	5	6
americablog.blogspot.com	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
www.theleftcoaster.com	59	59	255	5	0.009	0.062	33	20	14	7
jameswolcott.com	4	4	17	4	0.009	0.001	34	34	15	17
Total	763		3815	145	0.519	0.851				
Average (17 liberal sites)	44.9		224.4	8.5	0.031	0.050				
Median (17 liberal sites)	43.0		228.0	9.0	0.031	0.050				
Total (All 35 sites)	1609		9385	322	1.628	3.695				
Average (All 35 sites)	45.9		268.1	9.2	0.047	0.106				
Median (All 35 sites)	43.0		255.0	9.0	0.045	0.074				

page) - but as discussed below, there is no duplication of link counts.

The process of crawling the seed pages highlighted two difficulties with data collection from blogsites that do not arise in the context of web analysis of “normal” websites. First, depending on the context of the research it may be preferable to focus on either blogroll links (more permanent links in the sidebar of the weblog) or links embedded within the posts (“post citations” in the terminology of Adamic and Glance (2005)). While blogroll links indicate definite intent on behalf of the weblog author to link to another weblog, there is a problem with them growing “stale” over time, and for that reason some researchers prefer to focus on post citations as they are more indicative of the weblog author’s current linking intentions (or reading activity). The data collection process used for the present paper does not distinguish between blogroll links and post citations - this is something that will be addressed in future work. Thus, again using the terminology of Adamic and Glance (2005), the focus of this paper is on “page links” - a link that is found anywhere on a blog page (i.e. both blogroll links and post citations).

Second, there is the problem of “overlapping content” in weblogs. The weblog URLs for <http://atrios.blogspot.com> given above were to a page that contains all Atrios weblog posts for April 2005. The webcrawler used in `uberlink` crawled the entire page and thus collected post citations from posts that were not made within the week of analysis. This compromises the accuracy of the link data since many of the post citations made by Atrios may have been made before or after the week of analysis, thus skewing the link count for this weblog. Adamic and Glance (2005) address the problem of overlapping content by focusing their data collection on individual posts, rather than weblog pages. They used the weblog harvest system of BlogPulse<sup>7</sup> which uses a “model-based wrapper learner” to extract individual posts from weblog pages. It is clearly more accurate to focus analysis on posts rather than pages, and this will be addressed in future work.

### 2.3.1 Pages and page groups

The PBCD contains 10,905 observations, with each observation representing a unique web page. The focus of the analysis is on the linking behaviour of the 35 bloggers in our sample (we want each blogger to be represented in our network maps as a single node, not dozens of nodes representing each page stored in the PBCD) and so `uberlink` was used to aggregate web pages that come from each of these bloggers, thus forming *page groups* (or ‘sites’). In several cases, the URLs for blog pages in the database were from more than one domain. For example, there were pages from the blogger [volokh.com](http://volokh.com) that were served from the domains [volokh.com](http://volokh.com) and [volokh.powerblogs.com](http://volokh.powerblogs.com) - these were aggregated into a single page group.<sup>8</sup> There are 7236 page groups in the PBCD. However, note that for the purposes of this paper, all other pages in the database (i.e. pages not associated with one of the 35 bloggers in the sample) have automatically been assigned to “default” page groups that include everything up until the last “/” in the URL. That is, the 126 pages in the PBCD from the Washington Times are currently spread across a dozen different page groups including <http://www.washingtonpost.com/wp-dyn/articles/> and <http://www.washingtonpost.com/wp-dyn/opinion/>, while in fact they should be aggregated into a single page group representing the organisation, <http://www.washingtonpost.com/>. While

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<sup>7</sup>[www.blogpulse.com](http://www.blogpulse.com)

<sup>8</sup>See Thelwall (2002, 2004) for more on aggregating pages into groups or clusters using alternative document models (ADMs) based upon directories, domains and multi-domain sites.

`uberlink` has the facility to automatically assign pages to page groups based on the domain (which would be appropriate for the 126 pages from the Washington Post), this can be problematic as it can “aggregate away” interesting details in the data. For example, the PBCD contains homepages for around 20 U.S. congressmen and congresswomen that are hosted on the House of Representatives website `www.house.gov`. Automatic creation of domain-based page groups would lead to all representatives (conservative and liberal) being placed in a single page group, `www.house.gov`, which may be highly problematic for a study of the linking behaviour of liberal and conservative bloggers.

## 2.4 Linking activity

With the above caveats regarding data collection, what can we say about the linking behaviour of conservative versus liberal bloggers?

From Table 1 and Table 2, the average blogger made 268 unique links to other sites within the PBCD. The most active blogger in terms of links to other sites was `littlegreenfootballs.com` which had 787 unique links to other page groups within the database (compared with `belmontclub.blogspot.com` with zero outbound links). Conservative bloggers were more active in their linking behaviour, making an average of 309 links per site, compared with an average of 224 links made by the liberal bloggers. Even after allowing for the influence of outliers such as `littlegreenfootballs.com` and `belmontclub.blogspot.com`, conservative exhibit more active linking behaviour with median outbound links of 261 compared with 255 for the liberals.

The scale of data on the WWW make visualisation of networks a non-trivial exercise. How can we usefully visualise the online network formed by a blogger such as `littlegreenfootballs.com`, which has nearly 800 direct links to other sites in the database? `uberlink` has the facility to present interactive cybermaps using the 3D hyperbolic viewer H3Viewer of Munzner (1997) - hyperbolic space has the felicitous property of being less “cluttered” compared with the usual euclidean space. In Figure 1 a screenshot of the H3Viewer cybermap with the `littlegreenfootballs.com` website as the root node is presented. There are 6,724 nodes in the `littlegreenfootballs.com` web graph indicating that this site is connected (either directly or indirectly) to just about every other page group in the database. Moving from left to right in Figure 1, we follow the shortest path of outbound links from `littlegreenfootballs.com` and in Figure 2, the focus of the cybermap has shifted to `www.hughewitt.com`.

Column 5 of Table 1 and Table 2 shows the number of unique inbound links being made to the weblogs from other sites within the PBCD. Since only the weblog pages have been crawled at this stage, column 5 therefore shows the number of inbound links from weblogs to other weblogs. Conservative bloggers have an average of 9.8 inbound links (from other bloggers in the sample), compared with an average of 8.5 for liberal bloggers (however, the median count of inbound links is the same for these two groups). Figure 3 presents the HV cybermap showing inbound links to `littlegreenfootballs.com` - conservative weblogs are red and liberal weblogs are blue.

While the number of inbound links to a site provides a basic indicator of web visibility and prominence, the problem with this measure is that takes no account of *who* is doing the linking. A more sophisticated measure of web visibility is provided by the HITS algorithm of Kleinberg (1999). This algorithm is based on the premise of the existence of two distinct, but inter-related,



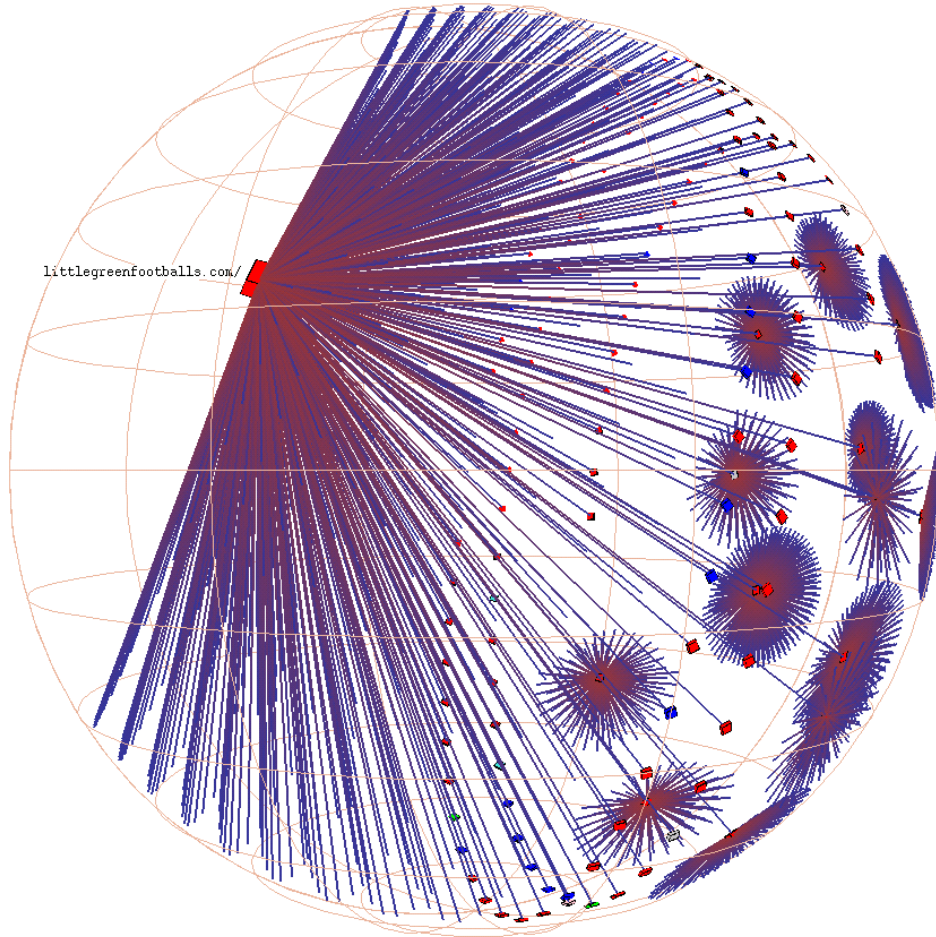


Figure 1: HypViewer cybermap for `littlegreenfootballs.com` - outbound links

types of pages - *authorities* are highly-referenced pages on a particular topic, while *hubs* are pages that point to the authorities (and thus confer authority). There is a mutually reinforcing relationship between authorities and hubs: a good hub points to many good authorities, and a good authority is pointed to by many good hubs. The HITS algorithm is implemented by associating each page group  $p$  in the connectivity database with an *authority weight*  $x(p)$  and a *hub weight*  $y(p)$ , which are initialised to 1. Let  $p \rightarrow q$  denote ‘page group  $p$  links to page group  $q$ ’. The HITS algorithm iteratively updates the  $x$ ’s and  $y$ ’s as follows:  $x(p) = \sum_{q \rightarrow p} y(q)$ ,  $y(p) = \sum_{p \rightarrow q} x(q)$ . After each iteration, the  $x$ ’s and  $y$ ’s are normalised so that the sum of squares is one.

Columns 6 and 7 of Table 1 and Table 2 show the hub and authority scores for the bloggers. Columns 8 and 9 show the overall relative ranking of each blogger (i.e. a ranking over all 35 bloggers), based on these two measures. Columns 10 and 11 of Table 1 show the relative ranking within the group of 18 conservative bloggers and columns 10 and 11 of Table 2 do the same for the liberal bloggers. What is astounding is that conservative bloggers occupy 9 out of the top ten positions both in terms of authority and hub scores. This is clear empirical evidence that the tendency for conservative bloggers to link more intensely to one another is having a marked impact on their relative online visibility.

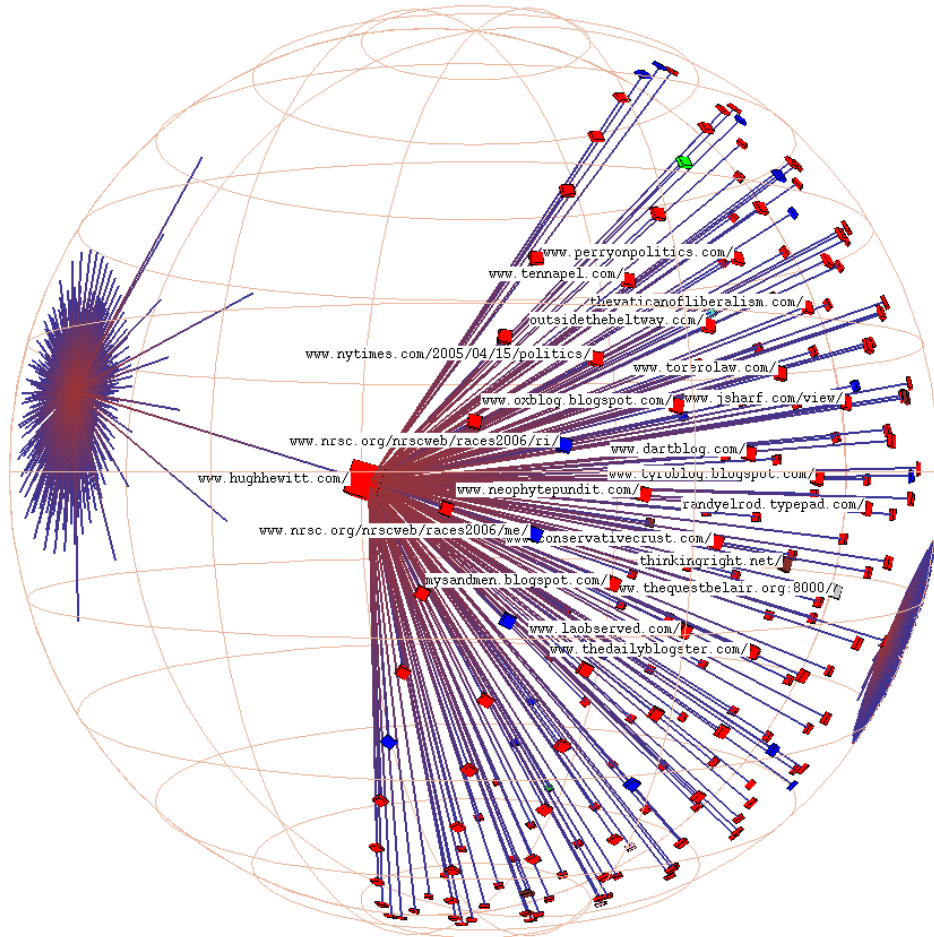


Figure 2: HypViewer cybermap for `littlegreenfootballs.com` - focus shifted to `www.hughewitt.com`

### 3 Conclusions

In this paper, a preliminary analysis of the linking behaviour of 40 prominent U.S. political bloggers has been presented. Despite using different data and methods to those used by Adamic and Glance (2005), their finding that conservative bloggers are more active in their linking behaviour is upheld. It was further shown that the relative differences in linking behaviour of conservative and liberal bloggers has important implications for the visibility of different types of political messages or ideologies in cyberspace. Based on one measure of online visibility, the HITS authority score of Kleinberg (1999), it was found that 9 of the 10 most visible bloggers were conservative.

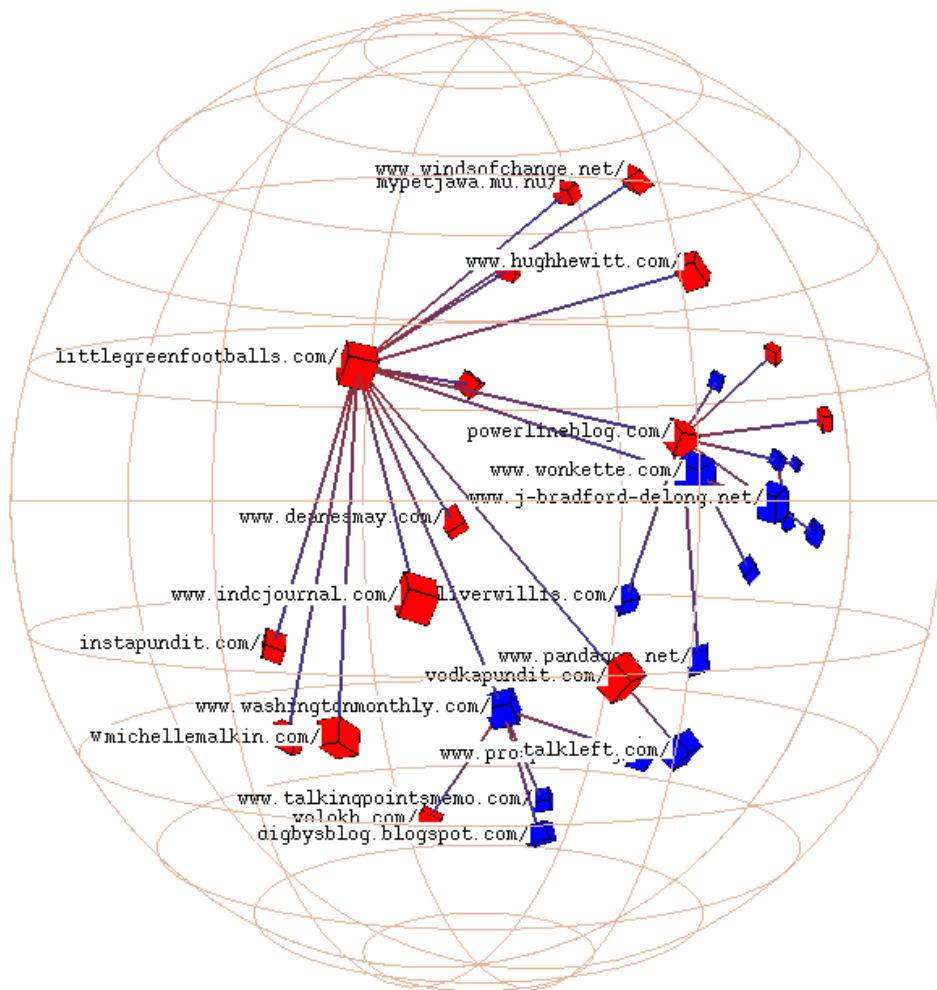


Figure 3: HypViewer cybermap for `littlegreenfootballs.com` - inbound links

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