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# A Social Networking Analysis Of Travel Blogs

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## Abstract

Travel blogs are C2C online diaries publishing personal stories and experiences, providing thoughts, commentaries, suggestions, advice and details of trips. In tourism, one of the most important information sources for travel planning is word of mouth. Travel blogs, a practiced form of word of mouth, play a crucial role in traveler's purchase decision. The paper aims to provide a methodology to locate central groups of travelers and to locate travelers that link to them. The paper also finds connectivity patterns between these groups of travelers: patterns of central travelers and patterns of travelers linking to them. It uses TravelPod (www.travelpod.com), the most popular travel blog, and studies incoming links between travelers through "favorite travelers" list, which is equivalent to a blogroll. The paper records 563 travelers. By using Social Networking theory, Multidimensional Scaling, and Hierarchical Cluster Analysis, the paper identifies central travelers' groups. Their importance is studied with regards to number of incoming links and travelers' and blogs' characteristics.

***Keywords:*** *Travel Blogs, Links Distribution, Patterns, Social Networking, Central Travelers' Groups*

## 1 INTRODUCTION

Blogs provide an easy way for an average person to publish material online sharing in this way a huge amount of knowledge (Nasr & Ariffin, 2008). Blogging is an act of sharing, a new form of socialization claimed Hsu & Lin (2008). In the last few years blogs are growing in popularity and have turned into a key part of nowadays online culture (Hsu & Lin, 2008). Travel and tourism have been of the most popular subjects in www (Heung, 2003) and blogs have important implications in this area (Schmallegger & Carson, 2008) as they can transform behavior of global travelers (Sigala, 2008a).Tourism products can hardly be evaluated prior their consumption (Rabanser & Ricci, 2005) thus; the functionality of the entire industry depends on the intangible and digital character of the distribution of tourism products (Pan et al., 2007) and on accurate and reliable information (Kaldis et al., 2003). "Due to the unbiased information shared in blogs based on first-hand authentic travel experiences, many travelers tend to use and trust blogs' information for searching for travel information, tips and selecting travel suppliers and destinations" (Sigala , 2009, p. 224).

Public travel blog sites, like travelblog.org, travelpod.com, blog.realtravel.com, yourtraveljournal.com, worldnomads.com and travelpost.com, have specialized in hosting individual travel blogs (Pan et al., 2007; Schmallegger & Carson, 2008). Travel blogs can include comments, suggestions, advice, directions, maps, photos and videos, links to related websites hyperlinks, to external information and links to other travelers. Blogging tools provide the appropriate features for managing blog interactivity and promoting the creation of social networks among bloggers (Du & Wagner, 2006). Williams & Jacobs (2004) highlighted that the success of social network systems such as blogs lies on interactivity and Sigala (2008b) mentioned "blogs create and maintain strong online communities through their social ties tools such as blogrolls, permalinks, comments and trackbacks".

Interactivity between blogs can be implemented with "blogrolls", "permalinks and comments" and "trackbacks". A "blogroll" is a list of blogs that many bloggers maintain. The list consists of the blogs that the blogger frequently reads or especially admires and offers links to these blogs. "Blogrolls provide an excellent means of situating a blogger's interests and preferences within the blogosphere. Bloggers

are likely to use their blogrolls to link other blogs that have shared interests" mentioned Drezner & Farell (2004, p.7). Interactivity can be also achieved by posting comments to entries, expressing thoughts (Drezner & Farell, 2004; Mishne & Glance, 2006). Such posts themselves link directly to a specific post on the other blog, and are a key form of information exchange in the blogosphere. Drezner & Farrell (2004) highlighted the fact that links and page views are the currency of the blogosphere. At last are trackbacks and pingbacks. Trackback is a citation notification system (Brady, 2005). It enables bloggers to determine when other bloggers have written another entry of their own that references their original post (Waggener Edstrom Worldwide, 2006). "If both weblogs are enabled with trackback functionality, a reference from a post on weblog A to another post on weblog B will update the post on B to contain a back-reference to the post on A" (Marlow, 2004). A pingback is an automated trackback. "Pingbacks support auto-discovery where the software automatically finds out the links in a post, and automatically tries to pingback those URLs, while trackbacks must be done manually by entering the trackback URL that the trackback should be sent to" (http://codex.wordpress.org/Introduction_to_Blogging#Pingbacks).

The paper aims at investigating conversational patterns in travel blogs. It uses TravelPod. TravelPod has been identified as one the most popular travel blog site by many researchers (Carson, 2007; Pan et al., 2007; Schmallegger & Carson, 2008; Wenger; 2007). On 18th November 2008, TravelPod was identified through Technorati as the 11th between the 100 top blogs having an Authority: 9299 and Rank: 9, and is the 1st travel blog in the list. "The discovery of information networks among websites or among site producers through the analysis of link counts and patterns, and exploration into motivations or contexts for linking, has been a key issue in this social science literature" (Park & Jankofski 2008, p. 62). The paper aims to provide a methodology to locate central groups of travelers and to locate travelers that link to them. Next, the paper finds connectivity patterns between these groups of travelers: patterns of central travelers and patterns of travelers linking to them. TravelPod, was founded in 1997 as the world's original travel blog. It introduces itself as: "TravelPod's free travel blog lets you chart your trips on a map, share unlimited photos and videos, and stay in touch while you travel". Thought TravelPod travelers can 1.preserve travel memories by uploading photos and videos, chart trips with travel maps and weave photos directly into stories 2. Get inspired for next trip by meeting other travelers and participating in travel forums 3. Share experiences with family and friends, by setting up email import tools, send email updates and RSS feeds and email notifications for new entries 4. Use advanced features as update travel blogs from mobile phone, track visitors of blogs, show travel blogs on MySpace, Facebook and other sites send update notifications to Facebook friends and others. In TravelPod each traveler can maintain many blogs presented at "travelers TravelPod page". At this page, "Recent Entries", "Recent Comments", "Recent Forum Posts", "Favorite travelers" and "Others Similar Travelers" are also presented. "Favorite travelers" is a special form of a blogroll and is a list of travelers that travelers frequently read or especially admire. These lists are taken into consideration in this paper in order to investigate connectivity and conversational patterns between travelers.

## 2 TRAVEL BLOGOSPHERE

Barger (1997) used for first time the term weblog and defined blog as ''a web page where a blogger 'logs' all the other web pages he finds interesting''. Later on Drezner & Farrell (2004, p. 5) defined blog as "A web page with minimal to no external editing, providing on-line commentary, periodically updated and presented in reverse chronological order, with hyperlinks to other online sources" . The term blogosphere refers to weblogs as a social network (Hill, 2004).

People use blogs in various ways, for publishing information, for transferring knowledge, for transferring information, for building relationships with other bloggers and for establishing networks (Du & Wagner, 2006; Lu & Hsiao, 2007). Wagner & Bolloju (2005) mentioned "weblogs are an ideal medium for experts who wish to broadcast their expertise to a large following but also suitable for bloggers who wish to converse with a small group of others by each telling their stories through the weblog and possibly linking to each other". In the business world, blogs are considered as environments for knowledge

sharing (Festa, 2003), a "magic" formula for corporate communication (Jüch & Stobbe, 2005), a potential for future profit (Lu & Hsiao, 2007) and a new way to reach potential customers (Hsu & Lin, 2008).

The blogosphere in tourism takes many forms (Schmallegger & Carson, 2008). First of all it contains business to business (B2B) and business to consumer (B2C) blogs. Gazetters.com is a B2B weblog for travel agents (Sigala, 2007). Companies use blogging to become recognized in the industry and to take direct feedback from customers, by allowing the public to make comments on blog posts (Hepburn, 2007). Southwest Airlines and Starwoods Hotels and Resorts maintain such official blogs (Dwivedi et al, 2007). Blogosphere contains also government to consumer blogs (G2C). Countries and destinations implement blogs for tourists in order to share their experiences on their official destination websites (Marzano, 2007; Pan et al., 2007). Austria, Sweden and Canada for example maintain such blogs. Finally, it contains consumer to consumer (C2C) blogs.

In that form of communication, travelers use blogs to express their thoughts and opinions to the global community of Internet users (Gretzel, 2007), to publish their personal travel stories and make recommendations online in the form of travel diaries or product reviews (Schmallegger & Carson, 2008). Travel blogs provide also geographic information, as destination websites. However bloggers provide more authentic information, gained through personal experience than destination websites who tend to describe only the positive aspects (Sharda & Ponnada, 2007). Travelers' blogs, as all tourism virtual communities, are serving for information exchange, collaboration, knowledge creation purposes and provide value for tourists' trip planning (Chalkiti & Sigala, 2007). Interpersonal influence and word-of-mouth are ranked as the most important information source in the process of making a purchase decision (Litvin et al., 2008). This was also claimed by Kozinets (2002) who mentioned that people, who interact in spaces like blogs over a long period of time, trust the opinions of the other users and take them into consideration when making a purchase decision. Another point was highlighted by Laboy & Torchio (2008) who wrote: "Consumer generated content holds a larger influencing effect than your own marketing". Regarding travel blogs Schmallegger & Carson, (2008, p.100) claimed "One of the major reasons for this phenomenon is certainly the higher perceived credibility of consumer opinions as compared to traditional tourist information sources".

## 3 METHODOLOGY

The paper considers the Top 100 travelers list, according to number of visits to their website, for TravelPod.com and records links from travelers to other travelers within TravelPod. Next, by using snowball sampling, links from these travelers to new travelers within TravelPod are recorded. Finally, a set of 563 travelers and their incoming links is formed. The recording of travelers and their hyperlinks was done during January 2009.

The paper studies incoming links between travelers, using the "Favourite travelers list" which is equivalent to blogroll. In order to construct a network, a 563 by 563 non-symmetric binary data matrix is used where unity is placed in cell ij if traveler i links to traveler j through the favourite travelers list, else zero is placed in the cell. The next step involves the construction of a travelers' interconnection network. It is a directed graph where travelers are noted as nodes and incoming links as directed arrows.

In this paper, we use the original adjacency matrix of the social network of travelers, which could be regarded as the starting point for presenting networks as graphs and interpret their graph theoretic properties in social networking theory. The paper adopts a statistical approach for studying networks, although other graph theoretic approaches also exist such as finding components or cliques. These graph theoretic notions are used in the study of social networks to locate actors who interact which each other. Our statistical approach on the other hand, in particular scaling and clustering analysis, is the preferred method because the interest is to find groups of travelers which have these properties: 1) within these groups the travelers need not be interconnected but 2) rather, they need to be linked by

nearly the same set of travelers. In this sense, clustering algorithms applied on the original adjacency matrix are considered suitable for locating these groups.

The paper adopts a method introduced by Zafiropoulos and Vrana (2008) for locating core blog groups in political blogging. The original idea (Drezner and Farrell, 2004) is that political blogs are organized around central focal point blogs, where most of the informative conversation is taking place. Zafiropoulos and Vrana (2008) introduced a combination of social networking theory, multidimensional scaling and hierarchical cluster analysis to locate such groups by studying incoming links through blogrolls. By finding such groups, one can explore how bloggers are organized and easily follow how conversation proceeds. For travel blogs, the idea may take a different form. Travelers or travel blogs are interconnected through blogrolls or "favourite travelers" lists, and in this way they may form groups of blogs or travelers, which are considered familiar or most important (while the rest of the blogs or travelers are more isolated). It is important to locate such groups in order to see how travelers or travelers' blog are organized, which blogs are considered familiar and which are their characteristics that distinguish them from the rest of the travelers.

Multidimensional Scaling (MDS) is used in the analysis as a data reduction technique and also to quantify the original binary data. The method reproduces the original data and map them on a fewer dimensions space (namely two in this analysis) while the effort is to keep intact the distances among the original data on the new reproduced data. "Stress" is a measure of goodness of fit between distances of original data and distances of the reproduced data. Better fit is assumed when stress is close to zero.

Hierarchical Cluster Analysis (HCA) uses the quantified data from MDS to produce clusters of travelers with similar properties. Travelers in the same cluster are linked by nearly the same set of travelers. So in this way the travelers in a formed cluster are regarded to be of the same family – have common characteristics - by travelers who link them. Some of the clusters that are produced by HCA, gather the largest number of incoming links. If this happens then they may serve as conversational focal points. Although it is not necessary, this property might be associated with the skewed distribution of links, also mentioned by Drezner and Farrell (2004) for political blogs: only few blogs have a very big number of incoming links while the rest, the majority of blogs, have only a small number of incoming links. This paper also presents the distribution of incoming travelers' links.

Principal Components Analysis (PCA) followed by Varimax Rotation is used to find and group intercorrelated variables. PCA is used to find general linkage patterns. PCA results to Principal Components (PC). Those that have eigenvalues over unity are considered significant. A factor-loading table presents how the original variables are correlated with PC.

## 4 FINDINGS

### 4.1 Incoming and outgoing links distribution

To test whether the hypothesis of skewness holds for travelers' blogging, this paper examines the distribution of incoming links to the 563 travelers of the study. To measure incoming links for a traveler, the paper calculates the "in-degree" of every traveler. For example, an in-degree that is equal to 10 for a specific traveler means that ten travelers consider this specific traveler as one of their favourite travelers, within Travelpod.com. Figure 1 describes the distribution of incoming links (in-degrees). Most of the travelers have a very small number of incoming links, while only a few blogs have a big number of incoming links (in-degrees). In-degrees range from zero to 30. Travelers have a very low degree of interconnectivity. Most travelers have only few incoming links, while only a few of the travelers have a bigger number of incoming links. In addition, Figure 1 also presents a scaterplot of the ranks of travelers according to incoming links vs the number of incoming links. The skewness of the distribution is obvious. Travelers that are ranked lower have only few incoming links. This finding provides evidence that Drezner and Farrell's (2004) argument about the skewness of incoming links distribution holds true.

In Figure 2 it is shown that skewness is also a property of outgoing links. The number of outgoing links for a traveler, is the number of favorite travelers for this traveler. Only few travelers have the majority of outgoing links (Figure 2).

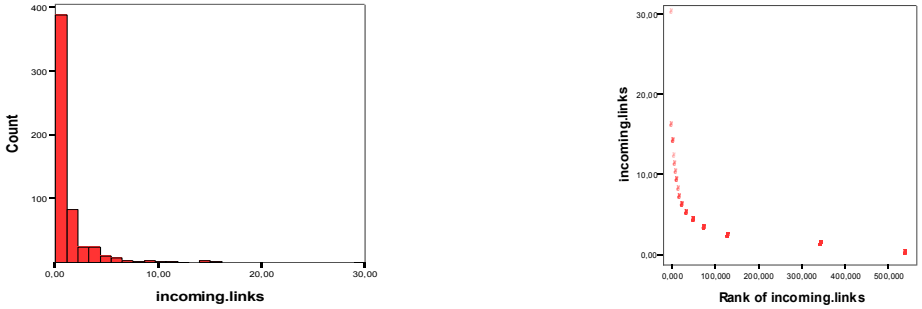


*Figure 1.* *Histogram of travelers' incoming links-indegrees (left) and scaterplot of travelers' ranks according to incoming links vs actual number of incoming links-indegrees(right).*

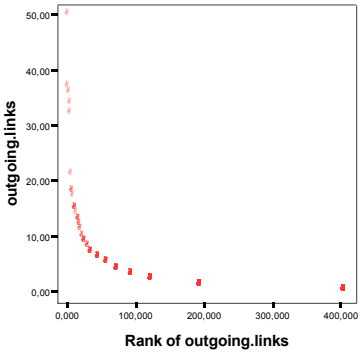


*Figure 2.* *Histogram of travelers' outgoing links-outdegrees (left) and scaterplot of travelers' ranks according to outgoing links vs actual number of outgoing links-outdegrees (right).*

### 4.2 In-Clusters of travelers

Multidimensional Scaling (MS presents very good fit with Stress=0.0493), followed by Hierarchical Cluster Analysis (HCA) result to the formation of seven clusters of travelers regarding incoming links. These clusters of travelers are described in Table 1. They are called In-clusters hereafter. To decide about the suitable number of out-clusters, the study uses a scree plot of the number of clusters against Wilks' Lambdas.

Only 41 out of 563 travelers, i.e. 7.3% of the 563 travelers are organized in seven clusters, while the rest (the majority) present low in-degrees and are not organized in a concrete cluster. In-Cluster 1 consists of 14 travelers who have an average in-degree 5.71. Clearly, it is the least referred cluster out of the seven clusters since the travelers within the cluster are referred nearly by six other travelers. In-Cluster 2 consists of ten travelers and has an average in-degree of 6.6%, which slightly larger that the relative in-degree of In-Cluster 1. In-Cluster 3 consists of seven travelers and has an average in-degree 6.86. In-Cluster 4 consists of five travelers with an average in-degree 11.83. Cluster 5 has two travelers "luchy" and "wakingdream" and an average in-degree 14. In-Cluster 6 and 7 both consist of one traveler each, "themeoff" in cluster 6 with in-degree 16 and "whereshegoes" in Cluster 7 with in-degree 30, which is the largest of all.

| | Average In-degree | Average # of countries visited | Average # Posted photos 5/12009 | Average # Posted entries 5/1/2009 | In travel blogs (Average) 5/1/2008 |
|---|---|---|---|---|---|
| In-cluster1(14travelers) | 5.7 | 24.21 | 1411.86 | 146.93 | 2.43 |
| In-cluster2(10travelers) | 6.6 | 34.9 | 1807.8 | 322,6 | 9.7 |
| In-cluster3(7travelers) | 6.8 | 40.71 | 5033.28 | 315 | 5.71 |
| In-cluster4(6travelers) | 11.8 | 30.33 | 4141.66 | 412.66 | 4 |
| In-cluster5(2 travelers) | 14 | 29.5 | 1364 | 102 | 8.5 |
| In-cluster6(1 travelers) | 16 | 24 | 2446 | 161 | 1 |
| In-cluster7(1 traveler) | 30 | 38 | 2454 | 737 | 5 |

*Table 1 . Description of clusters of most linked travelers (visited 6/1/2009).*

### 4.3 In-Clusters' characteristics

This section deals with the analysis of the characteristics of travelers' clusters. The seven clusters consist of the most linked travelers and, as it has been argued, they may have common characteristics because travelers in the same cluster are linked by nearly the same set of travelers. So in this way the travelers in a formed cluster are regarded to be of the same family – have common characteristics - by travelers who link them. These common characteristics may place them in the same cluster according to other travelers' choices (favourites). Several characteristics were taken into account in order to see whether they may be associated with placement of travelers to the specific clusters. They may not be all the characteristics necessary to drive to a solid conclusion but rather they must be considered to constitute an available set of data that allows making a first attempt to analyse clusters' profiles. These are traveler' s in-degree, his/her placement in the top100 TravelPod rating (in case he/she belongs in this list), number of visitors to his/her site (on 6/1/2009), traveler's country of origin, no of countries visited by him/her, no of posted photos by him/her (till 5/1/2009), no of posted entries (till 5/1/2009), no of his/her travel blogs (5/1/2009), duration of his/her membership, and whether he/she received TravelPod Badges (by means of recognition of his/her achievements or history regarding participation in TravelPod, for example if he/she is a founding member) (Table 1).

Clusters with higher in-degrees consist to a higher degree of travelers with TravelPod budges (founding members etc), longer period of membership and more posted entries in their blogs. This can be verified by correlation coefficients calculated for in-degrees and the travelers' characteristics (Table 2). In addition, placement in TravelPod top100 list is correlated though not significantly with number of incoming links. This means that there is a tendency for those travelers who are ranked high (according to visits to their sites) to be part of clusters with high in-degrees. However, the actual number of visitors is not correlated with in-degree, so number of visits to their own sites, does not provide evidence of the placement of travelers in some cluster and therefore is not connected in this since with networking patterns among travelers.

Regarding travelers' country of origin, travelers mainly come from Australia, United Kingdom, Canada and United States. Only few come from Argentina, France, Germany, Ireland, Philippines, and Thailand. Travelers that belong to most linked clusters, those are In-clusters 5, 6 and 7, and they all come from Canada. Regarding the number of countries, that the travelers have visited there is not a linear correlation between this number and the cluster membership (Table 2). Regarding number of posted photos and posted entries of the travelers, it is only number of entries which is significantly correlated with in-degree, and cluster membership. Travelers that are linked higher, also have higher communication flow by means of how frequently they address to visitors of the website by narrating their experience. On the contrary, number of blogs of the travelers is not correlated with in-degree.

Finally, duration of membership and TravelPod budges are correlated with in-degree. The most linked travels have also entered TravelPod earlier and hold some budges that is they are founding members or moderators, etc. In this sense, it seems that duration of membership and TravelPod budge holding are

synonyms. To clarify the connection of the travelers' profiles with cluster membership, a stepwise regression analysis is performed, considering in-degree as the dependent variable and the rest variables as independent (Table 3). Only posted entries and membership duration are affecting in-degrees (and consequently cluster membership). According to Beta absolute values they affect in-degree nearly equally, although posted entries present a higher coefficient (in absolute value). Highly linked travelers have more posted entries and are members of TravelPod for a longer time.

| | In-degree |
|---|---|
| Placement in Top100 TravelPod rating | -.351 |
| Number of visitors | .031 |
| Number of countries visited | -.029 |
| Posted photos | .186 |
| Posted entries | .408(**) |
| Number of travel blogs the traveler has created | -.108 |
| Member since (year) | -.317(*) |
| TravelPod budges (1 yes/ 0 no) | .379(*) |

(**: p< 0.01, *: p< 0.05)

*Table 2. Correlation coefficients of in-degree (number of incoming links) with travelers' characteristics.*

| R2=0.403 | B | Std. Error | Beta | T | p |
|---|---|---|---|---|---|
| Constant | 2771.280 | 1108.315 | | 2.500 | .020 |
| Posted entries | .018 | .005 | .559 | 3.340 | .003 |
| Member since (year) | -1.381 | .53 | -.418 | -2.497 | .021 |

*Table 3. Stepwise regression of in-degrees by travelers' characteristics.*

### 4.4 Out-Clusters or patterns of outgoing links

This section is seeking to locate patterns of travelers according to their outgoing links. Besides finding which are the most linked clusters of travelers (In-clusters), it is interesting to find clusters of travelers with certain properties regarding their outgoing links, especially those that link to the seven in-clusters described earlier. These newly defined clusters are called hereafter out-clusters. Out-clusters would be clusters of travelers who share common friends or link to the same in-clusters. The methodology to locate the out-clusters is somewhat different from the one followed to find in-clusters. The first step involves the calculation of seven new variables, each one in association with each In-cluster. These variables count the number of outgoing links from each traveler to each one of the seven in-clusters. Next, Principal Components Analysis (PCA) followed by Varimax Rotation is performed on these seven variables. PCA is used to find general linkage patterns on the one hand and as the first step prior to Hierarchical Cluster Analysis (HCA) on the other. Factor scores from PCA are used as input for HCA. Clusters formed in this way are called out-clusters.

PCA results to three Principal Components (PC) with eigenvalues over unity. They account for 65.94% of the total variance. Table 4 presents the factor loadings after applying PCA on the seven variables. The first PC accounts for 24.54% of the total variance. It is highly correlated with number of links to in-clusters 3, 5, and 7. This reveals a pattern on linking to in-clusters. Those travelers who link to in-cluster 7, they also link to in-clusters 3 and 5. The second PC accounts for 21.34% of the total variance and is correlated with links to in-clusters 2, 5, and 6. Travelers linking to all of the three in-clusters they link also to the other two. The third PC accounts for 20.06% of the total variance and is correlated with links to in-clusters 1 and 4. Concluding, we can say that in-clusters 1 and 4 receive incoming links from nearly the same set of travelers, while the in-clusters 2,5,6 have a common property. Finally, In-cluster 7 (the

most heavily linked in-cluster), is linked by nearly the same travelers as in-clusters 3 and 5 are. In-cluster 7 and in-cluster 6 are not linked simultaneously by the same travelers.

| | PC 1<br>% of total variance explained 24.54 | PC 2<br>% of total variance explained 21.34 | PC 3<br>% of total variance explained 20.06 |
|---|---|---|---|
| Links to In-Cluster 7 | .858 | .039 | -.011 |
| Links to In-Cluster 3 | .743 | -.031 | .255 |
| Links to In-Cluster 5 | .562 | .553 | .011 |
| Links to In-Cluster 6 | .030 | .819 | -.099 |
| Links to In-Cluster 2 | -.032 | .659 | .376 |
| Links to In-Cluster 1 | .004 | -.073 | .850 |
| Links to In-Cluster 4 | .335 | .275 | .682 |

*Table 4. Principal components and factor loadings (after Varimax Rotation) of key variables regarding outgoing links.*

HCA is performed using as input the factor scores of PCA. To decide about the suitable number of out-clusters, the study uses a scree plot of the number of clusters against Wilks' Lambdas. A six clusters solution seems to be the most suitable. One out-cluster contains 538 (95.6%) of the travelers.

When discussing PCA scores it is a commonly used technique to construct a scale by dividing scores in three categories: factor scores less than -1, factor scores between -1 and 1 and factor scores greater than 1. Having in mind that factor loadings are positive, the scale is as follows: scores with values less than -1 are considered to describe an out-cluster that does not link to an in-cluster, scores with values between -1 to 1 have no specific tendency to link to an in-cluster, and scores with values over 1 describe an out cluster that links to a specific in-cluster. It is obvious that only out-clusters with mean scores under -1 and over 1 may present some linkage pattern and are worth discussing them. When looking at the mean factor scores of these clusters it becomes obvious that the densest out –cluster has mean factor scores within -1 to 1. In PCA terms, this means that this majority of blogs out-cluster presents no specific property regarding the outgoing links. Blogs of this cluster may link or may not link to any of the seven in-clusters without presenting any specific linkage pattern. To see whether the rest of the out-clusters present any specific linkage pattern, the mean factor scores for every out-cluster are computed. From these the last two columns of Table 5 are constructed. The majority out-cluster (out-cluster0 is not further discussed). Out-cluster1 presents high mean value in PC 2 and thus links to In-Clusters 2, 5, 6. Out-cluster 2 has high mean values in PC 2, 3 and links to In-Clusters 1, 2, 4, 5, 6. Out-cluster 3 presents high mean values in PC 1, 3 and links to In-Clusters 1, 3, 4, 5, 7. Out-cluster 4 with high mean values in PC 1, 2 and low mean value in PC 3, links to In-Clusters 3, 5, 7 but does not link to Groups 1, 4. Finally, Out-cluster 5 has high mean values in PC 3 and thus links to In-Clusters 1, 4. Further analysis not presented here for economy, shows that most of the travelers of the out-clusters are very active having many entries and photos in their blogs. However, they do not have many incoming links although that in average they have many outgoing links (Table 5).

| | Average In-degree | Average Out-degree | Property according to Principal Components | Property according to linkage |
|---|---|---|---|---|
| Out-cluster 1 (15 travelers) | 2.7 | 9.2 | High mean value in PC 2 | Links to In-Clusters 2, 5, 6 |
| Out-cluster 2 (3 travelers) | 1.7 | 33.7 | High mean values in PC 2, 3 | Links to In-Clusters 1, 2, 4, 5, 6 |
| Out-cluster 3 (5 travelers) | 1.4 | 17.2 | High mean values in PC 1, 3 | Links to In-Clusters 1, 3, 4, 5, 7 |
| Out-cluster 4 (1 traveler) | 2 | 4 | High mean values in PC 1, 2. Low mean value in Factor 3 | Links to In-Clusters 3, 5, 7. (Does not link to |

| | | | | |
|---|---|---|---|---|
| | | | | Groups 1, 4) |
| Out-cluster 5 (1 traveler) | 1 | 21 | High mean values in PC 3 | Links to In-Clusters 1, 4 |

*Table 5. Description of clusters of most linking (according to outgoing links) travelers.*

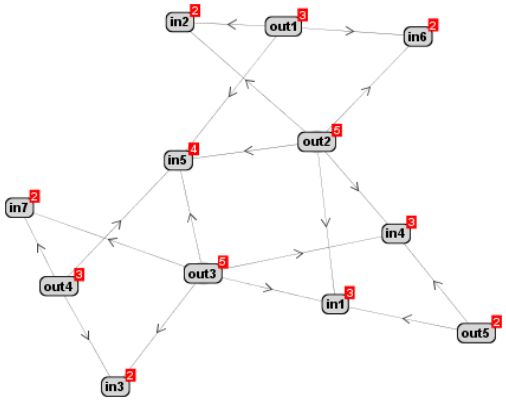


*Figure 3. In-Clusters network according to linkage by out-clusters.*

Figure 3 describes how out-clusters relate to in-clusters and therefore how in-clusters are "co-cited" by out-clusters. The network presented in Figure 3 was constructed using Touchgraph Navigator. In-clusters linked by many common in-clusters are placed closed to each other. There is a trend for travelers from out-clusters 3 and 4 to link in-cluster 7. Out-clusters 1 and 2 tend to link in–cluster 6. Having in mind that in-clusters 6 and 7 are one traveler clusters, it is obvious that there is a tendency that these two travelers are mainly linked by different groups of travelers. On the other hand there is a trend that in-cluster7 and in-cluster 3 are linked by out-clusters three and four. In-cluster 2 and in-cluster 6 are linked simultaneously by out-clusters 1 and 2. In-cluster 5 is linked by the majority of out-clusters but still presents a completely different linkage pattern compared to other in-clusters.

Concluding, only a minority of 7.3% of travelers presents an incoming linkage pattern and are considered as central travelers. These travelers present specific linkage properties in the sense that there is a small amount of active travelers with a pattern when linking to them. These travelers constitute out-clusters of travelers and they only reach 4.4% of the 563 travelers.

## 5 CONCLUSIONS

The originality of the paper lies on the study of travelers' interconnections through social networks, and the use of multivariate statistics to describe core travelers groups. By adopting ideas from political blogging, the paper proposes a methodology for locating linkage patterns and describes how travelers are networking, forming in this way central groups of travelers. By studying travelers, interconnection the paper has shown that only few travelers are really involved in networking, while the average of interlinking is low. However, there exist central travelers' groups, which can be located by using the proposed methods. Other travelers within TravelPod recognize and distinguish these groups possibly because travelers within each group have common characteristics. Analysis provides evidence that cluster-group membership is correlated with common travelers' characteristics. Also, travelers within some of the clusters-groups are most active in posting entries while they are members of Travelpod for a long time. In this sense, core groups contain the most active and more information providing travelers. It is more likely for these travelers to be reached by others who navigate through a series of incoming links that lead to them. In this fashion, it is probable that these travelers have the potential to address to

many visitors of the site and therefore it is probable that they have a bigger impact on the provision of information.

Social networks of travelers in this WEB2.0 application are forming connectivity patterns, although these are constituted by a minority compared to the total amount of travelers. Having in mind that Travelpod.com is one of the top travel blogs sites, we might consider this case as indicative of the relative sites. Travelers are loosely connected but still there is a minority linking in some specific way to a minority of centrally located travelers.

The research is limited to the use of a specific network namely Travelpod.com, it was performed at some specific time interval, by using a specific methodological approach. The study of other travelers' networks by using also other graph theoretic approaches would be useful to test or enhance the findings.

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