PREFACE

ISICO 2017 is the fourth edition of the Information Systems International Conference (ISICO). ISICO 2017 has taken place at Sanur Paradise Plaza Hotel, Bali Indonesia, between 6th and 8th November, 2017. The theme of the conference is "Innovation of Information Systems – visions, opportunities and challenges". ISICO 2017 has been hosted by Department of Information Systems, Institut Teknologi Sepuluh Nopember (ITS). In 2013, ISICO becomes the official Association for Information Systems (AIS) Indonesia Chapter (named AISINDO) affiliated conference.

The main philosophy of ISICO’s presence is that to widen the research collaboration among IS researchers worldwide. Especially (but not limited) those that of developing countries. To this point, ISICO does not aim to replace existing IS Conferences such as PACIS, AMCIS, ICIS, or ECIS but rather it complements their presences.

The salient features of ISICO are the keynotes and Scopus-index Elsevier publication support. In terms of Keynotes, we regularly invites Global AIS President such as Prof. Douglas Vogel, Hong Kong (ISICO 2013), Prof Jaekyu Lee, Korea (ISICO 2015), and Prof Matti Rossi, Finland (ISICO 2017).

This year ISICO was able to attract more than 153 submissions from 16 different countries. From those submissions only 93 were selected for publication, so the acceptance rate this year was 60.7%. This Conference Proceedings volume contains all papers accepted for publication in ISICO 2017. ISICO 2017 comprises a series of independent tracks that are relevant to Information Systems discipline. The conference cover enterprise systems track, information systems management track, data acquisition and information dissemination track, data engineering and business intelligence track, and IT infrastructure and security track.

We would like to thank Department of Information Systems, Institut Teknologi Sepuluh Nopember for hosting the conference, as well as all participants for their contributions. We would also like to thank our distinguished program committee members for the efforts they have put in reviewing the papers. Special thanks to Prof. Matti Rossi, Dr. Ahmed Imran and Prof. Caroline Chan for the keynote speech.

We are looking forward to the Fifth Information Systems International Conference (ISICO 2019).

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1. Introduction

The Web as an information source has a lot of potential to be extracted into consideration for decision making [1]. Extracting social network from Web not only considers the available potential only but systematically is also the way to gain structural social behavior [2]. Therefore, the methods applied for extraction also vary, and each involves the different potentialities of information source, although it involves the same social actors. However, since the method externally is outside the search engine system [3], although the methods in unsupervised stream heavily depends on the search engine [4], consequently the method can’t fully utilize the information resources optimally [5], moreover the methods in supervised stream [6] such as the use of: Latent Dirichlet Allocation (LDA) [7] or Hidden Markov Model (HMM) [8], for example.
The different information involvement of the Web in disclosing social networks has resulted in the different approaches for extracting social network from Web [9, 10]. However, in the same potential, it has not been revealed that there is a difference between these approaches. Therefore, this paper will reveal the performance of each approach in the superficial methods involving the experiment of social network extraction.

2. A Review

In the formal definition of social networks, expressed in graph theory $G(E, V)$, it has been disclosed that there is a set of vertices $V$ and a set of edges $E$, with which $v_i \in V$ $i = 1, \ldots, n$ denotes entities in social networks and $v_i v_j \in E$ denotes relationship between entities $v_i, v_j \in V$ in a social network [11, 12]. This definition reveals that in the extraction of social networks using the basic superficial method (BSM) occurs the process (a) determines the social actors and (b) builds relationships between them [13, 14]. Next we consider some basic characters related to the superficial methods.

In the first process, the use of the social name $a_i$ (without quotes) in the query $q$ is to represent a social actor or

$$a_i = q \leftarrow a_i,$$  

then generally search engines generate ambiguous information about the actor social [15]. However, with the addition of the keyword $kw$, in general it can reduce naturally the default property of used social name [13, 16], i.e. consequent of

$$aw_i = q \leftarrow a_i, kw$$

happen reduction ambiguity, with which $|aw_i| \leq |a_i|$, $|a_i| \in a_i$ is a cardinality of $a_i$ and $|aw_i| \in aw_i$ is a cardinality of $a_i, kw$ [17]. While using the well-defined name of social actor (in quotes) in the query $q$ will raises the entire social actors related information or

$$a_{-i} = q \leftarrow "a_i".$$  

In last case, $|a_{-i}| \leq |a_i|$, and $|a_{-i}| \in a_{-i}$ is a cardinality of ”$a_i$” [18]. As well as with

$$aw_{-i} = q \leftarrow "a_i", "kw".$$  

is about one of information concentrations of a social actor, $|aw_{-i}| \leq |a_{-i}|$, and $|aw_{-i}| \in aw_{-i}$ is a cardinality of ”$a_i$”, ”$kw$” [19, 20, 17].

In the second process, the relationship between two social actors is based on the concept of co-occurrence [21, 22, 23]. Thus,

$$a_i a_j = q \leftarrow a_i, a_j,$$

is a process to elevate the clue of relation be relationship between two actors, with which $|a_i \cap a_j| \leq |a_i|$ and $|a_i \cap a_j| \leq |a_j|$, and $|a_i \cap a_j| \in a_i a_j$ is a cardinality of $a_i, a_j$. The addition of a keyword towards the co-occurrence will usually reduce the number of information presented, that is

$$aw_i aw_j = q \leftarrow a_i, a_j, kw,$$

but it should meet that $|aw_i \cap aw_j| \leq |a_i \cap a_j|$, $|aw_i \cap aw_j| \in aw_i aw_j$ is a cardinality of $a_i, a_i, kw$ [10, 23]. Likewise, the use of the well-defined name of social actor in the query will reveal the relationship between two social actors appropriately, that is

$$a_{-i} a_{-j} = q \leftarrow "a_i", "a_j".$$  

whereby $|a_{-i} \cap a_{-j}| \leq |a_{-i}|$ and $|a_{-i} \cap a_{-j}| \leq |a_{-j}|$, $|a_{-i} \cap a_{-j}| \in a_{-i} a_{-j}$ is a cardinality of ”$a_i$”, ”$a_j$”. Thus, if $|a_{-i} \cap a_{-j}| = 0$, then it means exactly there is no relationship between two social actors [14]. Whereas the addition of a keyword towards the co-occurrence based on pattern as follows

$$wa_{-i} wa_{-j} = q \leftarrow "a_i", "a_j", "kw",$$
produces the relationship of a pair of social actors, whereby $|aw_{j} \cap aw_{j'}| \leq |ar_{j} \cap ar_{j'}|$, and $|aw_{j} \cap aw_{j'}| \subset wa_{j} \cap wa_{j'}$ is a cardinality of "$a_{i}$$", "$a_{j}$$", "$kw$$" [24].

In this case of occurrence, if each of $a_{i}$, "$a_{i}$$", $a_{i}$$, kw$$", "$a_{j}$$", "$kw$$" has a cardinality greater than 0, then each of them contains one or more snippets and URL addresses [17], i.e. $s_{i}$, $sa_{i}$$, saw_{i}$$, and saw_{i}$ respectively is a snippet of them, so $ua_{i}$, $ua_{i}$$, $uaw_{i}$$, and $uaw_{i}$ respectively is a collection of URL addresses of them [4, 25]. Similar to co-occurrence, each of $a_{i}, a_{j}, "$a_{i}$$", "$a_{j}$$", $a_{i}$$, a_{j}$$, kw$$", "$a_{i}$$", "$a_{j}$$", "$kw$$" has a list of snippets or a list of URL addresses, if them has a cardinality greater than 0. By involving Eq. (1) and $ua_{i} \in a_{i}$, for a pair of social actors can be generated social network $S N$. We call this approach as the underlying superficial method (USM) whereby the established relationship can be validate the previous relationship by involving $ua_{i}, ua_{j} \in a_{i}, a_{j}$ or using Eq. (5) in the joint underlying superficial method (JUSM) for generating a social network $S N_{v}$ as validation of $S N$. Similar to this concept, because $sa_{i} \in a_{i}$, used in the descriptive superficial method (DSM) and generates descriptive social network $S N_{d}$, whereby $sa_{i}, sa_{j} \in a_{i}, a_{j}$ that used in the joint descriptive superficial method (JDSM) generates the descriptive social network $S N_{vd}$ as validation of $S N_{d}$, see Fig. 1a. Likewise, if the concept of pattern is used in a query, various social networks will be generated. But on the use of pattern, possibility of returning information be more appropriate so that it used as access point to in more deep information, for example accessing the online database [26, 18]. We call the latter approach as the seed based superficial method (SSM) that is sometimes used as the basis for development of social network in different than usually [27, 28], see Fig. 1b. In this case, it is a social network based on seed $S N_{ps}$.

3. The Proposed Approach

Through the above reviews have been generated some treatments that may be used in methods for extracting social network from Web. Each treatment comes from the same potential and with different approaches [29]. The potential used in the extraction of a social network is the number of social actors as vertices in social network. The number of social actors is the equal to number of the required occurrence, whereby occurrence as a treatment , but the realization in the number of hit counts may be different or all hit counts must be greater than 0 [30, 31]. Thus, hit counts equal to 0 doesn’t present snippet and URL addresses so no treatment may be applied there.

Involvement of occurrence and/or co-occurrence in each method, results in the presence of different treatments as different approaches. This different treatments, not only changes the complexity but also the presence of pseudo similarity that helps in solving of resource constraints. The resource limitations associated with using search engines to respond to the queries submitted. Therefore, BSM [15, 32, 33], USM [4] and DSM [18, 34] differ in resource engagement iterations, but they still are same computationally. In addition, in certain method it can also be expanded
with different approaches, such as BSM converted into BSMv1 and / or BSMv2 by adding different or equal keywords, so the possibility of extraction results will be different [19, 10]. Therefore, the comparison of the complexity of performance on each method based on the reviews will show the feasibility and reliability of methods for the same purpose in the extraction of social networks from the web [35].

The outcome of the method also shows the feasibility and reliability of the method. Output is about how much relations in a social network, or number of edges as realization. The density of the social network as resultant of method is determined by the many relationships of two social actors as outcomes. Therefore, if the relation between two social actors is not limited to emotional closeness but also ideas and concepts or other relationships, then the outcome of the used method requires another consideration either from the point of density or description [12].

So, the way to see the performance of social network extraction methods is to compare some of the following,

1. Measurement of complexity: Computation (based on iteration), number of occurrences, and number of co-
oc-occurrences.
2. Percentage of output to number of relations potentially: realization of occurrences be vertices, and realization of co-occurrences be edges.
3. Similarities between the social networks, i.e. by using Jaccard coefficient based on edges in social networks
[36, 11]:

\[
sim_e = \frac{|E_1 \cap E_2|}{|E_1| + |E_2| - |E_1 \cap E_2|}
\]

\[|E_1 \cap E_2|, |E_1|, \text{ and } |E_2|\] are number of edges in social networks: \(G_1(V_1, E_1)\) and \(G_2(V_2, E_2)\).

4. Experiment and Discussion

By using 76 social actors (professor) as seeds, as much as 385 other social actors is generated as potential for
building social network. The first approach as an initiation we use the SSM method by involving the source of information from the online database (such as DBLP) directly through a URL address based on each seed and extracting the names of other social actors in co-occurrence formation. It is to get current information about relations between social actors [18], and as contra against manual effort and not up-to-date information of DBpedia [38]. So, in this experiment there are 462 social actors. We use this collection of social actors to form social networks both with other superficial methods and different sources of information from the Web.

Each method produces different number of edges, although by using same number of vertices. In addition, methods produce the different number of actors who have no relationship with others [37]. In order to produce the edges in the network, each method produces unequal strength relations between the pairs of social actors, there are several strength relations between social actors can be recognized by one method but cannot be disclosed by other methods, see Table 1. Therefore, each method uses different factors and concepts that serve as a basis for extracting relationships between social actors from information sources [39].

Table 1. List of methods and their complexity and realization

<table>
<thead>
<tr>
<th>Method</th>
<th>Computation</th>
<th>occurrence</th>
<th>co-occurrence</th>
<th>vertices</th>
<th>realization</th>
<th>edges</th>
<th>realization</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSM</td>
<td>106,491</td>
<td>462</td>
<td>106,491</td>
<td>462</td>
<td>100.00%</td>
<td>31,623</td>
<td>29.70%</td>
</tr>
<tr>
<td>BSMv1</td>
<td>106,491</td>
<td>462</td>
<td>106,491</td>
<td>373</td>
<td>80.74%</td>
<td>16,388</td>
<td>15.39%</td>
</tr>
<tr>
<td>BSMv2</td>
<td>106,491</td>
<td>462</td>
<td>106,491</td>
<td>389</td>
<td>84.20%</td>
<td>17,132</td>
<td>16.09%</td>
</tr>
<tr>
<td>PSM</td>
<td>106,491</td>
<td>462</td>
<td>106,491</td>
<td>462</td>
<td>100.00%</td>
<td>22,836</td>
<td>21.44%</td>
</tr>
<tr>
<td>PSMv1</td>
<td>106,491</td>
<td>462</td>
<td>106,491</td>
<td>369</td>
<td>84.20%</td>
<td>16,371</td>
<td>15.38%</td>
</tr>
<tr>
<td>PSMv2</td>
<td>106,491</td>
<td>462</td>
<td>106,491</td>
<td>382</td>
<td>82.68%</td>
<td>17,120</td>
<td>16.07%</td>
</tr>
<tr>
<td>USM</td>
<td>106,491</td>
<td>462</td>
<td></td>
<td>462</td>
<td>100.00%</td>
<td>99,150</td>
<td>93.11%</td>
</tr>
<tr>
<td>DSM</td>
<td>106,491</td>
<td>462</td>
<td></td>
<td>434</td>
<td>93.94%</td>
<td>12,158</td>
<td>11.41%</td>
</tr>
<tr>
<td>SSM</td>
<td>-</td>
<td>76</td>
<td></td>
<td>462</td>
<td>607.89%</td>
<td>1,297</td>
<td>1.22%</td>
</tr>
</tbody>
</table>
Based on online database, such as DBLP, SSM generates new actors and their relations based on concept of co-author relationship [18]. 76 professor (as academic actors) be seeds to get 385 other academic actors, but the social network density based on relations only 1.22% of 106,491 possible relations potentially [40].

For 462 social actors there are 106,491 potential relationships in symmetry. Through BSM, realized 462 occurrences and 106,491 co-occurrences into 31,623 strength relations. For the same case, but involving keywords:

1. Related to affiliation (in basic superficial method with keyword (BSMv1)), the approach produces 373 vertices and 16,388 edges (as a realization).
2. While, by using keyword for developing a community (in basic superficial method with other keyword (BSMv2)), the approach produces 389 vertices and 17,132 edges.

By using occurrences only, USM produces 462 vertices and 99,150 edges, USM produces 462 vertices and 99,150 edges, and DSM produces 434 vertices and 12,158 edges. In general, another approach developed from its basic form in realization results in lower social network density than the original form. In this case, BSM, BSMv1, and BSMv2 sequentially produce 29.70%, 15.39% and 16.09% strength relations of 106,491 relations potentially. As well as with BSM, three methods: PSM, PSMv1, PSMv2 produce 21.44%, 15.38%, and 16.07% strength relations of 106,491 relations potentially, respectively. However, all approaches used as validation depend on the occurrences and co-occurrences of the related method. For example, JUSM and JDSM depends on occurrences and co-occurrences of BSM, or JUpSM and JDPoSM depends on occurrences and co-occurrences of PSM. Thus the USM on its own is different from the related approach, USM contains a pseudo-strength relations. It based on the domain similarity of the website (the domains of URL addresses).

The similarity between social networks on the edges shows that there are methods that imply so close performance, namely PSM, BSMv1 and BSMv2. While other methods show social networks as results that are different from the others. In particular, that the similarity of social networks from SSM to other method shows the difference due to the resulting actors having stronger relationships other than co-author relationship. Furthermore, the existence of relationships within the online database is not necessarily detectable directly through queries in other methods, except that it only reveals some of the content of the online database. So there is the core of all social networks of more than 1% as the same result of all methods.

5. Conclusion

Unequal treatments result in different approaches to information resources, although involving potential same social actors, and this also results in several methods of extraction of social networks in the unsupervised stream. The superficial methods that have similar treatment show the similarity of results. Different results show that the resulted social networks have different characteristics. Nevertheless, the similarity between the edges of social networks shows the existence of the core of social networks as the foundation for the development of a social network. Therefore, different results from different methods suggest the needing next study for getting an integrity approach, while for getting trusty information is by involving dataset as standard evaluation.
getting trusty information is by involving dataset as standard evaluation. Different methods suggest the needing next study for getting an integrity approach, while for different results from the existence of the core of social networks as the foundation for the development of a social network. Therefore, social networks have different results show that the resulted from SSM to other method shows the difference from the related approach, USM contains a pseudo-strength relations. It based on the domain similarity of co-occurrences of the related method. For example, JUSM and JDSM depends on occurrences and co-occurrences.

44%, 1507% strength relations of 106,491 relations potentially. As for 462 social actors there are 106,491 potential relationships in symmetry. Through BSM, realized 462 occurrences and 106,491 co-occurrences into 31,623 strength relations. For the same case, but involving keywords: 22% of 106,491.

1. Related to a affiliation (in basic superficial method with keyword (BSMv1)), the approach produces 373 vertices and 17,132 edges. By using occurrences only, USM produces 462 vertices and 99,150 edges, USM produces 462 vertices and 99,150 edges, and DSM produces 434 vertices and 12,158 edges. In general, another approach developed from its basic

References


