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# Visualizing Clashes and Alliances in Social Networks of Political Discussions

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## ABSTRACT

**Political discussions are characterized by conflicts of interest, and decisions are made based on negotiations. In general, participants need to reinforce their opinions and influence other participants. In this context, it is important to know how allies and opponents are positioned, in order to understand the discussion dynamics and plan adequate actions. This paper suggests the use of social network visualizations to explicit oppositions and alliances in order to support the understanding and following of political discussions. A system which supports these visualizations was built. An experiment performed to test the proposed visualizations showed to which extent they can be more efficient in identifying information about clashes and alliances than an online discussion system can.**

## KEYWORDS

**Social Network Visualization; Online Political Discussion; Electronic Participation**

## 1. Introduction

A discussion is considered political when its participants have conflicting objectives and interests and the actions and decisions are made as a result from negotiation between the stakeholders during the discussion. This type of discussion is very common, especially in public institutions and democratic contexts.

Social Media, such as Facebook, Twitter, blogs, have been adopted as environments to promote political discussions. It is argued that their use can contribute to the increase of participation and engagement in political discussions [1]. However, these environments lack mechanisms to help participants understand the discussion flow and dynamics. In this kind of discussion, participants need to understand who is participating, how they are participating and who allies and opponents are, so that they can follow the discussion, participate accordingly and make better decisions. It may be hard to identify this information during the discussion, due to the number of manifestations generated and the complexity of relationships formed among them.

To help identify the information about participants and their relationship in political discussions, we propose visualization based on social networks representing clashes and alliances in the discussion [2]. Our focus is to use social network diagrams as a mean for information visualization [3] of political discussions and how information can be gathered from social interaction environments, whereas the network analysis is performed in a simple and preliminary way.

The concept of political discussion and the benefits of being aware of alliances and clashes in these discussions are presented with more details in Section 2. The concepts of clashes and alliances are presented in Section 3. The mechanism created to visualize clashes and alliances is presented in Section 4. The system implementing this visualization is shown in Section 5, while Section 6 presents how to use visualization to analyze the discussion. The experiment is shown in Section 7, with the conclusion presented in Section 8.

## 2. Political Discussions

The word "discussion" means "the action or process of speaking about something, generally in order to make a decision or exchange ideas" [4]. Discussions can be used as a part of the decision-making process, depending on the type of problems being solved.

The problems of decision making can be classified in categories depending on their technical uncertainty and the conflict of objectives and interests among participants [5] (**Figure 1**). Technical uncertainty occurs' when there is no detailed information about causes and effects of different solutions or about which approaches, techniques or processes to be used to solve the issue. Conflicts occur when the participants have different objectives or agendas, disagreeing with each other about the solution to be taken.

In rational or procedural issues, there is no need for discussion, because there are no conflicts—the objectives and the decision-making process are previously known by the group. A rational issue is, for example, to decide what website has the best usability. For this issue heuristics and rules need to be executed for all websites and compare the results. A procedural issue is, for example, system development. In this example, there are a lot of possible solutions and the development process may change during its execution based on problems that may occur.

In issues that bear conflicts about objectives, the discussion may help elucidate problems and exchange experiences about the topics under discussion. A political issue is, for example, students need to decide which disciplines they'll ask the school board to offer in the next semester. In this example, each student or group of students will have their own interests and may raise some conflicts, because each group will prefer one discipline instead of other. An anarchical issue is, for example, curricular reform in undergraduate courses, where teachers have distinct interests and there are a lot of aspects to be considered, such as names of disciplines, workload, prerequisites, etc.

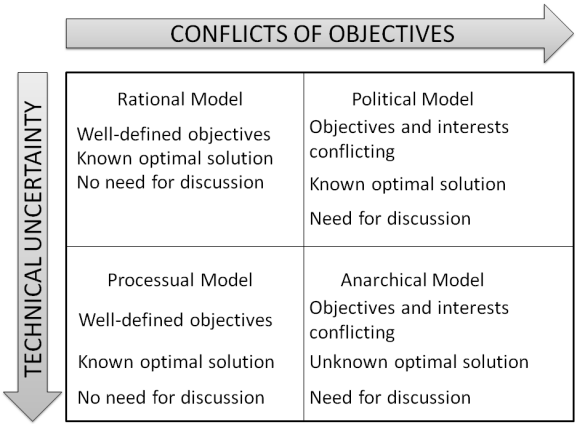



**Figure 1. Discussion models [3].**

In any kind of discussion, with information and experiences exchange, participants become better informed, make better decisions and can find other participants with the same positions and objectives, creating collective knowledge, positions and objectives [6].

In this research the term political discussion is defined as any discussion in which the issues that are discussed are characterized in anarchical or political models. In this kind of discussion, politics is considered a decision mechanism, in which participants have different degrees of influence and decisions are made by negotiation, instead of by rational choices based on technical knowledge. The dynamics of political discussions may be compared to a game, in which the following information is considered important [7]:

1) Who are the players? Which participants may impact the discussion and the decision? The way a participant contributes to a discussion depends on who composes the discussion group. Relationships of authority and power, the history they have of working together and previous experiences of conflicts and alliances, among other information, shape the way a participant perceive his place in the discussion.

2) Which factors shape preferences, perceptions and position of players? Which factors in the discussion leads a participant towards or against a proposal? Interests and objectives of an organization may influence a participant to agree with a certain position. Another factor which contributes to shaping these positions is the possibility to have new views of the same question, which is possible with argument exchange during a discussion when participants have different backgrounds, opinions and interests.

3) What is each player's influence? What impact each player may cause upon the discussion? Each participant's power of influence is based on three elements: advantages of negotiation, ability to use these advantages and the perception of others about these advantages. Advantages of negotiation can be derived from a participant's role, for example, if the participant holds some kind of authority or responsibility in the group, he owns an advantage and may negotiate using such asset.

4) How role, influence and movements of each player combine to generate decisions and actions? How these forces interact to shape the discussion process and its results? In a political discussion, each participant uses its forces attempting to influence outcomes in a way favorable to its interests and opinions.

In a political discussion, in which the shape and direction are influenced by the relationship among participants, it is important to be aware of this influence relationship. This research work focuses this relationship in informa-

tion about clash and alliance, as describe in the next section.

## 3. Clashes and Alliances

A clash is a dispute between two or more groups in social interaction, where each side use arguments to try to achieve different and conflicting objectives [4]. An alliance is a treaty between two or more groups in social interaction in which both sides have their own objectives and unite themselves for a common objective or for having aligned their objectives [4].

Clashes and alliances are evidenced or constructed during a political discussion about some issue, during manifestation exchange. These manifestations can be verbal, in the case of face-to-face discussions; or textual, in the case of computer-mediated discussions. **Figure 2** presents an example with three messages exchanged (in Portuguese), where the subject is a construction of a parking building at a federal university.

It is possible to identify relationships of clashes and alliances in the discussion fragment presented in **Figure 2**. Identification is facilitated by the small number of messages contained in the fragment and by the fact that participants referred themselves explicitly. However, the complete discussion contains 63 messages and 16 participants—in broader political discussions, numbers can be even higher—which makes it hard to identify these relations, especially during their course.

## 4. Visualizing Clashes and Alliances

The use of social network visualizations is proposed to visualize clashes and alliances. In this research, each node in the network represents a discussion participant and the edges represent relationships between them. These relations can be of **support**—when two participants tend to support each other—**opposition**—when two participants tend to oppose each other—or **indifferent**—when the participants' relation tends to uncertainty.

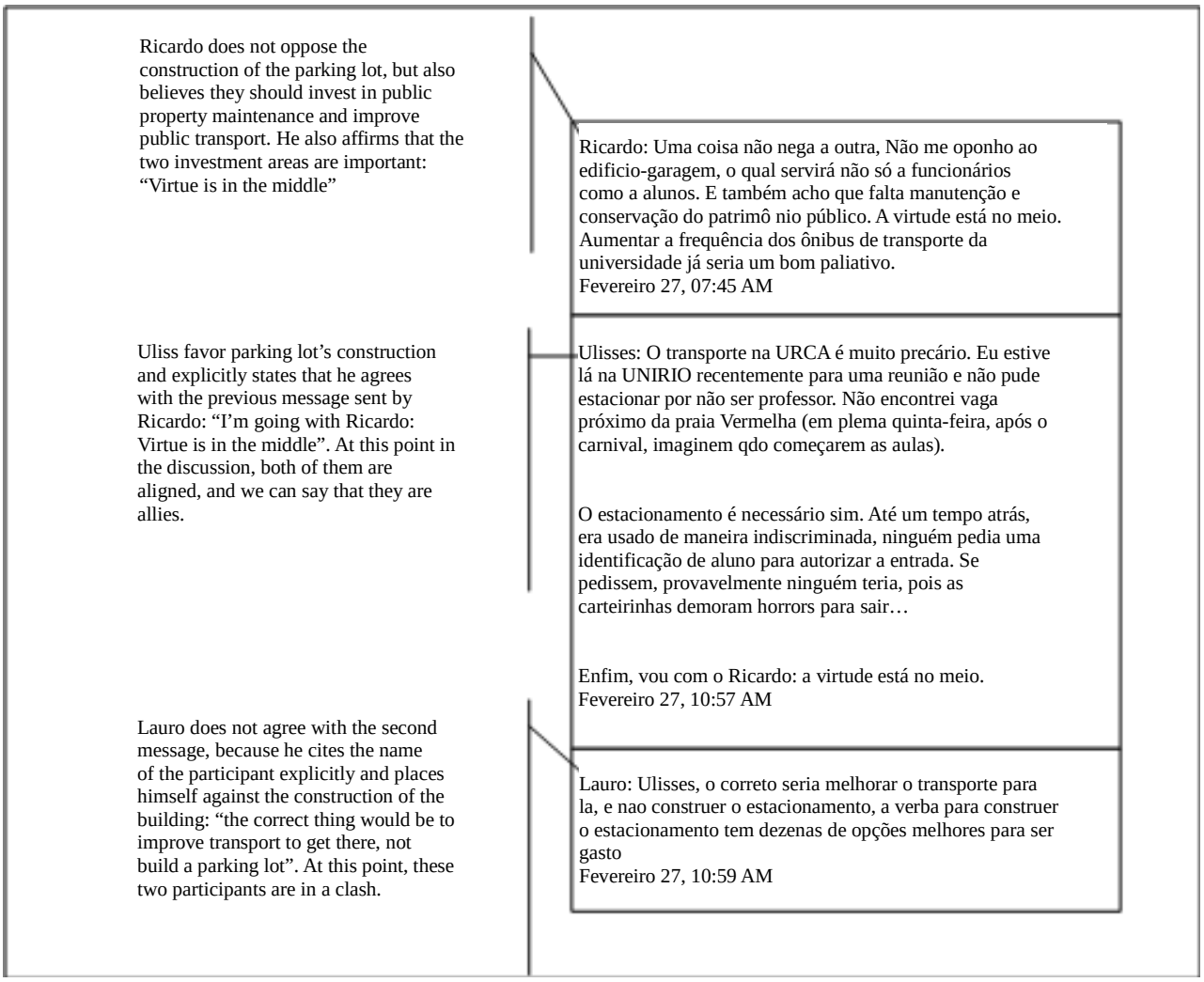



**Figure 2. Alliances and clashes can be identified in a discussion.**

The process used to create this visualization is shown in **Figure 3**. First of all, it is necessary to collect the discussion messages ("Collect corpus"), which will serve as input to generate the visualization. The output of this activity is the group of discussion messages organized by the following attributes: sender, date, time and content. The activity "Discourse analysis" receives as input the group of messages generated in the previous activity categorized and related. An example of this kind of analysis is shown in **Figure 4**. The arrows in the figure indicates the relation between the messages and, whether this it is a message of support, opposition or indifferent.

The activity "Visualizing social network" entails mapping the relations between participants in visual elements. In this visualization, participants are represented as nodes, while relationships are represented as edges.

Edges also represent the tendency of relation—if the relation tends to be a clash or an alliance. To calculate this tendency, we used the subtraction of the sum of support manifestations between two participants and the sum of opposing manifestations between two participants. The relation tends to be a clash when the result is a negative number. The more this subtraction approaches zero, the more difficult it becomes to determine relation tendency; thereby, it takes on an undefined type. Colors (red for clashes and green for alliances) and distances (closer for allies and distant for the confronted) were defined to represent these tendencies, as shown in **Figure 5**. This

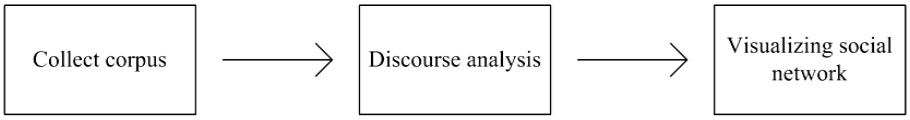



**Figure 3. Process to visualize social networks [2].**

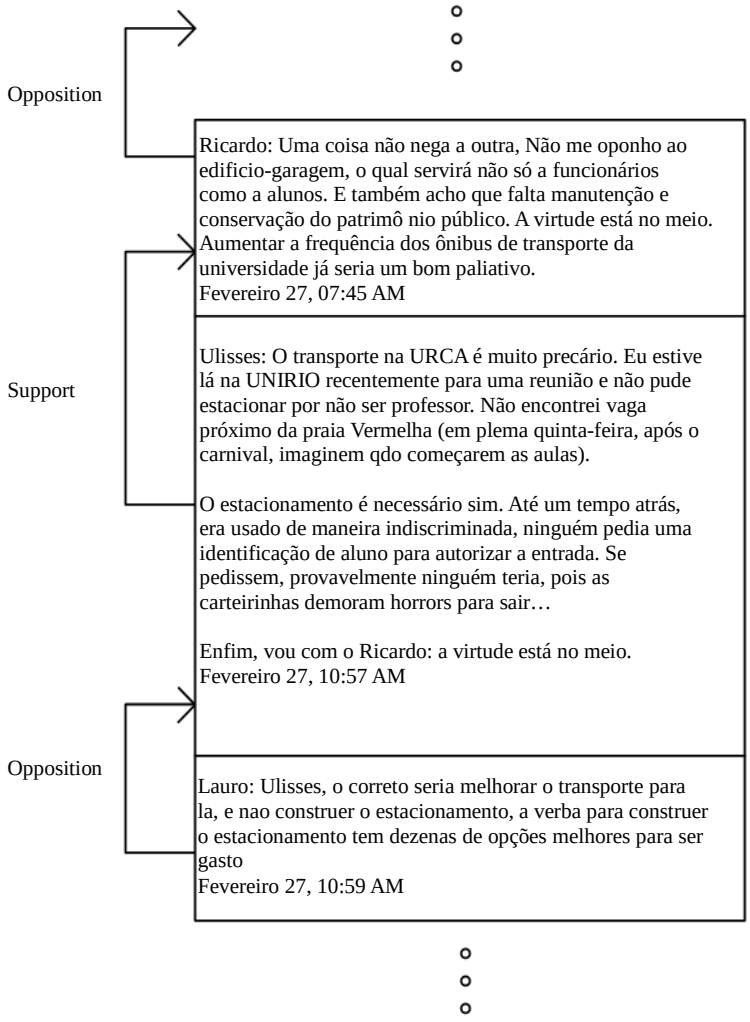



**Figure 4. Discourse analysis.**

visualization represents the result of the analysis made in Figure 4. Participants Ulisses and Ricardo formed an alliance, while Lauro and Ricardo clashed.

## 5. Visu System

The Visu system (http://comunicatec.uniriotec.br/visu) was developed to implement visualization of clashes and alliances, given any group of messages, independent of the discussion system. To achieve that, the messages from a discussion need to be given manually and structured according to a specific format and need to contain the following information: id (message's id), sender (name of the participant who sent the message), time (time that the message was dispatched), content (content of the message), position (position adopted in the message, it can be of support, neutral or opposing) and addressee (id of the addressed message). Figure 6 shows the data input interface in Visu.

Visu allows users to interact with the visualization in two ways: when user puts mouse over a node, participant's name represented by that node is shown; when the user clicks on a node, specific information about the participant is shown in a determined area. Figure 7 shows a final discussion and these interactions.

## 6. Using the Visualizations

In the visualization shown in Figure 8, it is possible to infer that there are two sets of participants in the discussion opposing each other, while there is another set of participants in the middle, maybe undecided, or trying to act as some kind of conciliator.

Analyzing this visualization it can be observed that the set 1 is a set of two people who are allies—their relationships are overall green and they are positioned near each other. They are in a clash with another set of allies (set 2) —between the members of set 1 and set 2 there a number of red edges and they are positioned distantly in the network. It is possible to see that set 2 is much more connected than set 1, which means components of set 2 support each other more; thus, maybe they are more engaged or more convinced about their ideas.

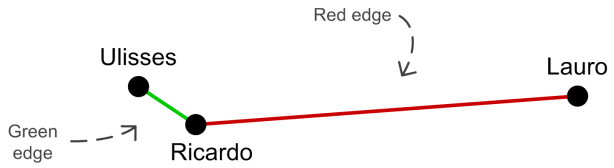
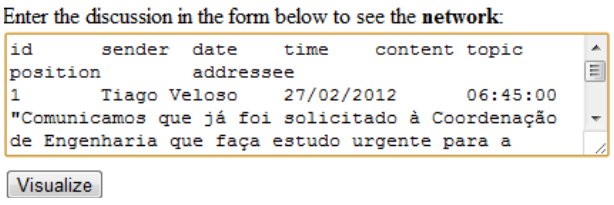



**Figure 5. Network of alliances and clashes.**


Enter the discussion in the form below to see the **network**:

```
id      sender  date    time    content topic
position        addressee
1       Tiago Veloso    27/02/2012      06:45:00
"Comunicamos que já foi solicitado à Coordenação
de Engenharia que faça estudo urgente para a
```

Visualize

**Figure 6. Data entry in Visu.**

Another analysis (Figure 9) which is possible to perform about this visualization is that some participants have more allied connections than the others, which may mean that they can be leaders of the group they are in. Or they can be participants attempting to gather more members for their group.

More importantly, when a discussion participant sees visualization like this, he or she may already think about what is happening in the discussion, and may have some answers, along with some questions, without the need of reading all 63 discussion messages. So if he or she thinks he or she needs to understand better why a participant has 8 allied connections, he or she can click on each of his connections or in the node itself to know more about him and his connections.

The proposed visualization can benefit discussion participants, a decision-maker or a facilitator. The participants can observe which one agrees with their ideas and what group of participants their oppositions are. With this information, they have more possibilities to decide on the better strategy or path to take from now on in the discussion, in order to convince others or try to benefit from the discussion outcome. The participant may, for example, decide to support the messages sent by allies, to fortify the group and declare support. The same participant can also decide to attack his opposition, arguing against the messages sent by them.

The decision-maker has more information to make his or her decision and communicate with the discussion participants. They can use the visualization to justify his decision about a question, based group majority opinion. He or she can also decide to talk with the most connected participants of the groups formed, if the opinion is highly divided, to try to decide in a way that is good for everyone.

The facilitator has more information to guarantee the best discussion flow. He or she can, for example, use visualization to interfere in the discussion, giving voice to participants who appeared not to have a formed opinion, to better understand why they did not pick a side.

## 7. Experiments

An experiment using Visu was conducted to validate the following research questions:

*Q*1) *Visualizations Effectiveness*: *Is clash and alliance information more correctly identified using visualization or using only the online discussion system resources*?

*Q*2) *Visualizations Efficiency*: *Is clash and alliance information identified faster using visualization or using the online discussion system resources*? (*Efficiency*)

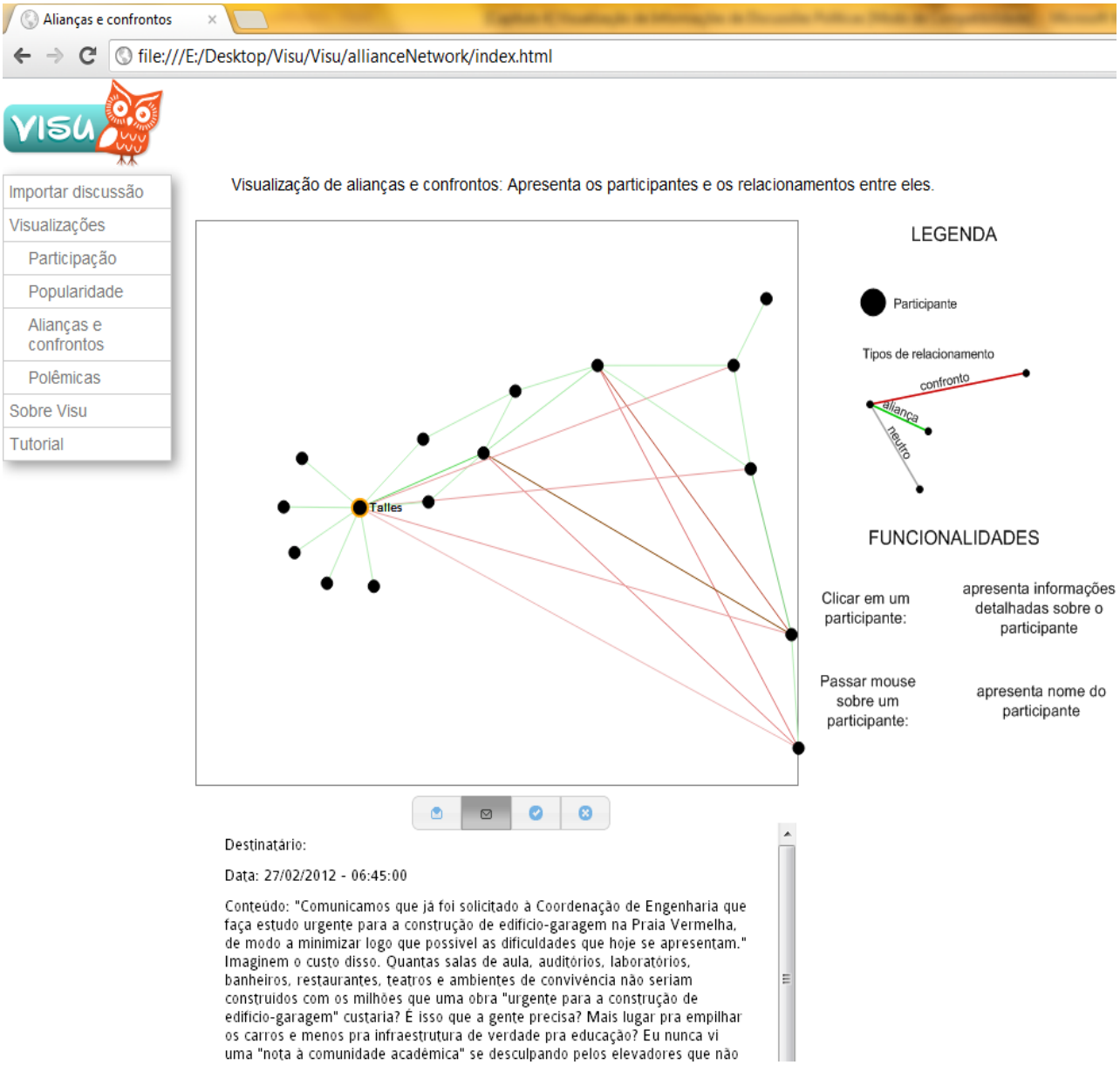



**Figure 7.** **Final network and interactions in Visu.**

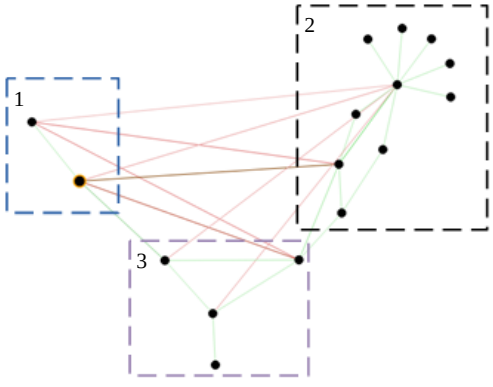



**Figure 8.** **Allies.**

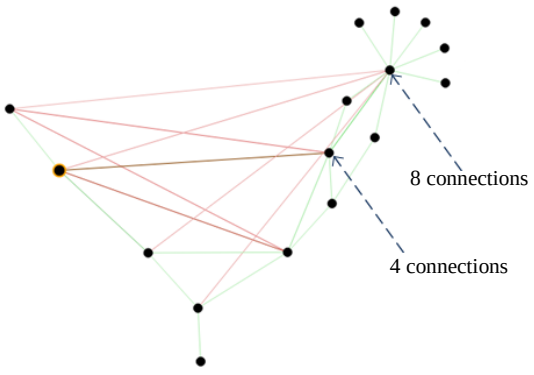



**Figure 9.** **Participants with most allied connections.**

The experiment was designed to comprise two groups: the control group, with eight participants, which used the online discussion system to identify information, and the experimental group, also with eight participants, which used the visualizations implemented in Visu to identify information.

The first hypothesis to be tested was whether the information identified by the experimental group was significantly more correct than the information identified by the control group. The second hypothesis to be tested was whether the time taken to identify information is significantly lower in the experimental group than the control group.

An overview of the experiment design is shown in **Figure 10**, and summarized as follows. If the effectiveness of responses is better using visualization than using the online discussion system, the hypothesis is confirmed. If it bears no significant difference between the two groups regarding effectiveness, then efficiency will be compared. If efficiency of responses is better using visualization than using typical discussion system, the hypothesis is confirmed. If any other result is obtained, the hypothesis cannot be confirmed.

## 7.1. Data Collection

The experiment bears two dependent variables: effectiveness and efficiency to identify information, using the visualization proposed and the typical discussion system.

To measure those variables, it was asked to the participants of both groups were asked the following questions:

1) *Who are the allies in the discussion*?

2) *Who are the groups clashed in the discussion*?

For each question, participants should also register the time they spent answering it.

The experiment was conducted during 2 months. The discussion used in the experiment was a recent debate among students of a public university about a decision by the university administration to build a new building in a parking lot area. This decision had impacted the student's routine: the parking lot area had been strongly reduced and a control access procedure was implemented, granting privileges to teachers and university staff members. This discussion could be classified as political due to the fact that no optimal solution for the problem could be outlined—the university needs to expand, being located in a historic city area where no parking lots are available and severe rules of construction and expansion are applied. Additionally, conflicting interests should arise through discussion, due to the fact that a great number of students do not use cars to come to the university, whereas others must come by car, for, otherwise, they would not arrive in time for classes.

The discussion occurred in the context of a Facebook group, gathering undergraduate and master's students. To select participants, sixteen people were sorted from the Facebook group where the discussion occurred, excluding the people that actually posted messages about the discussion (to avoid threats to the experiment validity). Eight participants configured the control group and other eight took part into the experimental group. The control group used the Facebook, while the experimental group used the Visu to answer the questions.

## 7.2. Results

To test whether the two sets were significantly different, the Mann-Whitney test was applied, with $\alpha$ = 5% [8]. **Table 1** shows the resulting data for the first hypothesis.

The visualizations proposed obtained a better effectiveness in both questions, but only one was significantly better. **Table 2** presents the results for the second hypothesis.

The visualizations proposed obtained worse efficiency in both questions, but in none of them was significantly worse.

Identifying information about alliances and clashes in a political discussion may be a very hard task for participants and stakeholders. However, the visualization proposed seems to help in this task, since the results referring to effectiveness showed that visualizations displayed better performance, even though this improvement was not significant in one of the two questions.

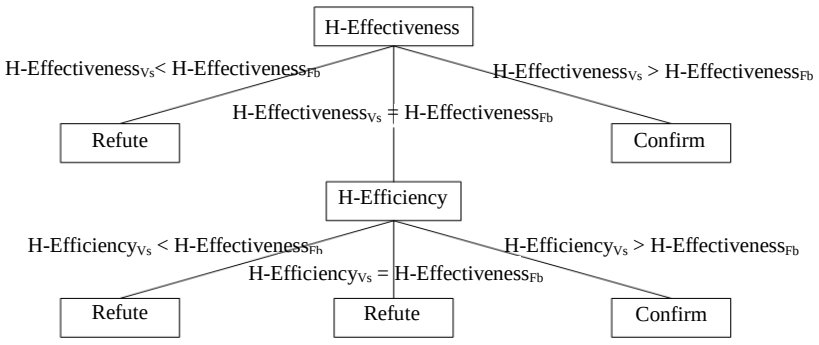



**Figure 10. Conditions to confirm the hypothesis.**

**Table 1. Results referring to the effectiveness hypothesis.**

| Question | Effectiveness with Visu (and standard deviation) | Effectiveness with Facebook (and standard deviation) | Effectiveness Visu > Effectiveness Facebook? |
|---|---|---|---|
| Who are the allies in the discussion? | 56% (31%) | 30% (30%) | Yes |
| Who are the clashed groups in the discussion? | 67% (36%) | 46% (39%) | Not |

**Table 2. Results referring to the efficiency hypothesis.**

| Question | Efficiency with Visu (and standard deviation) | Efficiency with Facebook (and standard deviation) | Efficiency Visu > Efficiency Facebook? |
|---|---|---|---|
| Who are the allies in the discussion? | 184s (81s) | 165s (88s) | Not |
| Who are the clashed groups in the discussion? | 138s (127s) | 108s (74s) | Not |

Also, participants took longer time to answer the two questions while using the visualization. This shows that the visualization does not give the answer right away, but it provides a better way to correctly identify the information.

### 7.3. Limitations

There are limitations in this experiment related to validation, selection of participants and discussion size. Related to validation, this work does not validate in case the information effectively helps participants to better understand and keep track of the discussion. Related to participant selection, few people have attended to the experiment, restricting the results. Related to the discussion size, it was not possible to verify its effect on efficiency and effectiveness of the proposed visualizations.

## 8. Conclusions

This paper addressed the problem of how to be aware of clash and alliance relationships in political discussions, and the difficulty to identify this information, especially when dealing with large numbers of people and manifestations. The proposal presented comprises the use of visualization of clashes and alliances based on social networks. It was also presented the Visu system implementing this visualization.

An experiment was performed to evaluate if the proposal renders the identification of information faster and more precise. In the experiment, effectiveness and efficiency of clash and alliance identification with the visualization proposed were compared to the effectiveness and efficiency for the same task using a typical discussion system. The result showed that the visualization proposed is more effective when asking about the alliances, but we cannot conclude the same when asking about the clashes. Also, it was not possible to conclude that the visualization proposed was more efficient. However, these results lead to evidence that further improvements of the visualizations should be researched.

As future work, it is planned to specify and implement in Visu new ways to interact with visualization. It is also necessary so as to make more experiments to evaluate to which extent the clash and alliance identification impacts participation in discussions. Also, the process of obtaining the information from the discussion—discourse analysis—should be performed automatically, using, for instance, text mining techniques. Finally, further studies on algorithms for performing deeper analysis of clashes and alliances in social networks are welcome in the future.

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