Application of knowledge about social network in creation of study groups

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Abstract

This contribution describes how friendships and student groups in certain courses affect their academic progress. The understanding of the social network between students and its impact on their academic progress is important by forming study courses. The goal of this work was the qualification of the 1st grade FRI (Faculty of management science and informatics) student social network parameters in the study program – Informatics. On the base of information from the actual students correlations in the social network were formed. To each tops the coefficients of academic progress were added, representing the number of success exams in the winter semester. Then study averages were compared to the students friends study averages and according to these results were these information evaluated.

Keywords: Social network, students, friendship, coefficient of friendship, fruitfulness of student.

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1. Introduction

We can imagine the social network as a set of network nodes and network edges. The network nodes can represent particular members inside of the network and the network edges can represent relationships between them (see fig. 1). Analyses of social network point to social relationships within the meaning of these nodes and coupling – in our case relationship between different students. The structure and the shape of social network help to determine the usefulness of network for its members. More open networks with weaker relations and social affiliation do easier produce new ideas and opportunities for others situated in the network than closed networks with many excess relations (Barabási, 2005). Created network can for example clearly show how many "shaking hands" is necessary to create a particular relation between two different nodes of the network (Backstrom, Boldi, Rosa, Ugander, & Vigna, 2012). The group of people interested by the same things are more willing to help each other and to cooperate much better than the group of people with different interests (Blackmore, 1999). The group of individuals with relations from different scopes represents an access to wider range of information (Ugander, Karrer, Backstrom, & Marlow, 2011).

Analysis of social network, formulation of conclusions and hypothesis verification can have a wide application especially in the domain of companies and organizations. We can identify through it those employees having bad negative influence what is reflecting in their work performance and in the atmosphere dominating in company. Social networks also have a key role for solving company´s success. Furthermore, networks are providing a method for companies to discourage competitors and for decision about future prices or politics of company (Barabási, 2005).
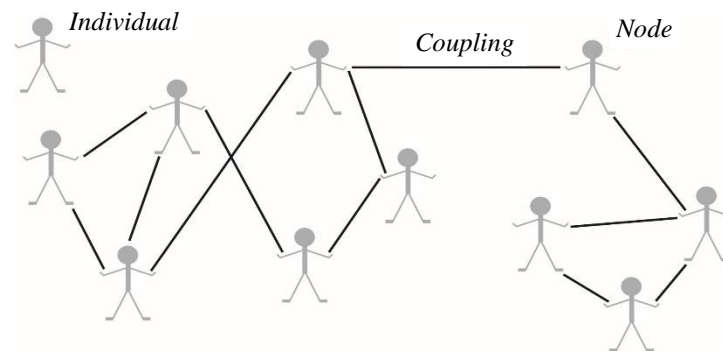

Figure 1. The model of social network (modified from (Dubovec, 2015)

2. Data source and data processing

In the beginning it was necessary to collect data to make possible creation and analysis of the network. Inquiry its-self was realized in two blocks.

At first through questionnaires (fig.2 represents its structure) distributed among students studying first year having informatics as their field of study. As questionnaire indicates, students were asked to put their friends in the order, starting with best friend. Due to technical reasons the sufficient maximal number of nodes representing friends of questioned node (student) was set up to ten but students were not asked to fill up all positions.

In each study group there were about 15-20 students in the beginning of the winter semester. We got returned back 145 filled questionnaires representing about 75% of total number of student in the first year who stayed on faculty or more precisely did not leave after the first semester. We did not ask these information from rerunning students. These students spent much longer time on the

faculty – so the social network between them is stronger and more interconnected (they know more people).

Another set of data was also a number of exams students completed in the winter semester. We got this information in study department after the end of exam period. The number of exams was divided by the number of required subjects through what was calculated "the fruitfulness of student" (example: student successfully completed 3 subjects. Because there were 5 required subjects in the winter semester, his/hers fruitfulness index is 3/5 = 0,6 or 60%).

Consequently each student was given a number which represents him/her in tables and charts. Because students have written different number of friends in their questionnaires, we can see in the graph "strong" nodes of the network which are connected with another strong nodes and reversely. Each node is evaluated by its fruitfulness and thanks to that it is now possible to identify a network and its parameters.

Total overview of study results is represented in figure 3 where each student is represented by a number and is attributed to him/her a fruitfulness index.

Name and surname:
I do commute(C) / I live in dormitory (I)
Names of people I know in the field of study of informatics (1st year)
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

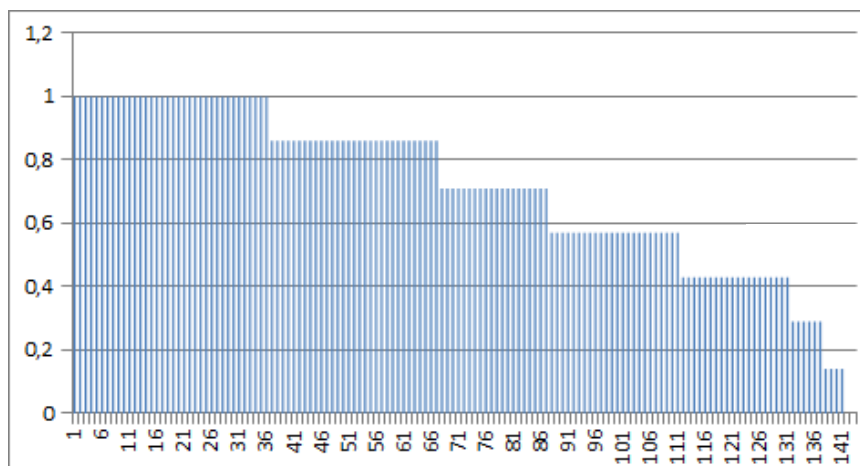**Figure 2. Structure of questionnaire**

Figure 3. Fruitfulness of student (Annotation: 1 – all exams from winter semester, 0 – any exam from winter semester)

3. Data interpretation

Table processor Microsoft Excel turned out to be the best technical solution for data processing. The program permitted to use implemented algorithms for sorting process. Also, it is a standard part of software equipment of a usual office computer such as the one where we were processing our collected data. As well as we earned a lot of time thank to using a well-known environment.

The fundamental table (fig.4) consists of basic data records originating in questionnaire search and in study department database.

node student	fruitfulness of student	dormitory	friends of the asked student								
1	0,57	1	12	2	55	5	6	90			
2	0,71	1	6	55	1	5	12	8			
3	0,57	0	4	6	5	12	17	16	89	55	
4	0,43	1	3	131	16	5	17	12	6	86	
5	1	0	5	12	6	55	16	17	2	3	4	1
6	1	1	6	129	55	2	12	5	1	16	4	17
7	1	1	8	62	15	63	96	64	21	11	
8	1	1	62	7	15	63	96	19	2	64	13
9	0,71	1	11	53	13	46	60	7	15	39	14
10	1	1	46	53	56	55	51	49	64		
11	0,86	1	9	7	15	13	14	74			
12	0,86	1	55	1	16	17	3	6			
13	0,86	1	70	87	68	89	83	15	7	14	63	96
14	0,43	1	13	15	11	9	7				
15	0,43	1	8	96	63	7	13	14	11	9	
16	0,86	1	59	17	4	89					

Figure 4. Friendships from questionnaires

The fruitfulness of the node (of the student) was obtained thanks to data concerning the number of completed exams in winter semester of each student. From this was possible to calculate the

number representing the fruitfulness of student. Living on dormitory was another factor. It is anticipated that social relations between students living in dormitory are tighter just because of lower physical distance of students. In next cells are written other node numbers – other students

Who are friends with concerned node. Due to technical reasons the sufficient maximal number of nodes representing friends of questioned node (student) was set up to ten. As the first was defined a friendship coefficient which represented the fruitfulness of friends of studied node (student).

node	fruitfulenss of student	coefficient of friendship (CF)	friendship with same CF	friendship with CF ± 0,1	bad friends
1	0,57	0,86	0	55	1
2	0,71	0,91	0	0	1
3	0,57	0,79	12	12, 4	1
4	0,43	0,80	0	12, 3	1
5	1	0,77	0	0	1
6	1	0,81	0	4	1
7	1	0,84	0	62	1
8	1	0,75	0	0	1
9	0,71	0,71	39	39	0
10	1	0,96	0	0	1
11	0,86	0,69	0	0	1
12	0,86	0,79	3	3	1
13	0,86	0,67	0	0	1
14	0,43	0,77	0	0	1
15	0,43	0,82	0	0	1
16	0,86	0,64	0	0	1

Figure 5. Table with results considering coefficient of friendship.

In the next table (Fig. 5.) were compared previous data (from fig. 4.) and nodes were replaced by results of studying fruitfulness. Sorting in the column "friendship with same CF" is showing those friends having the same friendship coefficient (CF). We calculated the friendship coefficient as a rate (fraction) where numerator represents the number of friends with the same fruitfulness index and denominator the number of students considered as friend (of studied student/node).

Measured data revealed that only 48 students out of 143 have friends with the same coefficient. Another situation – presence of friends with coefficient deviation 0,1 up or down – turned out to be more probable. There are 97 students having friends with this deviation what corresponds to more than a half of all studied students.

Data measured and represented in column "bad friends" is also very interesting. It shows friends with much worse results as those of studied student whereby 125 students out of 143 have this kind of friends.

Non negligible factor of social network is also a fact whether student is living in dormitory or not. Students living in dormitory were identified as more successful and motivated (see fig.6) than students who do commute (see fig.7). It is because of their cohesion and willingness to be helpful in case of "neighbourhood" or whether they live within students´ campus.
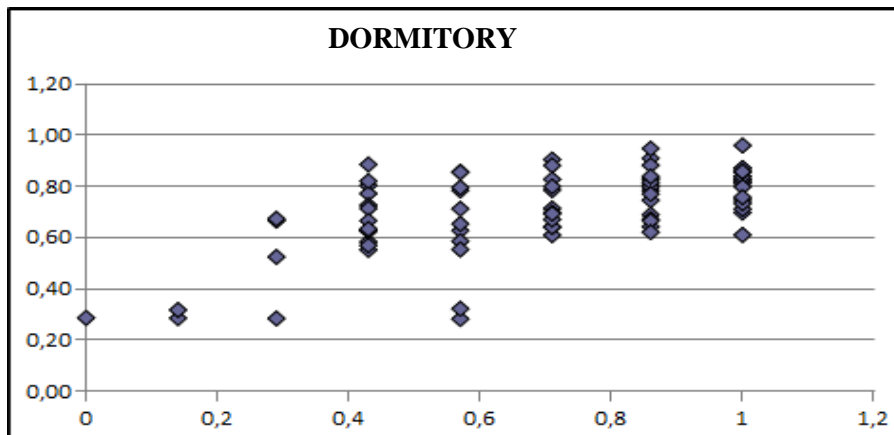
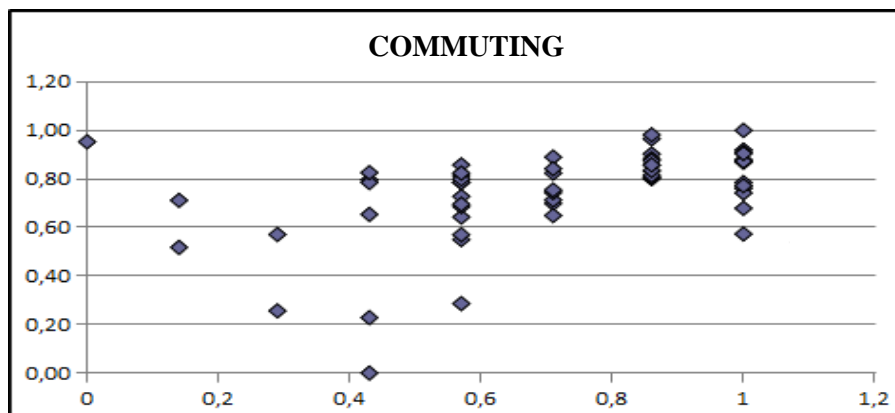**Figure 6. Friendship coefficients of students living in dormitory.**

Figure 7. Friendship coefficients of students who do commute

4. Conclusion

The search about the social network of students of the first year of bachelor study grade on Faculty of management science and informatics from study field informatics was realized for the purpose of analysis of students´ friendship in regard of their study results. The aim was to characterize this social group and relations inside of it based on questionnaires where each participant has written about 10 best friends. To each student was given a value corresponding to the percentage of completed exams in winter semester in school year 2010/2011. Due to these measured data were calculated values for friendship coefficient and number of friends with the same or similar friendship coefficient.

We anticipated that students will usually be friends with "equal" schoolmate, i.e. good students would have as friends students with good study results and bad students would have as friends students with bad study results. That is why the measurement was made by comparison of friendship coefficient.

Based on measured data was confirmed the hypothesis that students are looking after "equal friends" what can be confirmed also by an empiric detection that "birds of a feather flock together". This phenomenon can also be observed in tables in columns for values representing friendship with same or similar friendship coefficients.

Due to detected reality it is reasonable to think about the way how it would be the best to compose the studying groups (a set of students) on the faculty. With regard to this search it is obvious that it is not ideal to join together into one group good and successful students with weaker ones because it is not probable that a weaker student would have as a friend a good which would help him to improve his results. For that reason it would be more appropriate to make study group consisting of students with similar capacities and to apply to them different teaching methods and study pace.

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