

Communication Analysis for Student Support by Using Web Questionnaire

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Abstract—Recently, the decrease in child's interpersonal relationship ability becomes a problem. Various causes such as changes in the falling birthrate and the society are thought. The communications that especially use media such as blogs and SNS because of the development of various Electronic Medias by IT increase. Therefore, the state of the ideal communication between the children's has changed, and the correspondence is requested. Therefore, in this paper, the communications means between students is investigated by using the questionnaire with the web. Here, the example of the main communication means includes the telephone, E-mail, SNS, and the blog, etc. And, the correlation between students is analyzed from the result of the questionnaire, and the connection degree is shown in figure. It's possible to consider the state of the ideal communication between the teacher and the student based on those analysis result and figure. Moreover, it is thought that it leads to the promotion of the educational activity by comparing the analysis result with the result.

Keywords—Communication Ability; Student Support; Web Questionnaire;

I. INTRODUCTION

Recently, the decrease in young person's communication ability [1] is problem. The Internet spreads in one of the causes. Especially, communications that do not use the word increase by the spread of E-mail etc. The number of those who ask the person decreases to examine necessary information. Therefore, the chance to take communications with the person decreases. The average of communication ability has decreased according to these various factors.

In this paper, the communications means between students is investigated by using the Web questionnaire. The correlation between students is analyzed from the

questionnaire data, and the connection degree is shown in figure. The ideal method of communications between the teacher and the student is thought based on those analysis result and figure. Moreover, it is thought that it leads to the promotion of the educational activity by comparing the analysis result with the result.

This paper is organized as follows: The next section explains the outline of the web questionnaire. In section 3, the correlation between students is analyzed based on result of the questionnaire. In section 4, the connection degree is shown in figure based on the analysis result.

II. OUTLINE OF WEB QUESTIONNAIRE

In this section, we explain details of the web questionnaire. The method of taking the questionnaire uses the cellular phone (see Figure 1). Every student has a cellular phone in one of the reasons. It is moreover because the probability that an accurate answer comes back is high because it is never seen by others. And, the content of the questionnaire is a question of the friend with good relations. Several input the friend with good relations. The question is shown below.

- Name of friend with good relations
- Connection degree with friend (%)
- Chance of meeting (same department, same club, same high school, etc.)
- The main communications tool (E-mail, telephone, and blog, etc.)



Figure 1. Image of questionnaire

Between students and the correlation are analyzed based on results of the questionnaire. And, the correlation table like Table 1 is made.

Table 1. Example of Correlation Table

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|-----|-----|-----|-----|-----|-----|-----|
| 1 | - | 0.5 | 0 | 0.7 | 0 | 0.3 | 0.4 |
| 2 | 0.1 | - | 0.2 | 0 | 0.6 | 0 | 0.2 |
| 3 | 0 | 0.2 | - | 0.4 | 0 | 0.1 | 0.5 |
| 4 | 0.3 | 0 | 0.9 | - | 0.1 | 0 | 0 |
| 5 | 0.5 | 0 | 0 | 0.3 | - | 0.2 | 0.6 |
| 6 | 0 | 0.3 | 0 | 0 | 0.4 | - | 0 |
| 7 | 0 | 0.1 | 0.4 | 0 | 0 | 0.5 | - |

III. DEGREE OF PERSON'S CONNECTION FROM ADJACENCY MATRIX BASED ON NETWORK STRUCTURE

The person who is a lot of the friend is considered that communications ability is high. And, it has a strong connection with the person. When thinking about person and person's connections, we use the word communications abilities. The degree of the person's connection can be given by the index of such communication ability, naturally the degree of the person's connection changes depending on a network structure.

We first consider a graph in which a node represents the person and an arc represents the person's connection in the proposed network structure (see Figure 2). Figure 2 shows 7 persons, {1, 2, 3, 4, 5, 6, 7}, with 12 direct links, {1-2, 1-4, 1-5, 2-3, 2-7, 3-4, 4-1, 5-1, 5-6, 6-5, 7-1, 7-2}.

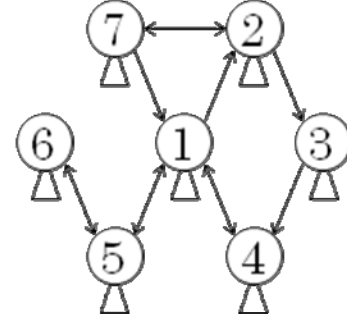


Figure 2. Sample of network structure

The conditions that the value g_i of the degree of person's connections of node i should satisfy are as follows:

- (1) The degree of person's connection is proportional to the total sum of one of neighbor node.
- (2) It becomes large if the number of connected node increases.

Let the vector of the degree of person's connection be

$$\mathbf{g} = [g_1, g_2, g_3, g_4, g_5, g_6, g_7]^T. \quad (1)$$

In order to calculate the value of the degree of person's connection, network structure must be transformed into the adjacency matrix. The element of directed graph satisfies $a_{ij} = 1$ if the target node i has an arrow to the other node j , otherwise it satisfies $a_{ij} = 0$.

$$\mathbf{A} = \begin{bmatrix} 0 & 1 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}. \quad (2)$$

The conditions of the value g_i , which have been listed above, can be represented by using the adjacency matrix as follows:

$$g_i = \sum_j \frac{a_{ji}}{\lambda \sum_k a_{ki}} g_j. \quad (3)$$

Then transpose operation is applied to matrix $\mathbf{A} \in \mathfrak{R}^n \times \mathfrak{R}^n$ and get a sum for each row. We assume

the transition probability from node i is the same for all connected nodes. Thus modified matrix can be defined as follows:

$$\mathbf{M} = \begin{bmatrix} 0 & 0 & 0 & 1 & \frac{1}{2} & 0 & \frac{1}{2} \\ \frac{1}{3} & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{3} & 0 & 1 & 0 & 0 & 1 & 0 \\ \frac{1}{3} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \quad (4)$$

where the element of matrix $\mathbf{M} \in \mathfrak{R}^n \times \mathfrak{R}^n$ is given by

$$m_{ij} = \frac{a_{ji}}{\sum_k a_{ki}}. \quad (5)$$

Again we can rewrite the condition of the value g_i by

$$\mathbf{M}g = \lambda g. \quad (6)$$

Now that, we can understand that the derivation of the degree of person's connection $g \in \mathfrak{R}^n \times \mathfrak{R}^1$ is the same of finding eigen vector for matrix \mathbf{M} . The sum of row in matrix \mathbf{M} becomes 1, based on Perron-Frobenius theorem, therefore we can find maximum eigenvalue as $\lambda_{\max} = 1$. The eigen vector for the maximum eigenvalue can be obtained by using power method.

The result is as follows:

$$g = [4.05, 2.00, 1.00, 3.25, 1.50, 0.75, 1.00]^T. \quad (7)$$

By normalizing the eigen vector, a probability vector can be derived by

$$g_s = [0.32, 0.14, 0.07, 0.23, 0.11, 0.05, 0.07]^T. \quad (8)$$

Finally we can illustrate the value of the degree of person's connection of each node like Figure 3. Size of circle represents each level of communication ability. We can easily understand node 1 has the high communication ability from other nodes based on network structure.

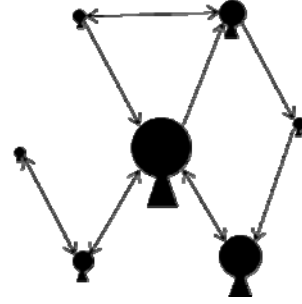


Figure 3. Degree of person's connection for sample of network structure

The degree of Person's connection concerning the communications tool can be seen based on this method. Figure 4 is an example of having shown the degree of person's connection according to the communications tool.

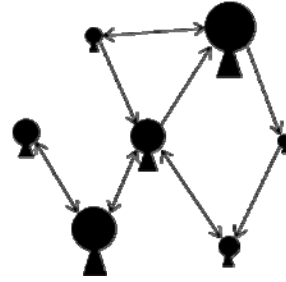


Figure 4. Example of the degree of person's connection with communications tool

IV. CONCLUSION

In this paper, we explained that Communication Analysis for Student Support by Using Web Questionnaire. In the proposal method, the degree of person's connection was shown by using the adjacency matrix based on network structure. It's possible to consider the state of the ideal communication between the teacher and the student based on proposal method. Moreover, it is thought that it leads to the promotion of the educational activity by comparing the analysis result with the result.

REFERENCES

- [1] S. Koyama and H. Kawashima, "Assessing Communication Competence : A Survey on Assessors and Cultural Factors, " Kanda University of International Studies, vol. 13, pp. 15-29, 2001.