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# CLUSTER ANALYSIS OF SSTS FRAMEWORK USING SOCIAL NETWORK ANALYSIS

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*Abstract*— **Educational Data Mining (EDM) is an emerging trend, concerned with developing methods for exploring the large data related to educational system. The data is used to obtain the Implicit and Explicit knowledge distribution. Educational Data mining methods are generally used to determine the performance of students, assessment of students and study students' behavior etc. In recent years, Educational data mining has proven to be more successful at many of the educational statistics problems due to enormous computing power and data mining algorithms [1]. This research explores the applications of data mining techniques applied in educational field.**

**The work explores SSTS, a new teaching learning process framework in higher education. The framework contains students database consists of various relational attributes. By applying data mining techniques to the database and mined the effective students' knowledge distribution clusters using social network analysis. The analysis found that good student faculty relation network clusters and average percentile of effective knowledge distribution by students' in higher education.**

*INDEX TERMS*— **EDUCATIONAL DATA MINING, INTERACTION, RELATIONSHIP. SSTS FRAMEWORK, TUTOR.**

## I INTRODUCTION

*Educational Data mining (EDM)*

EDM develops methods and applies techniques from statistics, machine learning, and data mining to analyze data collected during teaching and learning. EDM tests learning theories and informs educational practice. Learning analytics applies techniques from information science, sociology, psychology, statistics, machine learning, and data mining to analyze data collected during education administration and services, teaching, and learning. Learning analytics creates applications that directly influence educational practice [2][7]. Educational data mining researchers (e.g., Baker 2011; Baker and Yacef 2009) view the following as the goals for their research: Predicting students' future learning behavior , Discovering or improving domain models that characterize the content to be learned and optimal instructional sequences, Studying the effects of different kinds of pedagogical support that can be provided by learning software, Advancing scientific knowledge about learning and learners through building computational models that incorporate models of the student, the domain, and the software's pedagogy [8] [6][9][10] . To obtain the above goals, the various techniques such as prediction, clustering, Relationship mining etc are used.

## II SSTS FRAMEWORK

The teaching learning process is a process of cognitive thinking. The performance of students is based on their attitude and relation with their teaching faculty members. Of course it also includes the teaching methods or aids to improve the students' performance. Fig. 1 illustrates a framework which helps the students' to progress their attitude and in academic performance. It relates Staff – student (SS), student – Tutor (ST) and Tutor – Staff (TS) in higher education.

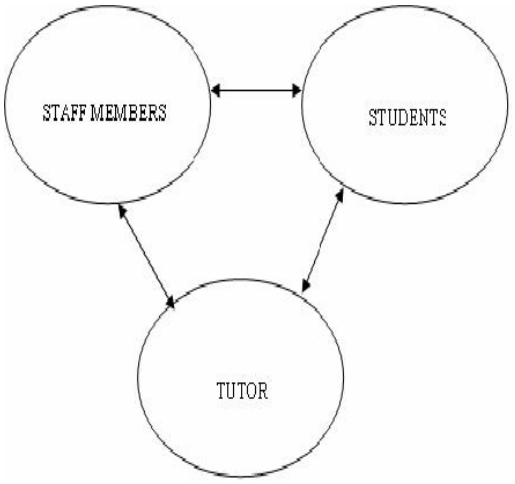


Fig. 1. Relation between Staff, Students and Tutor

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## III SOCIAL NETWORK ANALYSIS

Social network analysis [11] [5] [4] is the mapping and measuring of relationships and flows between people, groups, organizations, computers, URLs, and other connected information/knowledge entities. The nodes in the network are the people and groups while the links show relationships or flows between the nodes. SNA provides both a visual and a mathematical analysis of human relationships.

*a. Experiment*

The students' database have prepared based on general attributes such as name, age, year and cognitive attributes base on attitude, behavior and knowledge distribution. It also includes the SSTS framework attributes SSR, STR and TSR. The framework is designed in a two way relation.

The students from the dataset are randomly mined by k-means clustering using TANAGRA irrespective of their year of studies. A group of 9 students from the dataset were grouped into a cluster and each group is allocates to a tutor of the department. Now a day, the faculty members use a good teaching pedagogy to make the students to understand their subjects. Learning process involves the knowledge sharing, intelligence and utilization of resources and relationships.

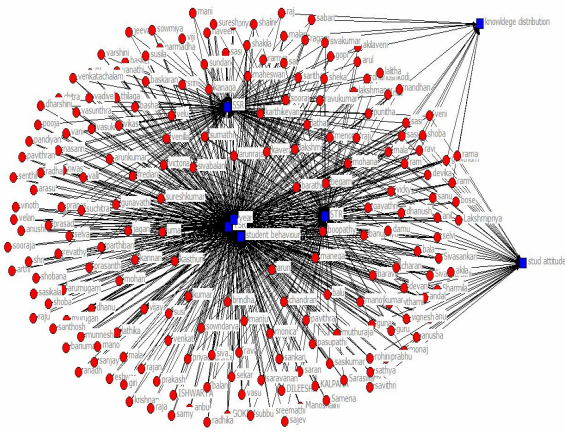


Fig. 2. Social Network

Fig. 2. shows the social network formed by the whole students' dataset with the related attributes.

The work explored that the tutor plays an important role in the improvement of students' performance. The clusters analysis showed the good interaction with the tutor – students' group and tutor – staff. The tutor – subject staff and student – student interaction in the group leaded to take special care both personal and in academics related. This explored good academic results and identified it one of the better framework for teaching learning process in higher education.

This experiment is done by using social network analysis software UCINET version 6. The grouped tutor clusters are given as input and changed to UCINET matrix dataset. It is then given as input to the DL compiler to link with the interface. The output is found, and converted into cluster.

Fig. 3. described the cluster of tutor1.

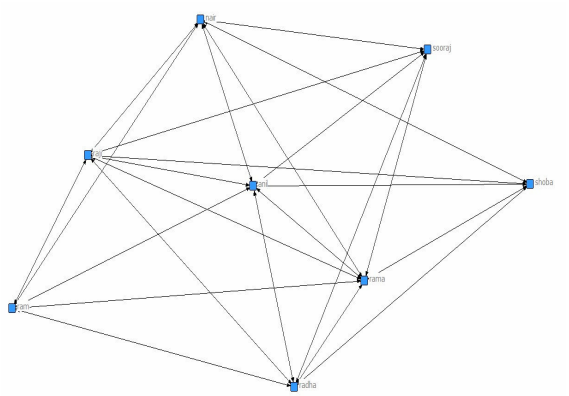


Fig. 3. Tutor1 cluster

The blue dot determines the student as an attribute. The arrow determines the interaction between the each student. The cluster is strengthened by the tutor involvement.

Fig. 4. shows the cluster of tutor2.

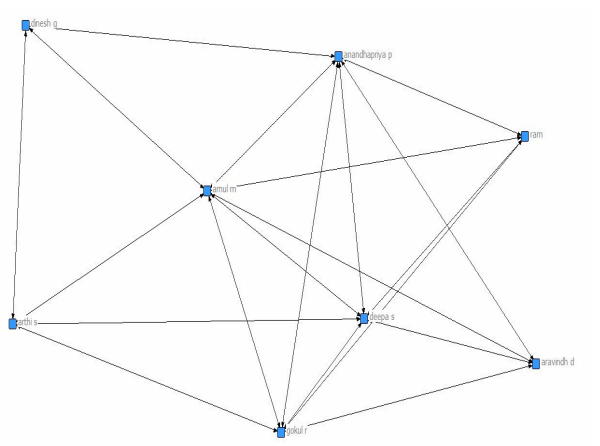


Fig. 4. Tutor2 cluster

Fig. 5. and Fig. 6. following dendogram describes the cluster of tutor1 and tutor2 relation.

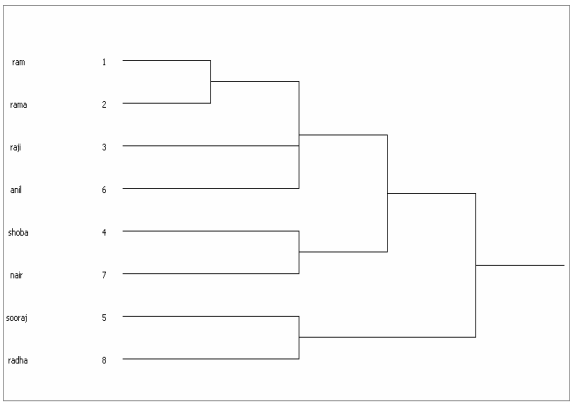


Fig. 5. Dendogram of tutor1

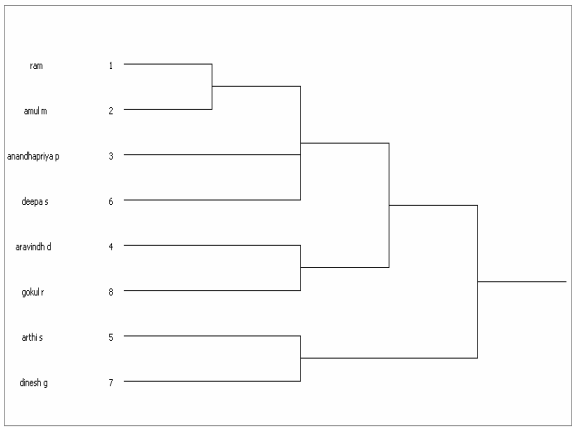


Fig. 6. Dendogram of tutor2

Fig. 7. show the adequate multilevel clusters formed by the tutor1. This revealed that there is a healthy interaction with that group of max 3.

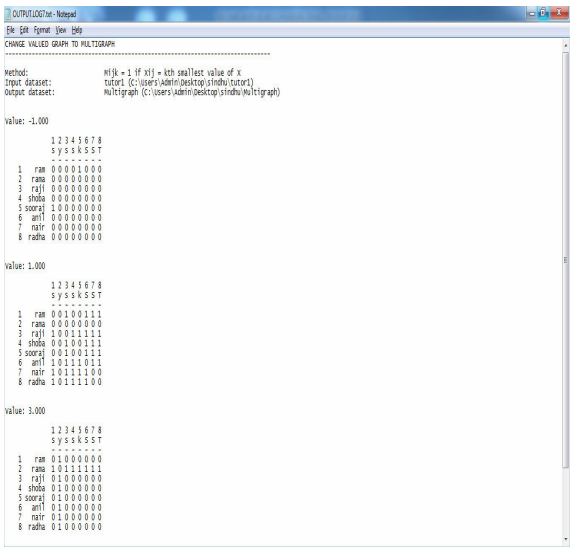

Fig. 7. Multilevel Clusters

The proposed work extended the clustering in means of students' behavior, attitude of and interactions.

## IV CONCLUSION

The research work explored a new SSTS framework in teaching learning process. The students' databases contain information about the related attributes. The matrix data are mined by using K means clustering from the large dataset using TANAGRA. The clusters are grouped under tutor and groups into matrix clusters. The experiment is carried out by using Social Network Analysis (SNA) tool. The clusters are analyzed and found fair interactions with the group and staff. It resulted in improvement of students' performance in academics of higher education.

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