

Analysis of Relationship between Extracurricular Activities and Academic Performance by Computational Intelligence

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Abstract - In the society that we live today, the requirements for a higher education graduate to step into the professional world have become quite complex. The basic knowledge can be achieved by following the curriculum, but the skills, practice and experience can only be gained through active participation in extra-curricular activities. Such activities assists the student in taking responsibility of their future and making right decisions. These activities make one stand out of the herd and be recognized as everyone is imparted the same level of knowledge relating to his/her particular field. The industry requires people who are adept at a variety of things and are not limited to a particular chore only.

Data for this research was collected from an aptitude test and the academic curriculum of students in a particular semester. Computational intelligence was employed for determination and analysis of the relationship between the chosen parameters (aptitude, GPA etc.) and data collected from students participating in extra-curricular activities conducted in the same semester. We have observed that Computational Intelligence has provided a higher degree of accuracy in our recent research works. This paper proposes the effects of extra-curricular activities in the overall growth of a student.

Keywords : Computational Intelligence, Fuzzy Logic, Mamdani Model

I INTRODUCTION

Extracurricular activities refers to the extensive range of activities that are not covered in the college curriculum .It play a vital role in the overall personality development of a person . . The basic education system educates the student about the existing theories while the extra-curricular activities guides him/her in the application of such theories in practical life. Involvement in

extracurricular activities helps to gain and improve skills . These activities develop a great deal of personality enhancing traits in a student such as leadership, communication, social, entrepreneurial and other skills. They inculcate co-operation, team spirit, perseverance as well as satisfying the creative needs of the individual . The industry today has a surplus of engineers and with each year the number is increasing exponentially. Extra-curricular activities have been established as a huge benefactor for the development of students' personality which is highly appraised by the employers. The primary goal of extracurricular activities conducted regularly in colleges is the well rounded development of an individual .Students learns to negotiate, communicate, and manage conflicts and to lead others by working together with other fellows.

The integration of extracurricular activities with academics critically influences student's persistence [1-2]. The motive of incorporation of extracurricular activities is to focus on institutional goals such as building and sustaining community in campus as well as student retention .A well documented relationship between student social, general cognitive and intellectual skills and involvement in extracurricular activities is presented [3] .The extracurricular activities have a good social impact on student life .It helps the student to make friends and instils confidence in him/her[7].The appreciation of involvement in extracurricular activities is needed to nurture student's learning .

The impact that extracurricular activities have on academic achievement is arguable .There is concrete evidence to support the notion that the

extracurricular activities can have both positive and negative effects depending upon the priority set by the student [5]. A study was conducted by Graham and Long Gisi to investigate the role played by college involvement in the intellectual development of adult undergraduate students. Their results proved that the learning outcomes for those students was greater who devoted more hours in such activities[6][4].

In this paper we employed Computational Intelligence(CI) for calculating the relationship between the parameters taken .It is a set of nature – inspired computational approaches that deal with real world problems that are too complex to be dealt by traditional approaches. It primarily includes Fuzzy Logic Systems, Evolutionary Computation and Artificial Neural Networks. Fuzzy logic involves reasoning which is approximate rather than exact .The concept of partial truth is applied in the fuzzy logic in which the truth can be at any position between completely true and completely false [8].

This paper proposed the relationship between participation in extracurricular activities and the academic performance of the students .Section 1 enlightens the ongoing research in this field. Section 2 discusses the research methodology applied in this paper .Section 3 discusses the simulation results using the computational Intelligence .Section 4 collects all the ideas discussed in this research and proposes a model which can be implemented for the betterment of students .

II RESEARCH METHODOLOGY

To realise the relationship between academic performance of a student and his/her participation in extracurricular activities, an extensive study of 142 students was conducted. It included the following subroutines for the collection of data.

.A simple mental ability test was organised consisting of general aptitude questions. The motive behind conducting this test was to assess the students’ academic performance and mental ability depending on their participation in extracurricular activities . The questions for this test were set in such a way so as to evaluate students’ logical reasoning , arithmetic aptitude, verbal reasoning etc .

A questionnaire was included along with the mental ability test which focussed on gathering information about the students’ participation in extracurricular activities and outdoor sports events .The questionnaire was designed to answer questions such as :

- Do the students take active part in outdoor sporting activities?
- What are the motivations behind their participation ?

The academic performance of the students involved in this study was taken from their university records.

The academic performance and aptitude of each student was classified as low, medium or high based on a certain set of parameters.The students were then categorised into 4 groups on the basis of their participation in extracurricular activities. The categorisation was as such :

- Group A : Students who took part neither in sports nor in extracurricular activities .
- Group B: Students who took part in sports but not in extracurricular activities.
- Group C: Students who took part in extracurricular activities but not in sports.
- Group D: Students who took part in both sports and extracurricular activities.

Let us discuss the data collected in Group D.

Out of the 142 students who were part of the study 36 students fell in this category.

The classification of students is as follows:

- 3 students had medium academic performance and low aptitude.
- 4 students had high academic performance and low aptitude.
- 2 students had low academic performance and high aptitude.
- 13 students had medium academic performance and medium aptitude.
- 9 students had high academic performance and medium aptitude.
- 1 student had low academic performance and high aptitude.
- 1 student had medium academic performance and high aptitude.
- 3 students had high academic performance and high aptitude.

III SIMULATION RESULTS USING CI

A. Fuzzy Inference System using Mamdani Method

A Mamdani model is developed using academic performance and aptitude as input parameters and number of students as output parameter .

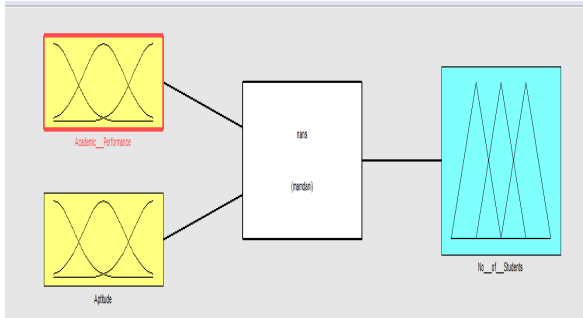


Figure 1: Fuzzy system using Mamdani method

B. Fuzzy Inference system

B.1 Fuzzy Inference system for Group A

Students who took part neither in extracurricular activities nor in sports . The academic performance and aptitude as input and number of students as output for Group A

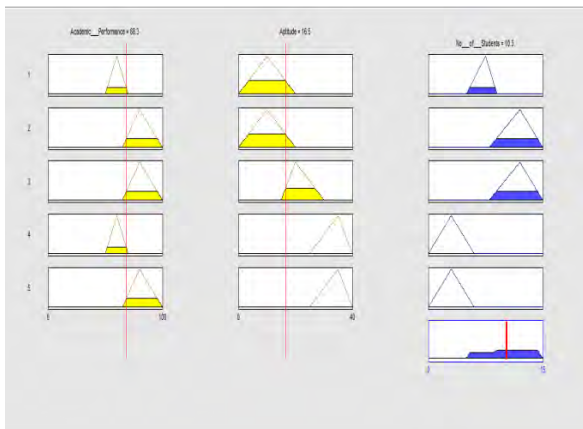


Figure 2: Fuzzy inference system for group A

B.2 Fuzzy Inference system for Group B

Students who took part in sports and but not in extracurricular activities . The academic performance and aptitude as input and number of

students as output for Group B.

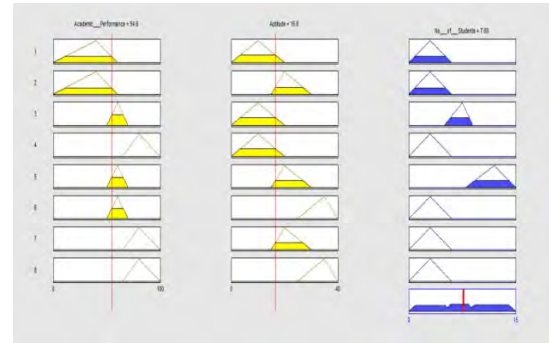


Figure 3: Fuzzy inference system for group B

B.3 Fuzzy Inference system for Group C

Students who took part in extracurricular activities but not in sports. The academic performance and aptitude as input and number of students as output for Group C.

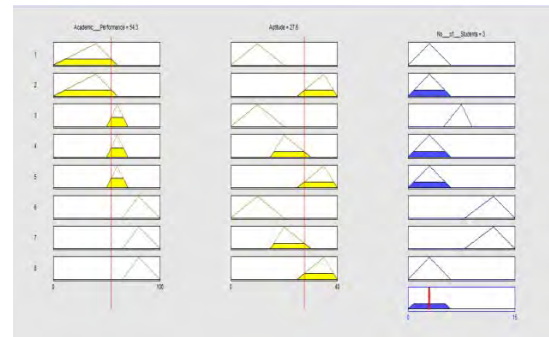


Figure 4: Fuzzy inference system for group C

B.4 Fuzzy Inference system for Group D

Students who took part in both extracurricular activities and sports The academic performance and aptitude as input and number of students as output for Group D.

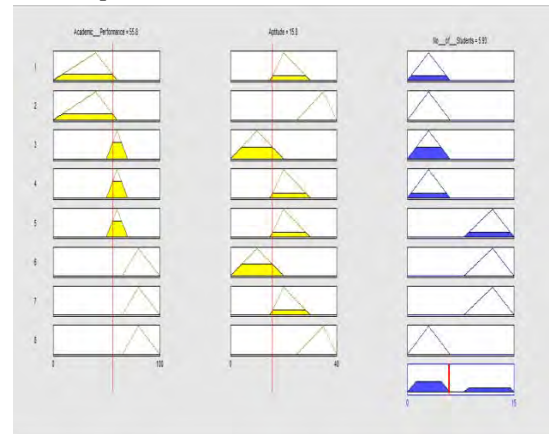


Figure 5: Fuzzy inference system for group D

3.3 Surface Viewer

Using Mamdani method, we draw a 3-D plot between between the input and the output .

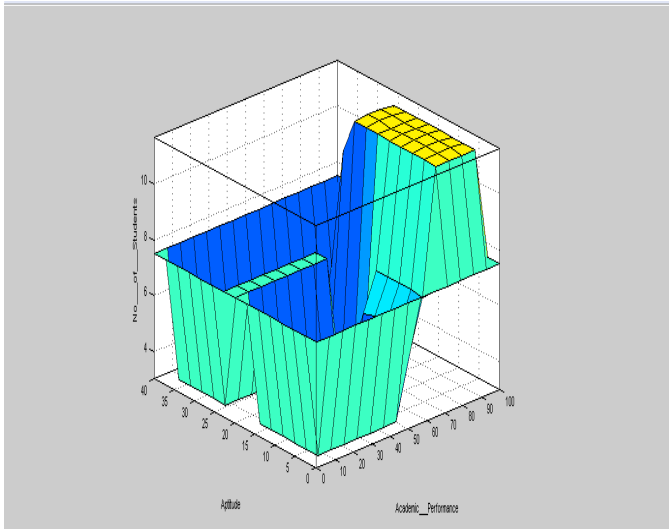


Figure 6: Surface viewer using input as academic performance and aptitude and number of students as output

IV CONCLUSION

This paper supports the notion that student who participate in extracurricular activities tend to have better academic performance .This paper proposes a model prepared by Fuzzy logic that can be implemented in educational institutions. This model will identify such students who are good in either academics or extracurricular activities but are lagging behind in the other. Such students need counselling and the reason behind their lack of performance in either aspect need to be identified.

This model will be able to distinguish these students so that they could be worked upon by trained professionals and ably guided so that their overall growth can be achieved. In this way the development of a student can be attained which will prove beneficial for them in all walks of life.

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