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SAAM Model: To Improve Attendence Analysis Management System Using Soft Computing

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Abstract: Currently Computer Science research centers are moving towards computing research. They are also followed by many research institutions/organization they are continuing research in soft computing. The probable is used due to its broad field of investigation for neural networks and fuzzy logic with probability computing. Foundations of Soft Computing include systematic development of one—standard based theoretical concept of mathematics to reach fuzzy logic and other relevant approaches to control both probabilistic and possibility. Here we propose a new model (SAAM) for student attendance system. The model highlights the fundamental trade-offs in soft computing through the evaluation of empirical study and experience report on different cases of soft computing for students. Finally we focus on the future research in this field and importance of SAAM model.

Keywords: soft computing; SAAM model, fuzzy logic, attendance, management.

I. INTRODUCTION

A. *Basic :*

The emergence of computational technology on the basis of computing mechanism and reduction of complex problem through multi computational techniques creates a new paradigm known as soft computing. It is a mini globe of computing techniques. In 1960's the concept of fuzzy logic was forced by Prof. Lotfi Zadeh and many definitions were proposed [1, 2]. According to him, "there are two types of computing which are measurable in the globe of computing techniques. The first one is soft and other is conventional computing. Conventional computing is also known as hard computing, it's working phenomenon and procedural techniques are different from soft computing. Soft computing uses the combined form of natural intelligence of human mind and its machined form as artificial intelligence."

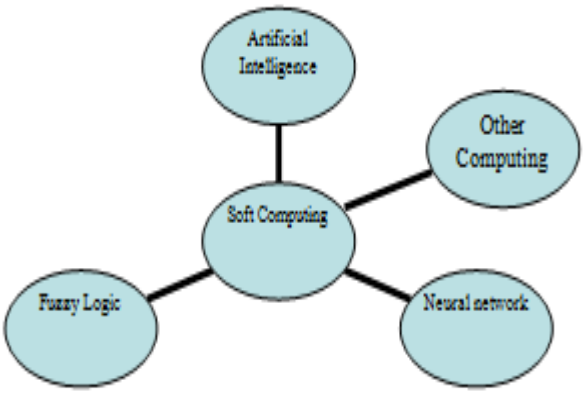

Figure 1: Graphical representation of soft computing

B. *Definition:*

Soft computing is the adjustable type of computing which covers approximation of results with tolerance of nearest trust for under-trained results. Main motive of such type of computing is to reduce the amount for solving the problem and reach its approximate solution with high level growth to trust the result. For this purpose two measures are considered: robustness and effect of result to the producer of problem. Past researches for soft computing focused to reduce the complexity by using neural networks with genetic algorithm. [5, 6]

II. IMPORTANCE OF SOFT COMPUTING

The critical stage problem is solved through fuzzy logic, neural Computing, genetic computing and probabilistic reasoning. These four techniques are the arms of soft computing. The combination of these makes soft computing more important for application environment. In future soft computing may play an important role in both areas of research: engineering and scientific field. [3, 4]

III. TECHNIQUES IN SOFT COMPUTING

BISC Group (Berkeley Initiative on Soft Computing) made a survey for the knowledge of soft computing from faculties to learners. [7, 8]

They caught few techniques required to support and handle the computational problems in soft computing.

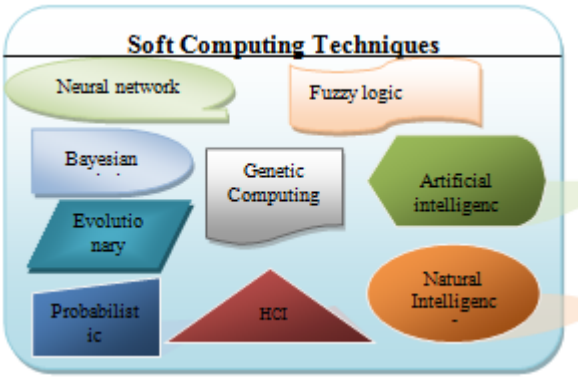

Figure 2: Soft Computing Techniques

We have found that there are five common techniques used for the soft computing as given below:

a. Evolutionary computing
b. Artificial intelligence
c. Neural networks,
d. Fuzzy logic and
e. Bayesian statistics.

These techniques also use a little methodology for solving the critical instance of problem. These methodologies may be genetic computing and probabilistic reasoning.

IV. STUDENT ATTENDANCE ANALYSIS MODEL (SAAM)

Basic area of soft computing research focuses on artificial intelligence, which is the machined form of natural intelligence on the basis of experimental report to form the automatic problem solving technique. Other is the fuzzy system: which covers the approximation result of any problem. For example, let us suppose there are 100 students in a class. We represent their scenario for attendance. Generally we have two choices: one is present in the class another one is absent from the class. For this purpose we have two symbols like P and A. After evaluation of 75 % attendance, we found out that only 40% students were able to appear in the exam. This means there may be many cases. We assume the following cases:-

Case 1: some students are regular but their attendance may not be marked because of their arriving late in class.

***Case* 2:** students like GATE scholars may be assigned internal departmental work.

Similarly other cases have been considered and exceptions by college authorities are assigned.

CASE I: If student has come to college and come to class,

R1: at right time then, P = 1.0

R2: after 20% time is over (from start to class) of total time duration of class

Then, P = 0.9

R3: when remaining 20 % time is left (from end to class) of total time duration of class

Then, P = 0.8

CASE II: If student has come to college and did not attend class,

R1: Due to some internal work assigned by faculty member that time duration (of class) and request to concern faculty before or after the class

Then, P = 0.7

R2: Due to some internal work assigned by faculty member that time duration (of class) but did not request the concerned faculty before or after the class then, P = 0.6

R3: enjoy the party in college canteen with friends at the time of class but did not create noise

Then, P = 0.5

R4: enjoy the party in college campus with friends at the time of class also create noise

Then, P = 0.4

CASE III: If student did not come to college but had reason for it,

R1: the cause is sufficient for his/her leave (like medical and approved by guardian with medical certificate) then, P = 0.3

R2: the cause is sufficient for his/her leave (like medical but not approved by guardian and did not have medical certificate) then, P = 0.2

Table 1: Student Class Attendance Rule

S. No.	Case	Rule	Present (value of P)	Absent (value of A)
1.	**I**	R1	1.0	0.0
2.		R2	0.9	0.1
3.		R3	0.8	0.2
4.	**II**	R1	0.7	0.3
5.		R2	0.6	0.4
6.		R3	0.5	0.5
7.		R4	0.4	0.6
8.	**III**	R1	0.3	0.7
9.		R2	0.2	0.8
10.	**IV**	R1	0.1	0.9
11.		R2	0.0	1.0

CASE IV: If student neither came to college nor had sufficient reason for it,

R1: the academic performance of student is good then, P = 0.1

Figur2: The Academic Performance Of Student Is Poor Then, P = 0.0

By using such rules for appropriate cases we observed the attendance scenario of students every month and after a semester we created the graphical representation of class performance of students according to their attendance.

Let T- be the total attendance of student

Then

$$TA = \sum_{0}^{30} (D_i I_j R_k) \quad \text{.....(i)}$$

Where i= 0, 1, 2, 3,… 30
J= 1, 2, 3, 4
k= 1, 2, 3, 4

Because $C_m = I_j R_k$

Therefore,

$$TA = \sum_{0}^{30} (D_i C_m) \quad ...(ii)$$

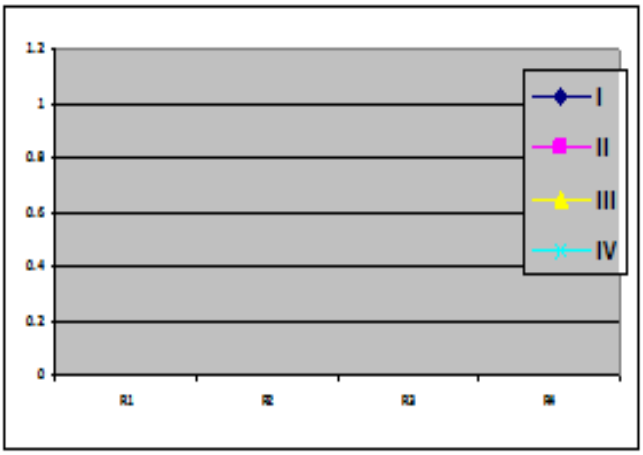

Figure 3: Line chart attendance through SAAM model

By the use of equation (ii) we can compute the total attendance of student.

V. COMPARING PERFORMANCE

For comparative study of results, we use a standard example of a student and on the basis of their attendance permit them to appear in exam as a standard of 75% attendance is required by Indian University/College to appear in exam for a student.

Let us suppose that the monthly register of student Ram shows that he attended only 15 classes in a month. And next 8 classes he gave excuse for not attending. According to previous rules university/college did not permit Ram to appear in the midterm exam. If the same process continuous, he can't appear in main exam and his year is lost. But according to our analysis model the 15 classes attended is saved as present class of Ram and remaining 8 classes are divided into four different cases. According to the case, a particular rule is applied. These rules grow-up the attendance of Ram and make it as 75 percent so that he can appear in main exam.

Table 2: according to model Attendance of Ram

Case/Rule	R1	R2	R3	R4
I	6*1.0	5*0.9	4*0.8	
II	2*0.7	1*0.6	3*0.5	4*0.4
III	1*0.3	1*0.2		
IV	2*0.1	1*0.0		

According to the model the attendance of Ram is calculated as

TA = [{(6*1.0) + (5*0.9) + (4*0.8)} + {(2*0.7) + (1*0.6) + (3*0.5) + (4*0.4)} + {(1*0.3) + (1*0.2)} + {(2*0.1) + (1*0.0)}]

= [{6 + 4.5 + 3.2} + {1.4 +0.6 +1.5 +1.6} + {0.3 + 0.2} + {0.2 + 0}]

= [{13.7} + {5.1} + {0.5} + {0.2}]

= 19.5

The computational value of TA shows it is nearly 66.67 percent means the class attendance of student is appropriate to appear in the main exam and we can allow him. Previous rule could not allow that student because according to it, his attendance was only 50 percent. This comparative study shows that our proposed model is a better technique for student as well as college management.

VI. APPLICATION AREA OF SAAM MODEL

This model has been tested for University/College and other institutions. It is also used to clarify the student attendance and his overall behavior for college. The extension of SAAM model is also applicable in other fields for attendance record management.

VII. DIFFERENT FACETS OF SOFT COMPUTING

Soft computing is a key of latest research. Most of researchers have proposed a new venture for this platform as compared to other computing area. Due to the lack of laborites, its implementation is not widespread. New researchers find the study of soft computing very complex.

VIII. CONCLUSION

Soft computing is a new paradigm growing up in the field computing – it captures the involving part of human computer interactions and their natural intelligence to perform a work. SAAM model clarifies the attendance record of student and most possibly represents his/her class behavior. Its application is more powerful as compared to previously accepted model.

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