



PREDICTIVE ACADEMIC COUNSELING EXPERT SYSTEM BASED ON CERTAINTY FACTOR TECHNIQUE

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Abstract

Academic counseling is a collaborative relationship between a student and an academic advisor. The intent of this collaboration is to assist the student in developing meaningful educational goals that are consistent with personal interests, values and ability. This research applied certainty factor technique under rule-based expert systems in giving academic counseling of students. The system provided advice on student's grade and performance, and predicted future grade. The agile system development methodology was adopted for the design of the system, and the system was implemented with Java programming language. MySQL was employed for the relational database management system to manage and store result data. The rules were defined in the knowledge base of the system, with which the system used to make inference. The system used the certainty factor to predict the academic progress of every student.

Keyword: Expert System, Academic Counseling, Certainty Factor, CGPA, Predictive

1.0 Introduction

Since the creation of PCs or machines, their ability to perform different errands have developed dramatically. People have fostered the force of PC frameworks as far as their assorted working spaces, their speeding up, and diminishing size concerning time. A part of software engineering named Artificial Intelligence (AI) seeks after making the PCs or machines as wise as people. Expert systems (ES) are one of the unmistakable exploration spaces of

Artificial Intelligence (AI). Rule-based master frameworks can imitate the dynamic capacity of human specialists. They are intended to tackle issues as people do, by taking advantage of encoded human information or skill. This information can be separated and obtained straightforwardly through communication with people. The extricated information frames the information base of the standard based framework. The other significant part of rule-based frameworks makes determinations from this information, and is alluded to as the induction motor. The ends and ideas presented by the standard based framework fulfill clients' requirements for ability inside the picked area.

Scholarly exhorting is a dynamic cycle through which any student prompted by a counsel, boosts the instructive experience through association explicitly appropriate to both curricular and vocation arranging. The nature of advisement can assume a basic part in students scholastic preparation and navigation. The advisement is a somewhat complicated process and includes exercises from accounting to talking about various issues with students. A adviser needs to have all the relevant data to offer a decent guidance to an student (Grupe, 2002).

Rule-based frameworks are intended to tackle issues in a chose space. Each space has its own insight and thinking people, which can be imitated and, surprisingly, supplanted through computerized rule-based frameworks. Numerous areas contain a lot of information that can be caught completely just through a data framework, since people may not get

to or quickly recover completely the required data. The method involved with exhorting students is a significant and tedious undertaking. Various instruments and strategies can be utilized to make it a powerful and effective interaction.

Certainty theory is a structure for addressing and working with levels of conviction of valid and misleading in information based frameworks. In conviction hypothesis as in fluffy rationale, vulnerability is addressed as a level of conviction. There are two stages in utilizing each non-probabilistic technique for vulnerability. To start with, it is important to have the option to communicate the level of conviction. Second, it is important to control (e.g., join) levels of conviction while utilizing information based frameworks. Sureness hypothesis depends on the utilization of conviction factors. Conviction factors (CF) express faith in an occasion (or a reality or a theory) in light of proof (or on the master's evaluation). There are a few techniques for utilizing conviction elements to deal with vulnerability in information based frameworks. One way is to involve 1.0 or 100 for essential fact of the matter (i.e., complete certainty) and 0 for specific misrepresentation. Conviction factors are not probabilities. For instance, whenever we say there is a 90 percent chance of downpour, there is either downpour (90%) or no downpour (10%). In a non probabilistic methodology, we can say that a conviction element of 90 for downpour implies that it is probably going to rain. It doesn't really imply that we offer any viewpoint about our contention of no downpour (which isn't really 10). Thus, sureness factors don't need to summarize to 100. Conviction hypothesis presents the ideas of conviction and doubt (i.e., the level of conviction that something won't occur).

2.0 Literature Review

The idea of a specialist framework advanced in the mid 1970's the place where there was significant interest in concentrating on choices by specialists that didn't utilize factual or other numerical apparatuses, and deciding whether and how such choices could be displayed in a PC (Shortliffe, 2003). From the right on time to mid-1970 and the mid 1980's, master frameworks application base appeared to be practically widespread, as the master frameworks have been applied to pretty much every possible

discipline, going from science to medication to business and to the scholarly community.

Shortliffe and Buchanan (1975) fostered the CF model during the 1970s for MYCIN, a specialist framework for the determination and treatment of meningitis and contaminations of the blood. From that point forward, the CF model has turned into the standard way to deal with vulnerability the executives in rule-based frameworks. (David Heckerman, 2015).

From the writing, four models for scholarly exhorting were chosen: Prescriptive prompting model, formative exhorting model, coordinated exhorting model, and the commitment model. The Prescriptive Prompting model is described by a dictator relationship where students follow the prescriptive routine of their advisers concerning course determination, degree necessities, and enlistment, without accepting obligation for navigation (Crookston, 1972). The Formative exhorting models depend on a common obligation between the student and the counsel where the adviser advises the student to appropriate assets; consequently, working with the advancement of more noteworthy autonomy, independent direction, and critical thinking (Chando, 1997). The Incorporated Instructing model consolidates components concerning both prescriptive and formative exhorting models (Heisserer 2002). The Commitment model includes building a connection between the student advisee and the teacher adviser to upgrade student self-adequacy for finishing the degree prerequisites. This approach would require a much more focused exertion with respect to the scholastic adviser in when current innovative practices could restrict the eye to eye student adviser communications. Innovation ought to be utilized to increment and work with admittance to student data and not to supplant the up close and personal student counsel connections (Yarbrough 2002).

The utilization of innovation in scholarly exhorting may present more noteworthy responsibility and may offer better types of assistance to students. The advantages of the utilization of innovation in scholastic encouraging empower chairmen to be student focused (Kramer and McCauley, 1995). Innovation is useful to advisers and advisees in that it adds to helping with settling on better-informed choices and further developed administrations. Notwithstanding, innovation doesn't supplant one-on-

one connections. Counsels ought to perceive innovation as an instrument to upgrade the exhorting experience, not to supplant it (Steele 2000). Colleges need a thorough arrangement that locations prompting, satisfactory personnel and adviser preparing, web support for designated students, advancement of extensive data sets for overseeing student information, and continuous exploration to assess intercession viability (Heisserer, 2002). Prompting can be an exceptionally tedious interaction prompting the requirement for robotizing a portion of its capacities. In a perfect world, a computerized counsel offers responses to a student's standard inquiries. The student can then meet with the Advisor for additional interview. This blend of human and machine can save time for the human adviser.

3.0 Materials and Methods

The adjusted strategy incorporate three principle exercises, to deliver progressive variants of the master framework, beginning from research model and finishing by the creation form. These exercises are:

- i. Knowledge obtaining.
- ii. Knowledge investigation and demonstrating.
- iii. Knowledge checking.

- i. Knowledge Obtaining

Information securing is viewed as the bottleneck of the master framework building process. One of the significant hardships at this stage is to unequivocally recognize and catch information pertinent to the expected application. Scholarly counsels of different levels, for example, 100,200,300 and 400 were utilized as specialists for the Information base.

- ii. Knowledge investigation and demonstrating

The Select-and-Change approach was embraced for mastery displaying, where a total conventional model was chosen from a bunch of predefined models, and consequently altered to suit the requirements of the expected application, giving a total tweaked skill model, after extra space information procurement.

The select-and-adjust approach was partitioned into the accompanying four exercises:

- a) Select-IM: Select an understanding model as indicated by a bunch of determination standards. In our circumstance, we have fostered a space explicit

library that contains models covering a large portion of the scholastic exhorting issues, e.g., student's GPA, CGPA, understanding timetable, and Result.

- b) Evaluate-IM: Explore, regardless of whether the chose IM is reasonable for the application, or that it needs some change. This action is finished by distinguishing the disparities between the necessary framework conduct and that of the chose understanding model. These disparities can be found either by strolling through the IM or by attempting theoretical cases to assess the framework.

- c) Modify-IM: Alter the IM, to make it appropriate for the planned application

- d) Domain-KA: Obtain the area information as per the chose, and likely adjusted translation model.

- iii. Knowledge Check

Information check is the stage by which we make quality affirmation of the procured information.

3.1 Certainty Factor Theory and Evidential Reasoning

Certainty Factor (CF) hypothesis is a famous option in contrast to Bayesian thinking. The most extreme value of the certainty factor is +1.0 (certainly evident) and the base - 1.0 (certainly bogus). A positive value addressed a level of conviction and a negative value, a level of mistrust.

IF <evidence>

Then, at that point, <hypothesis> {cf}

The conviction factors hypothesis depends on two capacities: proportion of conviction MB(H,E) and proportion of skepticism MD(H,E). The proportion of conviction and mistrust can be characterized as far as earlier and contingent probabilities as follows

In the event that $p(H) = 1$

$$MB(H,E) = (\max [p(H|E), p(H)] - p(H)) / (\max[1,0] - p(H))$$

In any case if $p(H) = 0$

$$MD(H,E) = (\min [p(H|E), p(H)] - p(H)) / (\min[1,0] - p(H))$$

Where:

$p(H)$ is the prior probability of hypothesis H being true;

$p(H|E)$ is the probability that hypothesis H is true given evidence E.

4.0 Design and Implementation

The motivation behind the framework configuration is to actually partition the general issue into little and more reasonable issues that can be effectively dealt with by isolated program modules. The information configuration connected the data framework and the client. It included the created determination and strategies for the information arrangement and those means were utilized to place exchange information in to a usable structure for handling.

The inputs required in the system were:

- i. The matriculation number and scores of each student
- ii. The details of a student to register
- iii. The details of a course adviser to assign to a particular class
- iv. The moral record of each student

The outputs gotten from the proposed system conveyed the following information:

1. The prediction of student result for each semester along with the corresponding GPA
2. List of all Student registered to the course adviser
3. List of all student according to their grade potential. Such as, list of all potential first class students, 2.1 students, 2.2 students, third class students and students that failed out.
4. The record of each student using the proposed system.

The framework guaranteed that aadviser for each level should initially be enrolled without which no student could be enlisted in any level. While enrolling; the student/counsel will demonstrate his status either as a "Student" or an "Advisor".



Figure 1: Students' registration page

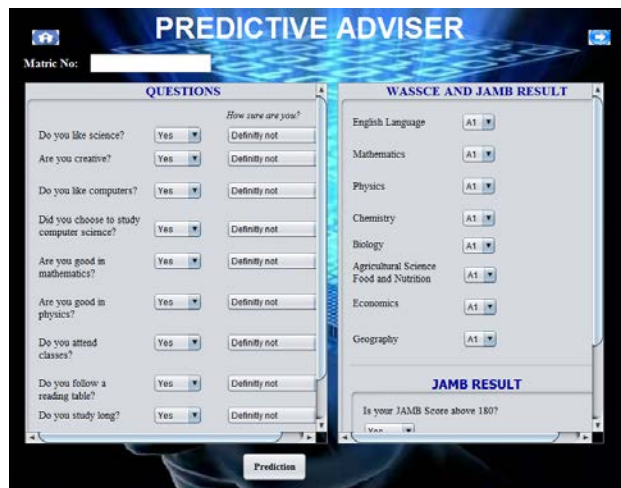


Figure 2: Predictive adviser

As seen in figure 2, the framework permitted a student to anticipate the outcomes he accepted he can get and afterward the framework utilizes the sureness component to check these expectations with the ethical check before it predicts the consequence of the student.

The sections by the right are the convictions which should be checked by the student and pick before the choice reasonable

4.1 Advisors Homepage

From figure3, adviser saw all students on the framework by embedding first name, last name and level he/she is prompting and click search, the framework list all students enlisted to that adviser. The Adviser can likewise sort his students as per their grade point by clicking top of the line to see the possible top notch student or 2.1 to see the potential 2.1 students and so on the adviser and snap on an student rundown to draw out every one of the records of that student in the framework.

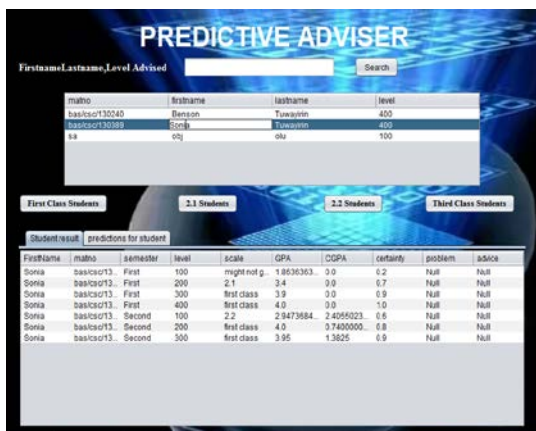


Figure3: Advisers' home page



Figure 4: Advice offered to a working student

5. Conclusion

This work focused on the utilization of an expert system with certainty factors to anticipate scholastic position forecast, GPA estimation and educating

regarding student. This work covers some expert knowledge on the course adviser expressing the points, highlights, benefits, drawbacks and furthermore the benefits, point, impediments and elements of the proposed framework.

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