



A Novel Approach for Descriptive Answer Script Evaluation

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Abstract— *The main concept of Intelligent Tutoring System using AI is to build any computer program that contains some intelligence and aims at providing immediate and useful instructions to novice learners. It is a system that performs teaching the students and evaluates their performances with proper feedback. It can help the students in various subjects and measures their strength and weakness. It used to organize test sessions and provides students with suggestive feedback after evaluation. The system works on the student's knowledge level and psychology. It checks on the answers with appropriate spelling and grammar under restriction. It works on respected answer given and distinguishes them whether correct, error or elaboration. According to the level of student order to produce educationally smart computers dates back to 1970s. The proposed intelligent online exam system detects the problems to a large extent and helps the instructors to decide knowledge, it automatically check the spellings and grammar of the answer and also to organize learning contents in order to suit with the learner until they can easily learn the contents. The proposed metric measures the correctness of descriptive type answers with spelling checking and grammar checking under restricted conditions.*

Keywords— *Intelligent Tutoring System, Descriptive answer checking, Tutor model, Student model*

I. INTRODUCTION

In the field of information technology, online education gains importance in the real world as an alternative to the human teaching system. Online teaching system is independent of time and space, so it gained a large audience in short periods. It is a system which specifies what can be taught to the students and how the contents be taught easily but systematically. Today, the systems provide instructions and feedback in order to make things easier for the students to learn them. Online examinations systems make it likely for them to possess processes suitable for intelligent approaches. The system provides the students with hints for the complex problems and also suggestions for the descriptive questions. Here, the students are provided with contents to learn and then test sessions are rendered. The system checks student's mastery of topics in order to adapt the style of instructions to be provided. Intelligent Tutoring System is not designed to replace human tutors in real worlds but it is capable of teaching a vast range of students individually, just before the examination, which is not possible for any human tutor. The researchers showed one to one tutoring is very effective. Besides, a student can freely ask his queries to the computer which might not be the case with human tutor and visualization techniques help learner in better understanding of the domain and an appropriate presentation. Intelligent tutors have proved to improve student understanding, spelling mistakes, grammatical errors and their performances. Also, these modern day tutors have proved to be affluent in teaching than their human counterparts in some other areas, viz, providing excellent test sessions by collecting information from all over the web by renowned scientists and psychologists and also it can be a veteran in one-to-one tutoring which is almost obsolete in human world today. Moreover, this proposed system handles the problems in adjustment learning classes and materials for each student according to student's performance. The objective of the system is to meet all the above mentioned challenges. Though intelligent tutors are becoming very common and proving to be increasingly effective, they are difficult and expensive to build. The purpose of this project aims to develop an Adaptive Web-Based Intelligent Tutoring System using Mastery Learning Techniques to support students in learning. We have divided this paper into different modules each describing a different area of this project. The next part describes related work, Implementation, experimental results which are followed by the Future Scope and Conclusion References.

II. REVIEW OF PREVIOUS WORK

The researchers in the 1980s had split into two broad aspects of this development, the first being the environment that encourages discovery learning. The most famous is the LOGO language which introduces the students to the world of geometry [1]. The language LOGO was formed in 1967 by Wally Feurzeig and Seymour Papert as a language streamlined for education. The second approach is the "intelligent tutoring" where the computer acts as a tutor and the students learn by being told. The computer learning concept has evolved since its inception in 1950s with Skinnerian

type linear programs. In 1960s the programming language developed into branching program. The latest form that took was the Intelligent Tutoring System. In 1996 Mark Urban-Lurain [2] carry out a survey on intelligent tutoring systems history and discuss how AI can be employ to construct an intellectual teaching system. John R. Anderson in 2010 tries to find out the brain activity of a student while learning through an intelligent tutoring system. He captures the mental state of a student during test session using a hidden markov model [3]. Annabel Latham, Keeley Crockett, David McLean and Bruce Edmonds in 2012 proposed a system called Oscar CITS with the help of Index of Learning Styles [4]. That minimizes the difference between human tutor and computer tutor. Sung-Young Jung and Kurt Van Lehn in 2010 design an authoring system called Natural-k , that facilitate non programmer to represent knowledge using natural language [5]. In 2009 Christos N. Moridis, Anastasios A. Economides developed a neural network based method to predict student's mood during self assessment test [6]. Sherry Y. Chen, Robert D. Macredie in 2002 represents how to develop a hypermedia learning system. They also developed a learning model by analyzing previous studies of hypermedia learning [7]. Richard M. Felder, Linda K. Silverman in 1988 described the process of solving various problems in engineering education system [8].

III. PROPOSED METHOD

Intelligent Tutoring System has been designed using many models and different algorithms. The system aims at providing content materials and most importantly test sessions. To design the entire system for tutoring following steps are required.

1. File Systems have been incorporated. Different files have been used to store different useful contents. For example – Keywords of the original answers of the question have been stored in a file which can be later retrieved to compare with the words mentioned in the student's answers.
2. The teacher and the student have to communicate with each other via an interface, which is known as user-interface.

After signing into his or her own account, the tutor performs the following activities:

1. The tutor can read materials mentioned in the system via links. He or she can read any topic on any subject desired.
2. After reading the contents, the tutor can set questions accordingly.
3. He or she also sets the answers of the questions set by him or her.
4. He can then see all the questions and answers set by him or her.

After signing into his or her own account, the student performs the following activities:

1. The student, after logging into his or her own account, can read content materials mentioned in the system.
2. Then he or she can give the test recommended for him or her.
3. The test is based on descriptive type questions and answers.
4. The student has to keep in mind that he or she can only type answers in simple sentences.
5. After typing the answer the student submits and hence goes to the next question. Finally, he or she gets his result which says whether he or she is correct or wrong displaying the correct answer with proper feedbacks.

The design is illustrated in Figure 1.

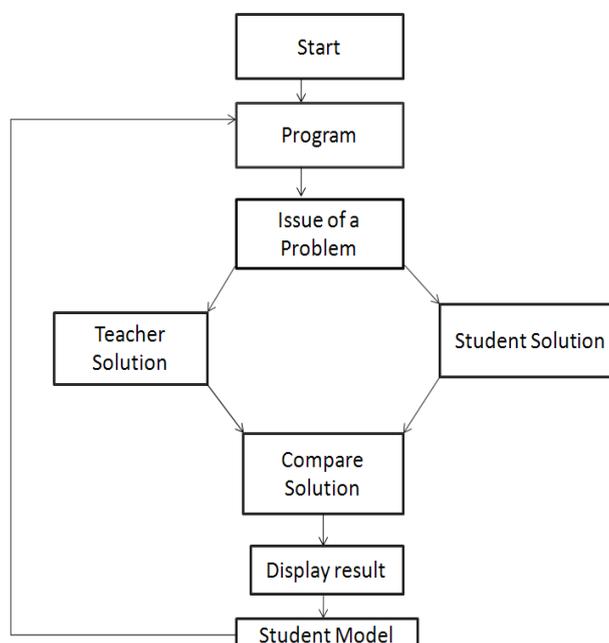


Figure 1: Work-Flow of the proposed model.

IV. EXPERIMENTAL RESULTS

The students are rendered with different content materials according to the subjects they desire to learn and then test sessions are taken from them. A pre knowledge test can be taken to evaluate the student's knowledge on the concerned topic. After taking the descriptive type question test, the system can compare the knowledge's of the student and evaluate whether he has improved in the certain area or not. The system does not trace the previous knowledge of the student so it cannot compare whether the student has improved after studying the content materials supplied to them. So systems can take into account to take the pre-knowledge test from the student immediately after he logs into his account. The evaluation must be overt so that the students can take get correct suggestions and learn from them. The descriptive type answers are checked in detail, by checking the spellings and changing them accordingly. Then it goes on checking the grammar and the meaning of the sentence. The sentence written by the student must be a simple sentence. So the software has been incorporated with a spell checker and a grammar checker. The spell checker corrects the incorrect spellings the students write and they get relaxation for minor mistakes. Thus finally, the student gets his score.

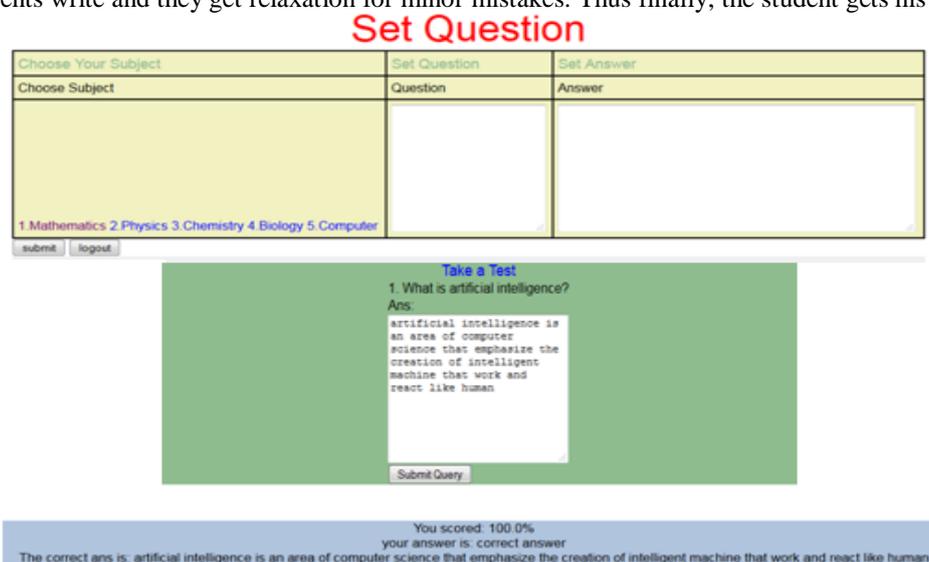


Figure 4: Experiment result of the proposed model.

V. CONCLUSIONS

The spell checker developed do not give a cent percent accuracy; giving only 80% accuracy. This paper presents an assembled approach with a number of essential features of an Intelligent Tutoring System including a metric embedded to it. The metric helps improving the evaluation of descriptive type test sessions. The system demonstrated with the proposed approach can be used as a limited content delivering tutoring system. The contents provided can be edited by an authenticated tutor. The evaluation is done through various levels of test sessions. Feedbacks given are explicit and suggestive. The metric of evaluating the descriptive answers works best for simple sentences. The provision to enter new words in the databases makes the databases flexible. As it is dependent on spell checking and grammar checking the result may not always be satisfactory. There are definitely scopes for future research work and implementation on this algorithm and architecture. The word dictionary and databases used in the metric can be upgraded for more accurate results. Plug-in can be used to develop well-formed spell checker and grammar checker to obtain better results. With an improved grammar checker the metric can also support compound and complex answers. This online tutoring system is also used in distance education and has been found very effective in the said matter. Researchers described the intelligent tutoring system as a web-based learning community with a set of "intelligent" functions allowing student modeling and automatic curriculum generation. There are scopes for further improvement on this system with advanced technology. The algorithm for evaluating the descriptive answers as demonstrated in the system works only for simple sentences. Third party tool can be used for the grammar checking and spell checking module for better accuracy. With proper grammar checker the algorithm can also support compound and complex answers. The spell checker module provides limited relaxation to the students. The available relaxation rules should vary according to different questions. There is provision to insert words in the files. New words can be added for new question-answer sets accordingly. The files can be upgraded so that the design can support a wide variety of answers.

REFERENCES

- [1] Intelligent Tutoring System from the Wikipedia: The Free Encyclopedia.
- [2] Mark Urban-Lurain, "Intelligent Tutoring Systems: An Historic Review in The Context of the Development of Artificial Intelligence and Educational Psychology", Michigan State University, 1996.
- [3] John R. Anderson, Shawn Betts, Jennifer L. Ferris, and Jon M. Fincham, "Neural imaging to track mental states while using an intelligent tutoring System" PNAS, April 13, 2010 , vol. 107 , no. 15 , 7019.
- [4] Annabel Latham, Keeley Crockett, David McLean and Bruce Edmonds, "A conversational intelligent tutoring system to automatically predict learning styles", Volume 59, Issue 1, August 2012, Pages 95–109,CAL 2011.

- [5] Sung-Young Jung and Kurt Van Lehn, “Developing an Intelligent Tutoring System Using Natural Language for Knowledge Representation”, Chapter Intelligent Tutoring Systems, Volume 6095 of the series Lecture Notes in Computer Science ,pp 355-358,2010.
- [6] Christos N. Moridis, Anastasios A. Economides , “Prediction of student’s mood during an online test using formula-based and neural network-based method”, Computers and Education, Volume 53, Issue 3, November 2009, Pages 644–652.
- [7] Sherry Y. Chen, Robert D. Macredie, “Cognitive styles and hypermedia navigation: Development of a learning model”, Journal of the American Society for Information Science and Technology, Volume 53, Issue 1, pages 3–15, 2002.
- [8] Richard M. Felder, Linda K. Silverman, “Learning and Teaching Styles in Engineering Education”, *Engr. Education*, 78(7), 674–681 (1988).