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Intelligent Tutoring System for Teaching Java

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Abstract: An Intelligent Tutoring System is based on cognitive learning theory which is a learning theory interested in how information organizes in human's memory. ITS are intelligent programs which know what, how and whom they will teach so computer play an important part in education and instruction aims are performed and suggested in this work. In this paper described of ITSs in educational application and demonstrate used modules in ITSs. In Intelligent Tutoring System, using Pre-quiz evaluation the knowledge level of the student is measured by asking objective type question to the student. And the system automatically allots and registers the details of the student according to their performance level. According to the level of the student allotted by the system, the study material is provided. In this system the student level is categorized into three sections, beginner level, average level and excellent level. In this system, tutor is registered by the administrator; this system has monitored all the apparition has based on student Id, who help in managing quiz creation for evaluation purpose and study material creation according to each level of student. And Student can also ask any queries or doubts to the tutor for any clarification. To clarify important terms in a concept, this system automates the key terms will search expand and definition by matching with the database, whenever the students move to the curser on the keyword. The server show immediately the keyword expands and also illustration. In advance this system provides solution student immediately because the tutor also available on another side, which helps the student to have searched with the study material with any keyword terms. The quiz evaluation each phase of section is made, which helps the student to know their level if they perform well they are upgraded. Reports are also managed by this system.

Keyword: Intelligent Tutoring System, Student, Java, learning

I. INTRODUCTION

Nowadays beside computer has come into our life, learning, independent from time and place, is implemented in an effective structure, since many studies are consummated education is implemented in a structure which takes into account. Benefits of the qualities include being more effective, qualified and independent from time and place. In order to develop the software's that present students effective instruction methods and provide education with being adapted to students, studies are carried out. Intelligent Tutoring Systems (ITSs) are tutoring systems which form using artificial intelligence (AI) techniques in computer programs to facilitate instruction.

In every teaching strategy approach of a learning process involves an entity that performs the learning phase and another phase of entity that teaches the latter. Based on real-class room situation, that can be referred to as the–student and the –tutor, respectively; using this approach a framework of a tutorial system for the student is made to evaluate their performance to maximize the learning curve.

This system manages the student level as three sections, as beginner level, average level and excellent level. The knowledge of student is evaluated while entering into the system and accordingly the study material are provided to the student. The evaluation knowledge is made objective based approach.

The allocation of student level is made by the system based on their performance level, If the student secures more than 80%, the system allocates them to expert level, if the student secures below 80% and above 60%, the system allocates them to average level, If the student secures below 60% and above 40% the system allocates them to beginner level, If the student fails in the pre-quiz evaluation, the system allocates them to starter level and accordingly the teaching are provided, the study material are classified and are taught by the system. The main motto of this system is to optimize the skill of the students ranging from starter to expert level.

In this system, tutor is registered by the administrator; this system has monitored all the apparition has based on student Id, who help in managing quiz creation for evaluation purpose and study material creation according to each level of student. And Student can also ask any queries or doubts to the tutor for any clarification.

To clarify important terms in a concept, this system automates the key terms will search expand and definition by matching with the database, whenever the students move to the curser on the keyword. The server show immediately the keyword expands and also illustration.

- It tracks the student performance; in fact this system cares for the learner to improve their skills.
- Perform control over question and answers to display randomized question.

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- Models the student learning using different strategyMethods
- An effectiveness of this system is that it enables students and tutor to have interaction with each other.

Enhance search helps the student to do, find solution immediately.

II.INTELLIGENT TUTORING SYSTEM

An Intelligent tutoring system (ITSs) are education systems which aim at high qualified and operational education, by this aim, try to provide an individual atmosphere for a student as if he is in one to one interaction with a professional educator, present necessary resources in time which are adapted according to individuals and in which the applications that prevent the student from being lost are developed in a Database. In other words, ITSs are computer systems which know what, how, to whom it will teach and are designed by benefiting from within techniques that take place in common formation of AI [1].

An intelligent tutoring system has the following as inputs:

- Prior knowledge, provided by the agent designer, about the subject matter being taught, teaching strategies, possible errors, and misconceptions of the students.
- Past experience, which the tutoring system has acquired by interacting with students, about what errors students make, how many examples it takes to learn something, and what students forget. This can be information about students in general or about a particular student.
- Preferences about the importance of each topic, the level of achievement of the student that is desired, and costs associated with usability. There are often complex trade-offs among these.
- Observations of a student's test results and observations of the student's interaction (or non- interaction) with the system. Students can also ask questions or provide new examples with which they want help.

The output of the tutoring system is the information presented to the student, tests the students should take, answers to questions, and reports to parents and teachers.

2.1 Structure of Intelligent Tutoring System

Intelligent tutoring systems consist of four basic components based on a general consensus amongst researchers

1) Domain model
2) Student Model
3) Tutoring Model
4) User Interface Model

2.1.1 Domain model

The key feature that distinguishes a knowledge communication system from standard ITS on the Domain Expertise dimension is that the representation of the subject matter is not merely a set of static frames, but actually is a dynamic model of the domain knowledge and a set of rules by which the system can "reason." These systems have their roots in expert systems research (such as medical diagnostic or electronic troubleshooting systems) and have the ability to generate multiple correct sets of solutions, rather than a single idealized expert solution.

2.1.2Studet Models

The student model can be thought of as an overlay on the domain model. It is considered as the core component of an ITS paying special attention to student's cognitive and affective states and their evolution as the learning process advances. As the student works step-by-step through their problem solving process the system engages in a process called model tracing. Anytime the student model deviates from the domain model the system identifies, or flags, that an error has occurred.

2.1.3 TutoringModel

The tutor model accepts information from the domain and student models and makes choices about tutoring strategies and actions. At any point in the problem-solving process the learner may request guidance on what to do next, relative to their current location in the model. In addition, the system recognizes when the learner has deviated from the production rules of the model and provides timely feedback for the learner, resulting in a shorter period of time to reach proficiency with the targeted skills. The tutor model may contain several hundred production rules that can be said to exist in one of two states, learned or unlearned. Every time a student successfully applies a rule to a problem, the system updates a probability estimate that the student has learned the rule. The system continues to drill students on exercises that require effective application of a rule until the probability that the rule has been learned reaches at least 95% probability.

2.1.4 User Interface model

The interface allows communication between the student and the other aspects of the ITS. Here, research from the human factors and software design disciplines is applicable, but the pedagogical implications of and ITS interface must also be considered. Wenger suggests that the goal of knowledge communication requires that the interface contain a discourse model to resolve ambiguities in the student responses. Since the learner is most likely to provide incomplete or contradictory responses when stymied, providing a properly supportive response that can advance the diagnostic

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process is important. This helps the ITS avoid redundant presentations and enhances instruction. For example, SOPHIE is explicitly designed to search through its knowledge database and compare it with the student answers for a "close" match when attempting to recover from unexpected student responses.

Classification of Student Learning Processes

To learn is to acquire knowledge or skill. Learning also may involve a change in attitude or behavior. Children learn to identify objects at an early age; teenagers may learn to improve study habits; and adults can learn to solve complex problems. Pilots and aviation maintenance technicians (AMTs) need to acquire the higher levels of knowledge and skill, including the ability to exercise judgment and solve problems. The challenge for the aviation instructor is to understand how people learn, and more importantly, to be able to apply that knowledge to the learning environment. This handbook is designed as a basic guide to educational psychology. This chapter addresses that branch of psychology directly concerned with how people learn [8].

Human learning may occur as part of education, personal development, schooling, or training. It may be goal-oriented and may be aided by motivation. The study of how learning occurs is part of Neuropsychology, educational psychology, learning theory, and pedagogy. Learning may occur as a result of habituation or classical conditioning, seen in many animal species, or as a result of more complex activities such as play, seen only in relatively intelligent animals. Learning may occur consciously or without conscious awareness. Learning that an aversive event can't be avoided nor escaped being called learned helplessness. There is evidence for human behavioral learning prenatally, in which habituation has been observed as early as 32 weeks into gestation, indicating that the central nervous system is sufficiently developed and primed for learning and memory to occur very early on in development.

Play has been approached by several theorists as the first form of learning. Children experiment with the world, learn the rules, and learn to interact through play. Lev Vygotsky agrees that play is pivotal for children's development, since they make meaning of their environment through play.[2] 85 percent of brain development occurs during the first five years of a child's life. The context of conversation based on moral reasoning offers some proper observations on the responsibilities of parents.

III. TYPES OF THE STUDENT LEARNING

3.1 Process Associative learning

Associative learning is the process by which an association between two stimuli or a behavior and a stimulus is learned. The two forms of associative learning are classical and operant conditioning. In the former a previously neutral stimulus is repeatedly presented together with a reflex eliciting stimulus until eventually the neutral stimulus will elicit a response on its own. In operant conditioning a certain behavior is either reinforced or punished, which results in an altered probability that the behavior will happen again. Honeybees display associative learning through the proboscis extension reflex paradigm.

3.2 Sensitization

Sensitization is an example of non-associative learning in which the progressive amplification of a response follows repeated administrations of a stimulus (Bell et al., 1995)[citation needed]. An everyday example of this mechanism is the repeated tonic stimulation of peripheral nerves that will occur if a person rubs his arm continuously. After a while, this stimulation will create a warm sensation that will eventually turn painful. The pain is the result of the progressively amplified synaptic response of the peripheral nerves warning the person that the stimulation is harmful.[clarification needed] Sensitization is thought to underlie both adaptive as well as maladaptive learning processes in the organism.

3.3 Habituation

In psychology, habituation is an example of non-associative learning in which there is a progressive diminution of behavioral response probability with repetition stimulus. An animal first responds to a stimulus, but if it is neither rewarding nor harmful the animal reduces subsequent responses. One example of this can be seen in small song birds—if a stuffed owl (or similar predator) is put into the cage, the birds initially react to it as though it was a real predator. Soon the birds react less, showing habituation. If another stuffed owl is introduced (or the same one removed and re-introduced), the birds react to it again as though it was a predator, demonstrating that it is only a very specific stimulus that is habituated to (namely, one particular unmoving owl in one place). Habituation has been shown in essentially every species of animal, as well as the large protozoan Stent or ceruleans.

IV. MODELING INTELLIGENT TUTORING SYSTEM FOR TEACHING JAVA

This system focused on making an adaptive approach to student teaching strategy by intelligent tutoring system for educational knowledge based approach. The main benefit with this new modeling involves a multilevel learning strategy in which student can learn only one subject for JAVA in learning [11]. Each section is categorized and according to the level of the student the teaching is provided by the system.

The modeling of students involves pre-evaluation of quiz to identify the level of the student. And accordingly the level of student is categorized and lessons are taught by the system.

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The main objective of the system is to optimize the learning ability of the student and to interactive approach with the tutor helps managing chapters and improves teaching strategy with the student. More over search techniques are incorporated which the system helps the student to learn keyword terms for word. In addition, the search technique, this system provides instant information for some word by providing meaningful information and also the illustration of on the keyword terms with balloon tips.

This system can be used in any kind of environment the supports learning. It helps in managing the chapter topics and quiz preparation and learning material from the level based for the student. Any queries or doubts regarding the topics can be asked to tutor. And the tutor has suddenly replay based on student id. Student also view the reports history for date wise, how many time interaction queries and get answers from the tutor, The intelligent tutoring system for educational knowledge based approach is managed with four sections of modules, such as below

- **STUDENT MODULE**
  - New User Registration
  - Student Evaluation
  - Learning
- **TUTORING MODULE**
  - Beginner level
  - Average level
  - Expert level
- **EXPERT MODULE**
  - Quiz Module
    - Evaluation module
    - Chapter Quiz Module
  - ToolTip Module
- **USER INTERFACE MODULE**
  - Queries Interface
  - Quiz Interface
  - Chapter Quiz Module

V. STUDENT MODULE

5.1 New User Registration module

The new student entered ITS first collected the student details and stored in the database, such as name, DOB, father name, qualification, occupation, Mobile no, profile photos and password. After completing the registration process the server generated the user id Automatically. This is used as a reference in the learning process by the system.

5.2Student Evaluation

The evaluation for student entry level is made by this system. In which several concepts collected Question and answer with multiple choices are prepared from the concept, which are shown randomly to the student and evaluated the student level by the system.

5.3 learning

After the completing the student quiz program, the subject material view the student based on quiz test performance. The quiz testing not only for entry

Level it's also for after learning for each concept will test the level. In case the performance is increase or decrease the system will automatically. Re-learning the sme concept, up to the performance reach excellent level then only go to the next concept.

VI. TUTORING MODULE

This module contains the information which includes tutoring strategies and tactics which are stored in student module and which will be used for student's qualities. Tutor module provides the necessary information so that tutoring aims can be achieved. This module must have control over the choices and sequencing of subject materials which will be showed students. Besides, it will answer students' questions properly and will present the needed help when they solve a problem or perform their skills.. As a teaching strategy, the student is first evaluated with per-quiz evaluation module. And according to the score, the student level is allocated by the system. Student level. In which the system uses in to evaluate the student level for each chapter. The student level based though the subject material for each chapter.

If the student secures more than 80%, the system allocates them to expert level, if the student secures below 80% and above 60%, the system allocates them to intermediate level, If the student secures below

60% and above 40% the system allocates them to beginner level, If the student fails in the pre-quiz evaluation, the system allocates them to starter level and accordingly the teaching are provided [6] [13].

VII. EXPERT MODULE

The expert module references and expert or domain model consists of a description of the knowledge or behaviors

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represent expertise in the subject – matter domain the ITS is teaching, often an expert system cognitive model [14].

7.1Evaluation module

The evaluation for student entry level is made by this system. In which several concepts collected Question and answer with multiple choices are prepared from the concept, which are shown randomly to the student and are evaluating the student level by the system.

7.2ChapterQuiz Module

A separate section of chapters with question and answers are managed by the system according to each.

7.3 ToolTip Module

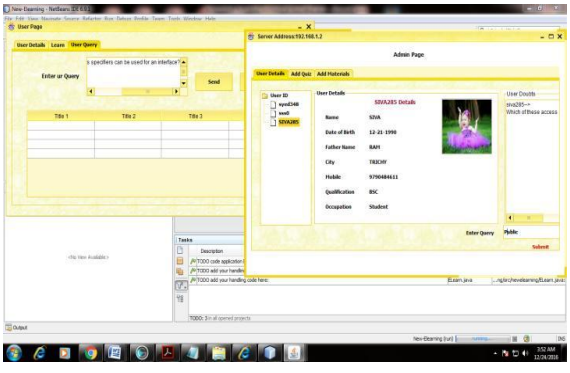
To clarify important terms in a chapter, this system automates the key terms will search expand and definition by matching with the database, whenever the student move to the curser on the keyword. The server shows the keyword expand and also illustration immediately.

VIII. USER INTERFACE MODULE

The user interface module is the communicating component of the ITSs which controls the interaction between the student and the system. In both directions, it translated between the system's internal representation and an interface language that is understandable to the student.

8.1Queries Interface

The student learning for a separate concept wise, at a time the student can't understand for some technical word. So they are sending to the queries to server, at a time the server also available on another side, so replay to the student immediately bested on student Id.



8.2 Chapter Quiz Module

A separate section of chapters with question and answers are managed by the system according to each student level. In which the system uses in to evaluate the student level for each chapter. The student level based too, though the subject material for each chapter.

IX. CONCLUSION

Intelligent Tutoring System is viewed as future's tutoring system and many studies accomplish in this area. When they are compared to other systems on catching up with the classroom atmosphere, ITSs are quite successful and by relatively taking students place, they undertake the supporting duty for students. In computer assisted tutoring, student differences aren't taken into account.

Transfer of learning is the application of skill, knowledge or understanding to resolve a novel problem or situation. Which happens when certain conditions are fulfilled research indicates that learning transfer is infrequent; most common when ‐ cued, primed, and guided‖ and has sought to clarify what it is, and how it might be promoted through instruction. A significant and long research history has also attempted to explicate the conditions under which transfer of learning might occur. Early research by Ruggeri, for example, found that the ‐level of attention‖. ―Attitudes‖, ―method of attack‖(or method for tackling a problem), a ‐search for new points of view‖. ‐a careful testing of hypothesis‖ and ―generalization‖ were all valuable approaches for promoting transfer. To encourage transfer through teaching, Perkins and Salomon recommend aligning instruction with practice and assessment, and ‐bridging‖, or encouraging learners to reflect on past experiences or make connections between prior knowledge and current content.

The model developed in this work helps the tutor system to provide multiple topics to the student according to their levels and also helps the student to learn quicker and faster using this system by promoting and interaction with the learner and tutor. And as a main objective of learning, the level of the student is optimized in which they are enhanced to increase their learning curve with each level

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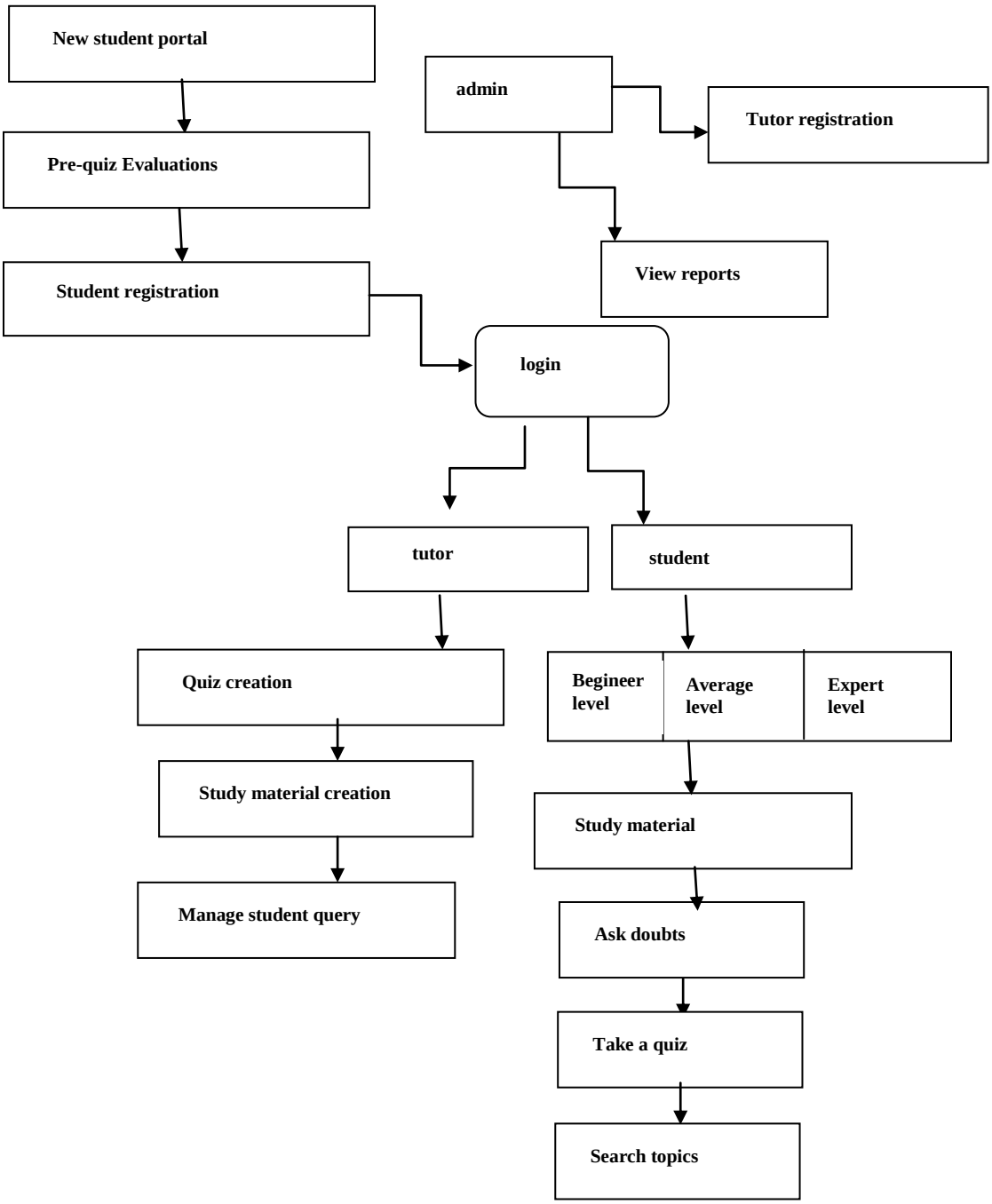

Architecture of Intelligent Tutoring System for Teaching Java