WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Bayesian Networks in Intelligent Tutoring Systems as an Assessment of Student Performance Using Student Modeling

Suchitra Hosamani[1]*, Mr. Rohit B.K[2]

[1]Post Graduate scholar, Department of CSE, VTU Belagavi,India
[2]Assistant Professor, Department of CSE, VTU Belagavi, India

ABSTRACT

Web Intelligence is a branch of scientific research that looks at how Artificial Intelligence can be applied to the next generation of Web-enabled technology. We provide a Web-based intelligent tutoring system for computer programming in this study. Bayesian networks, a formal framework for uncertainty management in Artificial Intelligence based on probability theory, drive the decision-making process in our intelligent system. Unlike many tutoring systems, which are simply static HTML Web pages from a textbook or lecture notes, our intelligent system can guide a student through online course materials, identify learning goals, and construct appropriate reading sequences. Using Bayesian networks, this research presented a model for constructing an intelligent tutoring system for any programming language.

I.INTRODUCTION

Because they are more appealing than traditional paper-based textbooks, web-based learning systems are becoming more popular. Web courseware is freely available and provides more flexibility, allowing students to set their own study pace. Web-based teaching systems, unlike traditional textbooks, can include multi-media such as audio and video to communicate a point. Due to the fact that many existing Web-based teaching systems are static HTML Web pages, they have two main flaws: they are neither interactive nor adaptive. Developed an intelligent system for supporting a user in addressing an issue in the context of Web-based tutoring systems. Clearly, this entails developing systems that can make decisions based on ambiguous or inadequate data. Bayesian networks, which use probability theory as a formal framework for uncertainty management in Artificial Intelligence, are one formal framework for uncertainty management. Bayesian networks have been used by web intelligence researchers for a variety of applications, including student monitoring, e-commerce, and multi-agent systems. We provide BITS, a Web-based intelligent teaching system for computer programming, in this work. A Bayesian network is used to assist the decision-making process in our intelligent system. BITS, like BITS, can help a learner navigate through online materials. BITS, on the other hand, can suggest learning objectives and develop relevant learning sequences. For example, a learner may only desire to understand "File I/O" rather than all of the concepts covered in the prior materials. BITS can determine the bare minimum of knowledge required to comprehend "File I/O" and display the links to these concepts in the proper learning order. BITS has been created and will be utilised in the summer 2004 session of CS110, the University of Regina's first computer programming course. Individual one-on-one counselling has been found in research to be effective.

BITS is intelligent software for implementing computer assisted one-on-one tutoring, which is the most successful way of teaching and learning.We offer a model and architecture for the design of ITSs based on a Bayesian approach in this study. The global model is broken down into interactive submodels that deal with user modelling, knowledge design, and Bayesian inference. This method allows for the creation of tutors in a variety of scenarios using the same architecture. The user model, knowledge model, adaption module, pedagogical module, and presentation module are the five parts of the shell, which is the part of the tutor that is teaching domain independent.

II. BAYESIAN NETWORKS

A Bayesian Network is a graphical representation of a probability distribution that allows for efficient probability transmission while maintaining rigour. A BN for a given domain is a set of local distributions combined with a set of conditional independence claims that represents the domain's joint probability distribution, p(x), over the set of random variables, X. Expression 1 is used to calculate this joint probability.

P (x1; x2;:::;xn) = Yni=1 P (xi j i)……. (1)

where fx1;:::;xi1 is a collection of variables on which xi is conditionally dependent for each variable xi. The BN structure encodes conditional independence claims as a directed acyclic graph with the following properties: (a) each node corresponds to a variable; (b) the parents of the node corresponding to x i are the nodes connected with the variables in i. The Bayesian Network for that domain is made up of the structure (graph) and the collection of local distributions, P (xi j i) for each node in the domain.

INTELLIGENT TUTORING SYSTEMS

For more than 35 years, computers have been employed in education. Traditional Computer-Assisted Instruction (CAI) uses a strict tree structure to direct students from one topic page to the next based on their responses. This technique is limited because it ignores the diversity of students' knowledge levels and requirements (c.f. [19]). CAI systems are also non-adaptive and incapable of providing the individualised attention that a human instructor can. An Intelligent Tutoring System (ITS) is a computer-based application that provides flexible and tailored access to instructional content. These systems can be utilised in the traditional educational process, as well as in distance learning courses, and can run on stand-alone computers or as Internet-based applications. An ITS must be able to accomplish three things, according to Shute and Psotka: I accurately diagnose a student's knowledge level using principles rather than preprogrammed replies; (ii) select what to do next and alter instruction accordingly; and (iii) deliver feedback. An ITS is distinguished from a CAI by this type of diagnostic and adaptation, which is commonly achieved utilising Artificial Intelligence approaches. Individual one-on-one tutoring has been proven to be the most successful way of teaching and learning, and ITSs are the only technology that can apply computer-assisted one-on-one tutoring.

III.EXISTING SYSTEM

There are two tasks involved in assisting a student in navigating a personalised Web-based learning environment under the current system. To begin, the problem domain's structure must be modelled. Second, each idea in the problem domain must be recorded in terms of student knowledge. Bayesian networks can assist us in achieving both of these goals. We narrow the scope of the challenge to make the process of designing an intelligent teaching system easier. Only the most fundamental subjects are taught, such as those found in a first programming course. That is, basic concepts like variables, assignments, and control structures are covered, but advanced concepts like pointers and inheritance are not.

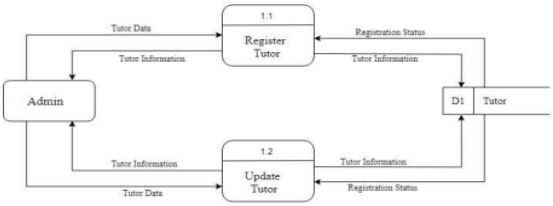
PROPOSED SYSTEM

For our objectives, we identified a set of ideas taught in CS110, the University of Regina's first computer programming course. A node in the graph represents each concept. If understanding the former requires knowledge of the latter, we add a directed edge from one notion (node) to another. The DAG encapsulates the right sequence for learning all of the concepts in the issue domain and can be built manually with the help of the course textbook. v There are two ways to get evidence for updating the Bayesian network in BITS: A student's direct response to a BITS question about whether or not they understand a particular idea. To determine whether or not a student has grasped an idea, a sample quiz result for the related concept is provided. We believe that this method of estimation is more dependable. After reading the presented lecture notes, the student sends feedback to BITS. She chooses one of the three options below in further detail:

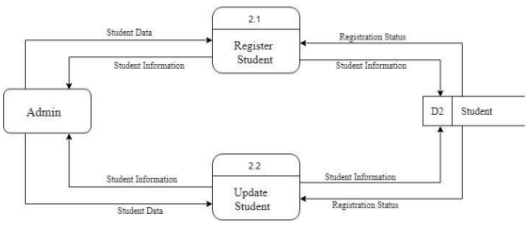
i. I understand this concept,
ii. I don't understand this concept,
iii. I'm not sure (quiz me),

IV.DATA FLOW DIAGRAM

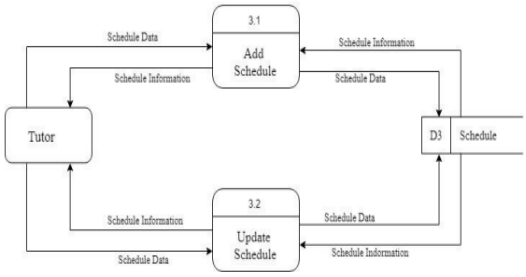
DATA FLOW DIAGRAM LEVEL 1



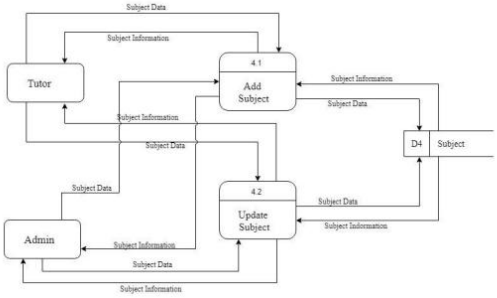
DATA FLOW DIAGRAM LEVEL 2



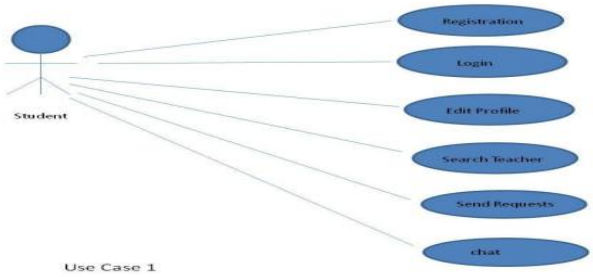
DATA FLOW DIAGRAM LEVEL 3

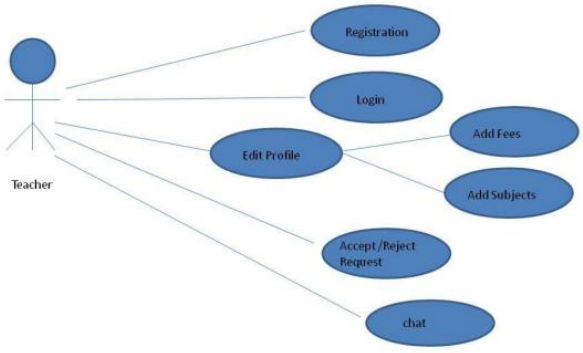


DATA FLOW DIAGRAM LEVEL 4



USECASE DIAGRAM





V.SYSTEM STUDY

FEASIBILITY STUDY

In this phase, the project's feasibility is assessed, and a business proposal is presented, along with a very generic project plan and some cost estimates. A feasibility study of the proposed system is to be carried out during system analysis. This is to ensure that the planned system will not cause the organisation any problems. A basic understanding of the system's primary requirements is required for feasibility analysis..

Three key considerations involved in the feasibility analysis are

i.Economical feasibility

ii.Technical feasibility

iii.Social feasibility

VI.TABLE DESIGN

The metadata of a database is stored in a data dictionary, which is a file or a series of files. The data dictionary stores information about other database items, such as data ownership, data relationships, and other data. A relational database's data dictionary is an essential component. Surprisingly, despite its relevance, most database users are unaware of it. The data dictionary is required by most relational database management systems (RDBMS) software in order to access the data within a database.

.

VII.TECHNOLOGY USED

1. FRONT-END

HTML5

HTML stands for Hyper Text Markup Language, and it is a key Internet markup language used for organising and presenting content for the World Wide Web. It's a programming language, after all. A web browser's job is to read HTML texts and put them together into visible or audio web pages. HTML5 was used to construct our system. HTML5 is the World Wide Web Consortium's final and complete fifth iteration of the HTML standard, which was published in October of 2014.

CSS3

Cascading Style Sheets (CSS) is a language for describing the appearance and formatting of a document written in a markup language. Since CSS was originally established in 1997, it has been a tool for Web developers to define the look and feel of their Web pages. For a Web site developer, it is a very strong and important tool. CSS is becoming decoupled from HTML and is now compatible with any XML-based markup language. After the separation of HTML and CSS to various contexts, it is easier to maintain sites, share style sheets, and tailor pages.

BOOTSTRAP

Bootstrap is a free and open-source library for building websites and online apps. Because it is utilised for typography, structure, buttons, navigation, and other interface components, it creates HTML and CSS-based design templates. The fundamental goal of Bootstrap is to make developing dynamic websites and web applications easier. Bootstrap was designed in such a way that it supports both HTML5 and CSS3. Unlike server-side code, which is deployed on the server, Bootstrap produces a user interface that is a front end framework.

2. BACK-END

CODEIGNITER FOR PHP

Code Igniter is a strong PHP framework for web developers who want a simple and well-tested toolkit to create full-featured online applications. It provides a comprehensive set of libraries for a variety of tasks, as well as a user-friendly interface and logical structure for accessing these libraries, allowing the developer to construct projects much more quickly than he could using these libraries alone, which is the major purpose. Code Ignite helps you focus on your project by reducing the amount of code you need to create it.

3. DATABASE

MYSQL

Oracle Corporation creates, distributes, and supports MySQL. It is the most extensively used and most popular open source SQL database management system. The Structured Query Language (SQL) is a programming language that is used to communicate with databases. According to the American National Standards Institute, it is a standard language for relational data management systems (ANSI).

A database is a collection of organised information. To add, access, delete, and process data in a computer database, a database management system is required.In a nutshell, MySQL is a database management system. System for managing databases Databases are structured in a relational manner. The

open source database server is quick, dependable, scalable, and simple to use. Client/server and embedded systems are both supported by the server. There is a large amount of software that has been contributed.

SCRIPT IN JAVA

The programming language JavaScript is used to construct web pages. It's an object-oriented language with first-class functions that's lightweight, prototype-based, and understandable. It's also known as the multi-paradigm scripting language for web pages. However, java script is present in many non-browser settings. It runs on the web sites' client side. It's used to specify how web pages handle the occurrence of an event. It is simple to learn and widely used to regulate the attitude of web pages.

JQUERY (JavaScript Framework)

jQuery is a JavaScript framework. The goal of jQuery is to make things a lot easier.

VIII.IMPLEMENTATION

LOGIN PAGE

This is the user interface that allows them to access the system. When the application loads, the user will be prompted to input their username and password, followed by a click on the login button

CREATE FILE INTERFACE

When a user logs in and clicks "Create File," the system displays this page. The name of the file, the file number, and the department where the file is created must all be filled out in order to complete the form. When a file is produced, it is instantly moved to the Virtual shelf, where it can be accessed by other users. Here you can see actions like "take file." When a user takes a file, it is saved in their "My Files" closet. Files can be taken from and released from the virtual shelf by an administrator or departmental user. The "My Files" page contains the feature of releasing files. For varied privileges, the "My files" page differs.

MESSAGING INTERFACE

This function is meant to be used for user communication. It's designed to work solely as an email client

LOG FILE

The file log is used to keep track of hardcopy files that have been sent to another user. This module can be used by a secretary who needs to document a transfer of hardcopy files, for example.

TRACKING OF FILES

This module aids in determining a file's location regardless of its geographical location. The system provides a website that allows you to keep track of your files. The user can track a file using either the file number or the date it was generated, as shown in the result of an example file being tracked.

ADMIN

Super users might be assigned assignments or tasks. Both super user and general user can be created or deleted by the administrator. The admin user can create a new super user and a general user, as well as delete the super user and general user. The assignment can also be given to the super user by the administrator.

SUPER USER

The assignment can be assigned to a regular user by the super user. The super user is assigned jobs by the admin user. General users can be assigned duties by the super user. Super users have the ability to add or remove assignments assigned to common users.

USER IN GENERAL

The details of the assignment assigned to him are visible to all users. After finishing the assignment, the ordinary user submits it online and updates its status.

IX.INPUT DESIGN AND OUTPUT DESIGN

INPUT DESIGN

The link between the information system and the user is the input design. It entails creating data preparation specifications and procedures, as well as the steps required to convert transaction data into a usable format for processing. This can be accomplished by inspecting the computer to read data from a written or printed document, or by having people key the data into the system directly. Limiting the amount of input required, controlling errors, avoiding delays, avoiding superfluous stages, and making the process simple are all goals of input design. The input is created in such a way that it gives security and convenience while maintaining privacy.

Input Design considered the following things:

I. What data should be given as input?
II. How the data should be arranged or coded?
III. The dialog to guide the operating personnel in providing input.
IV. Methods for preparing input validations and steps to follow when error occur.

OUTPUTDESIGN

A quality output is one that satisfies the end user's needs and shows information clearly. Any system's processing results are conveyed to users and other systems via outputs. It is decided how the information will be displaced for immediate use, as well as the hard copy output, in output design. It is the user's most essential and direct source of information. The system's relationship with the user is improved via efficient and intelligent output design.

1. Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.

2. Select methods for presenting information.

3. Create document, report, or other formats that contain information produced by the system.

The output form of an information system should accomplish one or more of the following objectives.
i. Convey information about past activities, current status or projections of the Future.
ii.Signal important events, opportunities, problems, or warnings.
iii.Trigger an action.
iv.Confirm an action.

X.CONCLUSION

Web Intelligence looks at how Artificial Intelligence can be applied to the next generation of Web-enabled systems. In this research, we suggest a Web-based intelligent tutoring system for computer programming that makes use of Bayesian networks, a well-known framework for managing uncertainty in AI. Our tutoring system is clever, unlike many traditional tutoring systems that aren't interactive or adaptive. Using traffic lights, it can assist a student in navigating the online course material.
When a certain topic is poorly understood, it can suggest learning objectives. Finally, if a learner wishes to study a certain concept without knowing all of the prior concepts, BITS can present the bare minimum of prerequisite knowledge required to comprehend the requested concept in the right learning sequence.
Our clever system has been constructed and will be utilised in the summer offering of CS110, the University of Regina's first computer programming course. Individual one-on-one tutoring is the most effective style of teaching and learning, according to empirical studies, and intelligent tutoring systems are the only technology that can implement computer-assisted one-on-one tutoring. The study presented here, in conjunction with, proves the practical utility of Bayesian networks in Web intelligence.

.

REFERENCES

[1] *Conati, C., Gertner, A., &Vanlehn, K. (2002). Using Bayesian networks to manage uncertainty in student modeling. User modeling and* user-adapted interaction, 12(4), 371--417.
[2] Elsom-Cook, M. (1993). Student modelling in intelligent tutoring systems. Artificial Intelligence Review.
[3] Gamboa, H., & Fred, A. (2002). Designing intelligent tutoring systems: a bayesian approach. Enterprise Information Systems III. Edited by J. Filipe, B. Sharp, and P. Miranda. Springer Verlag: New York, 146--152.
[4] Hall, P.S. Wood P.(1990) Intelligent Tutoring Systems: A review for beginners. Canadian Journal of Education Communication, 19(2), 107--123.
[5] Henze, Nicolas and Negill, Wolfgang. Student Modeling in an Active Dancing Environment using Bayesian Networks. University of Hannover, Hannover, Germany 1999
[6] Karen Stauffer, Student modelling and Web-based learning Systems, Athabasca University, March 22, 1996
[7] King, Rogel L. Classification of Student Modeling approaches for Intelligent Tutoring, Technical Report MSSU-COE-ERC-98-4, Engineering Research Centerfor Computational Field Simulation, Mississippi State University, Jan.98
[8] Ma, W., Adesope, O. O., Nesbit, J. C., & Liu, Q. (2014). Intelligent tutoring systems and learning outcomes: A meta-analysis. Journal of Educational Psychology, 106(4), 901.
[9] J. Beck, M. Stern, and E. Haugsjaa, "Applications of AI in education," ACM Crossroads, pp. 11-15, 1996
[10] B. Bloom, "The 2 sigma problem: The search for methods of group instruction as effective as one-toone tutoring," Educational Researcher, 13(6): pp. 4- 16, 1984.