

Automatize Content Personalization by Agents In Digital Learning of Java Course

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Abstract

Thinking style differs among all the students in the way they get knowledge, delineate ideas and deals in reality. In growing age of virtual learning it is very essential to provide personalized environment to students having different skills and mind-sets. This paper presents use of learning style and content navigation algorithm to provide content personalization. To check effectiveness of learning assessment test is provided and mining concept is applied on marks to give guidance for future study and for more personalized environment.

Index Terms: Content personalization, content navigation algorithm, multiple intelligence, thinking style

Introduction

All humans are living and working in a changing world. New technologies are coming on daily basis and humans want to make them comfortable to walk along with emerging trend. With the help of internet and wide availability of digital resources learning became one stop process. People surf net on regular basis to get new information.

Education evolves swiftly in the world and it is changing with time. Learning method, platform differs as technology differs. With a rapid evolution of internet, e-learning is becoming a new learning trend as it has no boundary with respect to space and time. But every coin has two sides. The white side contains large number of resources and choices and black side has lack of faculty interaction and low quality

resources [1]. Suppose if learner wants to learn new technology or subject but as because of so many options and choices available on internet confusion is obvious. Less guidance and suggestion gives doubt in learner's mind and target goal will be dissipated. Help is very important factor in any one's life. So to provide important help in learning process of student system should contain all the details of learner for decision making.

Research on learning shows, that learners have variety of ways for learning same concept and prefer different study materials. Understanding level is not same for all as it differs for each individual. Some learner can assimilate in a better way the knowledge received visually, auditory or through a certain sense [2]. At the time development of e-learning curriculum this fact should take into consideration to get good results and integration of different teaching strategy into the curriculum to meet requirement of all the learners [3].

Curriculum generation is directly depends on learning objects and its combination. Intelligent agent can allow us to adapt learning routes and different way of combination [4]. To provide highly personalized navigation learning navigation path algorithm is best suitable. All students are not equal and based on their level content should be provided. This gives automatic content generation and assessment technique which is far better than regular classroom. Antonio Garrido et al. motivate the educators to think about student's diversity and individuality existing in them. They focus on usability of intelligent planning in e-learning environment and its importance. They also solves limitation of previous work done in this area by using simple navigation algorithm as they were not dealing with learning standard to solve this problem [4].

Related Work

Several techniques have been proposed in literature for thinking style of learner and content personalization. In this section motivation behind this research and suitability of intelligent agent in digital learning environment is given. Recent researches show that intelligent agent is the best way to automate the system and to make it more comfortable personalization should be done.

According to J. Henno et al. [5] today students are very different from last five year's generation. Young people accept changes and new technology very easily and they used to do multitask and collaborative. They are constantly connected and use multiple devices for being connected as a result they are highly visual, experiential and time oriented. They conducted the study by storing and deploying the content in the cloud. Cloud can help e-learning financially as well for development. The current scenario of the students and their lifestyle as well as future of learning technology had been described by them.

Quinghua et al. [1] introduced learning navigation path algorithm to help learner. The algorithm is based on topological sorting and navigation is done by priority given to contents. Learning curriculum has more than one way to achieve goal and algorithm is giving solution for that also. The main limitation of this algorithm is it is

not giving content personalization to learners and system should ask learner about his knowledge also.

The answer for equal priority content is also given by different algorithm. Knowledge map plays a major role in navigation and it is a simple graph having no loop in it. So here system gives MCS of target knowledge unit and after that through secondary sort strategy system get whole navigation path in order to guide learners study well. It improves the learning efficiency of learners and speed is also at its peak.

Bouhnik Dan & Carmi Golan [6] conducted a research study about gaps which exist in the population of learners and to their various needs and to a better understanding of the factors which affect the affectivity of the studying and success rate of the student in e-learning environment. The connection between thinking styles, learning function and satisfaction of students participating in academic e-learning courses have examined and analysed by conducting multiple intelligence tests which is very much useful to identify learner's learning style and to provide best content material for better understanding.

Nidhipandey et al [7] have proposed algorithm for intelligent agents to automate the requirement gathering process and to give personalized virtual environment to learners. Limitation of this algorithm is it is not working on student's history or not considering past experience with student. The system has 3 agent adviser agent, personalization agent and content managing agent. All agents are interrelated so complexity and robustness is low. This paper is provided with very good algorithm to deal with new users but for existing users some improvement is required. Some have extended this intelligent agent concept so that agent can take into consideration previous experience of student which is stored in profile. Profile adaptation is very necessary to provide best user interface and proposed system is best for profile adaptation.

Proposed System

In this section we present proposed system with complete methodology with figures.

A. Personalization Agent

Main task of this agent is to provide personalized environment to each learner and for that it uses multiple intelligence concept given by Howard Gardner. This agent deals with students having different learning style and characteristics. So it gives different types of content to different students by identifying their level and mind-sets.

As shown in fig.1 with the help of three intelligent agent combination proposed system gives highly personalized environment to all kind of learners. Each agent has its own role and responsibility. The brief description for all agents is given below.

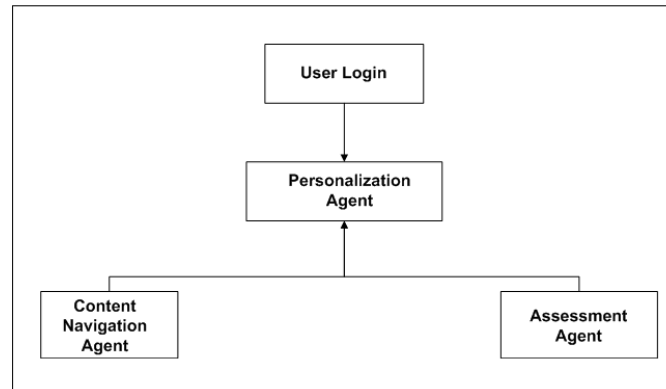


Figure 1: Abstract Model of Proposed System

As shown in fig.2 when user login agent will check whether agent is new or not. If agent login first time then agent will conduct multiple intelligence test to identify learning style and stores it for further sessions. If learner already given test then based on result different content is provided to student and assessment is done after learning content.

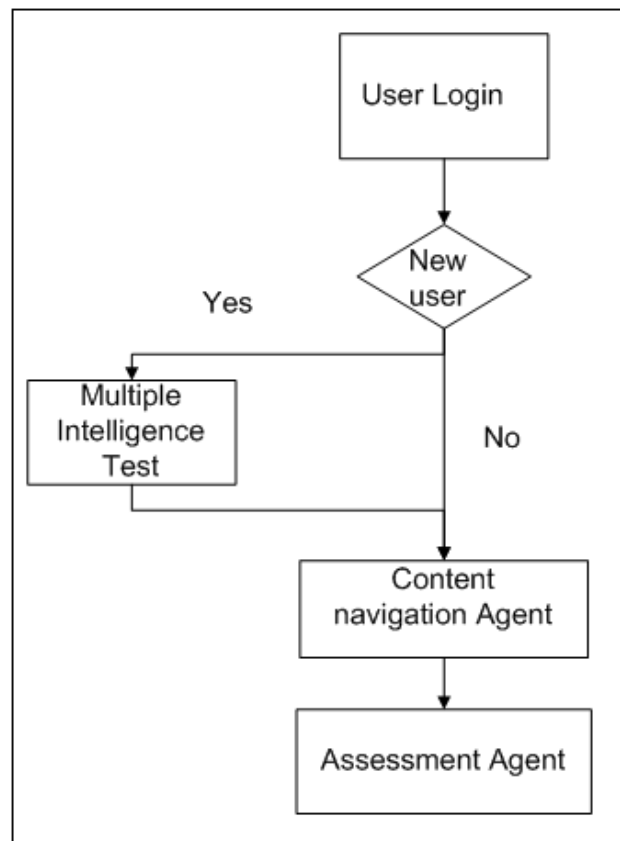


Figure 2: Working model of personalized agent

According to Howard Gardner's theory of Multiple Intelligences, there are basically nine types of intelligence available [8]. He has used nine different criteria to identify the learning styles. So the agent will search best suitable content for learner which should be matched with learning style of learner. As shown in figure.

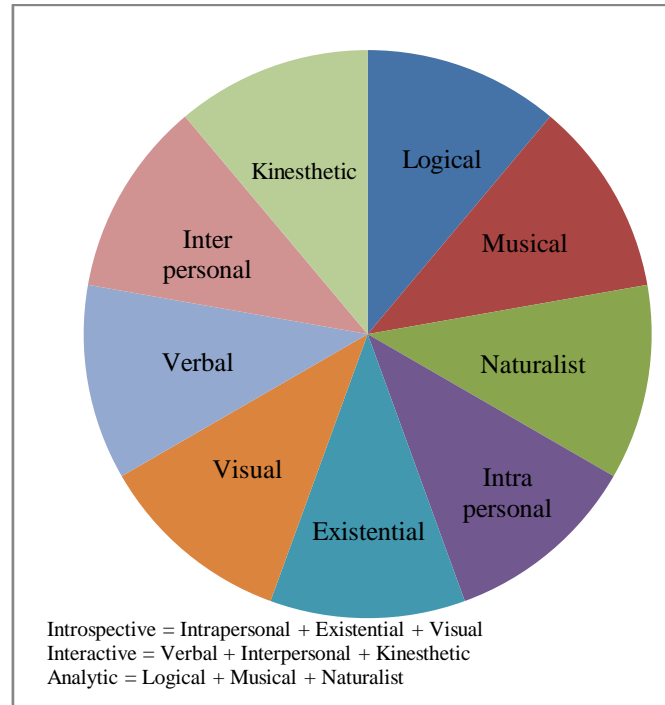


Figure 2: Multiple Intelligence to identify learning style

B. Content navigation agent

This agent is mainly for combining learning objects to make easy going path for learner and giving different experience to each learner. Each path is different for each student based on his/her knowledge and learning style. If student is already familiar about basic concept then directly learner will directed to next portion without any instructions. This is done by navigation algorithm which takes care for previously known content and level of understanding based on past experience.

As shown in fig 3 students can directly take test also if they want and after test suggestion will be provided for improvement. Content agent navigate course from start to end by taking continuous care about learner's learning experience.

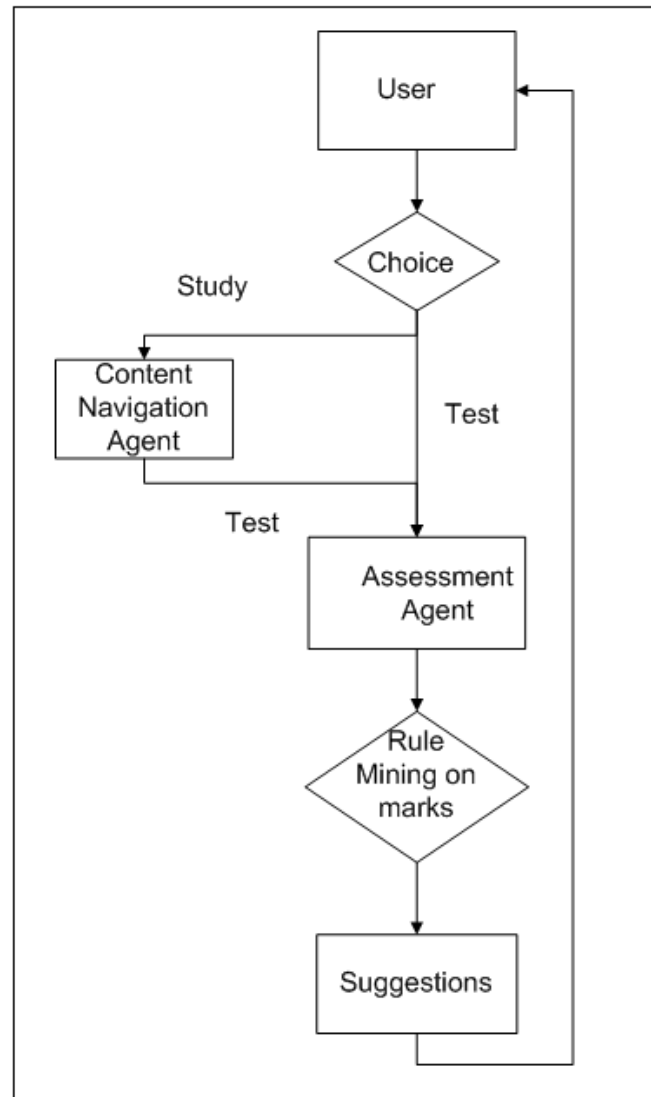


Figure 3: Model of Content Navigation Agent

C. Assessment agent

Assessment agent assess performance of student by conducting test for concepts which are already known by learner and store marks of all test in repository for future reference. With the help of mining concept assessment agent can mine knowledge about in which subject student is good or poor. After gaining knowledge about student's knowledge related suggestion and content will be displayed for further study.

Using different clustering technique class performance and group of student in which he belongs can also identify. For doing this basically two approaches used. One uses standard defined marks to identify students level and other one is relative grade method. At last agent will ask for feedback to student and based on that necessary dynamic changes will be done in system for better user interface and learning.

Implementation

At present the work of all three agents is completed individually. Personalization agent identifies and suggests best suitable learning style for each student by is conducting multiple intelligence test.

Options	userid	naturalistic	musical	logical	existential	interpersonal	kinesthetic	verbal	intrapersonal	visual
6	8	7	5	9	10	2	5	6	7	
1	5	6	5	8	9	7	1	2	3	
10	10	9	4	0	10	0	3	9	5	
2	2	4	5	7	10	9	0	1	2	
3	10	8	10	5	2	7	6	3	2	

Figure 4: Database table showing decision making of personalized agent based on marks

As shown in above figure based on marks obtained by each student agent will identify learning style and give input to content navigation agent. Content navigation agent will guide the student throughout his/her learning and suggest path they should take with specific content type. As given in fig. 5 content navigation agent provides video content taken from internet directly for topic in which students needs to improve them. For analytical skill student different text format and slides are given with suggested path for navigation.

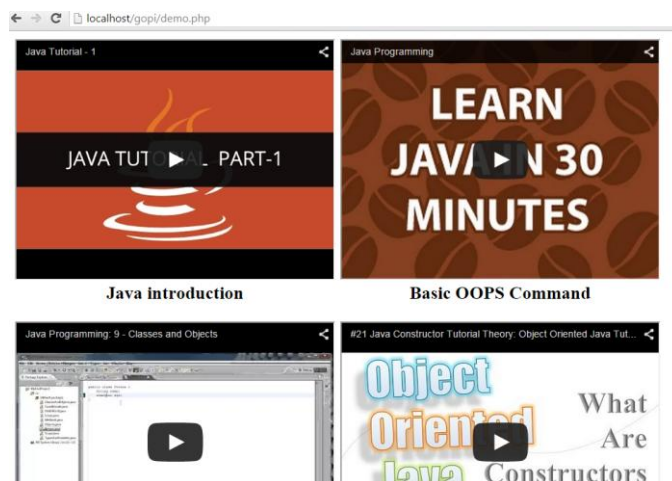


Figure 5: Video content for interactive or introspective styled learner with different suggested topic by content navigation agent

Assessment agent conducts different test for different topics learned by student and analyzed marks and suggesting topics which needs more attention and providing analyzed result to content navigation agent for better results in forth coming session.

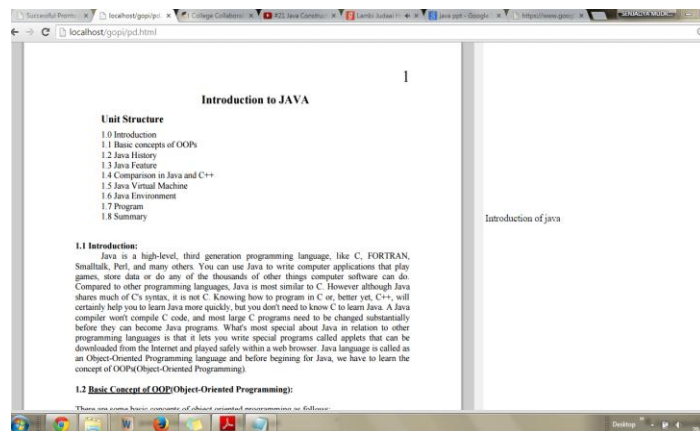


Figure 6: Textbook and readable content for analytical styled learner with different suggested topic by content navigation agent

Limitation of System and Future Scope

As Robert et al. [3] provides important relation between reading style and impact on digital environment as by given in paper reader speed is 25% less in virtual reading compared to book reading so timer should be implemented to identify reading speed. By seeing reading speed it is easy to predict whether user is understands the concept or not. So if speed is slow then more content should be provided to clear all the doubts regarding that topic.

As J. Henno et al. [5] shows that future of e-learning is in cloud as today students are very different from last five year's generation of them. Young people accept changes and new technology very easily and they used to do multitask and collaborative. They are constantly connected and use multiple devices for being connected as a result they are highly visual, experiential and time oriented. The researcher conducted his study by storing and deploying the content in the cloud. Cloud can help e-learning financially as well for development. The current scenario of the students and their lifestyle shows that future of learning technology will be in cloud. So agent should be adaptable to work with cloud storage.

Agent should understand career objectives of student in learning as well priority of topic for future study also. All three agents are inter-dependent so complexity level is more and robustness is low in future good testing strategy should be developed. Performance measurement should be defined and strictly followed by agent in future perspectives. Some students are not so digital environment friendly so special care should be taken by agent and guidance for system usability should be given. Dynamic knowledge map generation is also one problem needs attention for automation in map generation by agent.

Conclusion

This proposed system is useful to all the kind of students and especially for new comers in any specific area. As system will guide student in all the way the lack of faculty in online or in electrical media can fulfill by this system and new level of success can be achieved by student. Digital virtual learning environment will achieve new level of intelligence and also flexibility and convenience can be improved for all students. This system is helpful for weak students by suggesting them in which subject they are lacking and for smart learners by simply giving them navigation of the content which they need to follow. This system tried best to take place of faculty and make learning as simple as classroom learning for all kind of students and makes environment more personal for digital learning.

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