

Self-Learning and Assessment Platform

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Abstract - With time E-Learning is flourishing widespread and exponentially. Enabling E-Learning in organisation or practising at home not only allows learners from all over globe to advance their learning but also reduce organisational time and cost to make a mass learn through training session. In my paper I discuss about a learning platform where authenticated users can study recommended course material and further in order to pass through self-selected course they have to go through regular step wise evaluation. Model named SLAP provides self-learning and assessment platform to its authorised E-Learners.

Keywords - *Recommender System, content based, collaborative filtering, ITS.*

1. Introduction

E-Learning is a mean of education that is not only self-motivating, communicative but also an efficient technology among various learners of same area of interest and without any interference of physical teacher. E-Learning not only eliminates boundaries and distance but it is also affordable, save time, provide flexibility thus being dynamic in nature provide result and reviews. As web is not a small sphere with limited content thus it is an issue for E-Learners to distinguish their concern out of all available content. This filtration is simplified by following concept of "Recommender System". Recommender system help in filtering as E-Learner identify content of its interest out of the mesh of all available throughout the web.

1.1 organisation of paper

While going through paper, in section 2 we will be introduced to Recommender system followed by architecture of system in section 3. In section 4 we will have basic introduction of Intelligent tutoring System and finally section 5 includes my work of self-learning and assessment platform (SLAP).

2. Recommender System

There is in all huge content available over web that can be transmitted all over the side of the globe through a network between the user's system and central dynamic repository. The central dynamic repository is so huge that often it become difficult for users to exactly reach to their concerned content, this flaw is much reduced by concept of "Recommender system".

"Recommender System" is a filtering concept that enables its users to cut short their search as search engine of recommender system will itself sort the content out of the bulk and display to its users as a "suggestion". These suggestions are built on the basis of details provided by users. Details may be over platform of area of interest, level of expertness or peer advisory suggestions.

As per [1] Recommender systems can be classified as:

- Content based: Based on user's past preferences and transaction history done till last access time suggestions are made.
- Collaborative filtering: Simplest and original implementation of this technique by [2] segregates item with users and other users of same taste and like. In this technique, no machine auto generated suggestions are provided to users instead a group having same likeness or dis likeness for material will suggest content to each other. No doubt person will accepts suggestions of its own friend prior to auto generated suggestions but the content which was not introduced to anyone in a group would be ever hidden. Thus probability of accessing newly introduced content is very low.
- Demographic: Often suggestions are made on the criteria of age, gender or location. Suggestions made on platform of such a demographic environment are rare to be seen and thus this field is least researched till now.
- Community based: It is best explained by saying, "Tell me who your friends are, and I will tell you who you are" [3, 4]. It is type of getting suggestions from friends [3,4] or contacts and mutual friends or contacts. One prioritises suggestion from known instead of from some unknown source. The sense of reliability is more in community based mechanism of Recommender system.
- Hybrid Recommender system: As no single technique is completely adequate to make successful suggestions to all its users of varying interest and behaviour thus a blend is preferred to provide suggestions. A blend that correcting flaws of single technique using advancement of some other technique.

3. System Architecture

A technique of providing suggestion to learner of some specific category is not as simple as it seems to hear. E-Learners, virtual teachers and massive repository containing course material have to work all together and dynamically in order to be successful in functioning. E-tutors design a curriculum of knowledge in sense it maintain a repository of all course material that can be provided to a student while its online learning and also contain rating done to course material by all learners of the domain. As a learner request to access online course material, following any of technique (collaborative filtering or content based etc.) smart recommendations will be made to the learners. Module updating learners learning and assessment is dynamically maintained under observation of “virtual teacher”.

Also repository is updated regularly so as crawler, sense maker and garbage collector work to its maximum advantage. Crawler helps in navigation of course material to course material in case some common link is attached to multiple course material as and when if required. Sense maker relates the material of similar content it may be on basis of pattern followed by learner during its past access or by its level of expatiation (novice, intermediate or an expert). Outdated or not worthy course materials are removed by garbage collector so that repository in all does not become bulky unnecessarily.

Tiffany et al. [5] proposed an architecture referring working of their proposed system as below.

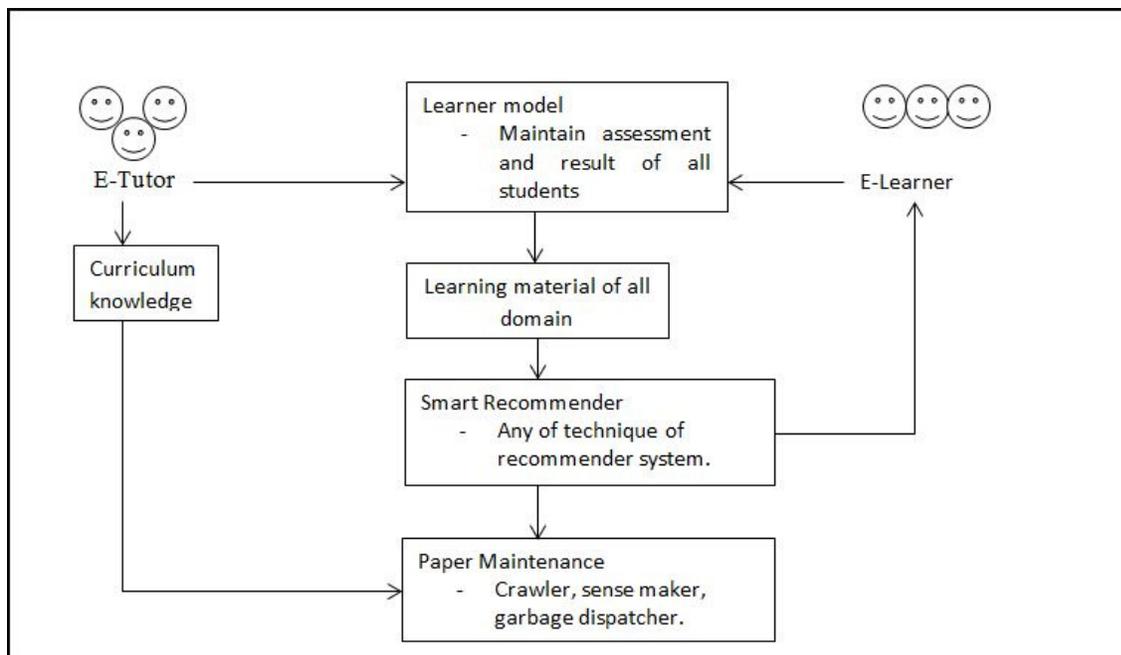


Fig. 1 Architecture of Recommender System [5]

3.1 Example of Recommender System

[5] Well explained functioning of Recommender System with a simple running example as follows. Suppose three learners L1, L2 and L3. L1 and L2 belong to same learning domain but of different location and varying access time similarly L3 also access at different time and he is from different learning domain.

As if L1 go through course material of web mining, Recommender System will record its area of interest and will provide with more suggestion under same subject at same time Recommender System will record traversing pattern of L1 that it's avoiding highly technical level or knowledge of course. Thus Recommender System

will conclude L1 to be novice with basic knowledge. Thus, Recommender System will put it under category of novice learner, web mining and thus will show paper A, paper B and paper C to L1.

L2 who logged in later to L1 with same category of learning-novice and web mining as area of interest but with added paper D and paper E in addition to paper accessed by L1 with same categorisation earlier. Consider L3 to be technically sound and advanced learner of same course material – web mining thus L3 belongs to category of advanced learner of web mining thus Recommender System will show different suggestive material for L3- paper P, paper Q, paper R, paper S, paper T.

This shows that all learners although belongs to same course material domain yet different material is recommended to all, depending upon their level of knowledge.

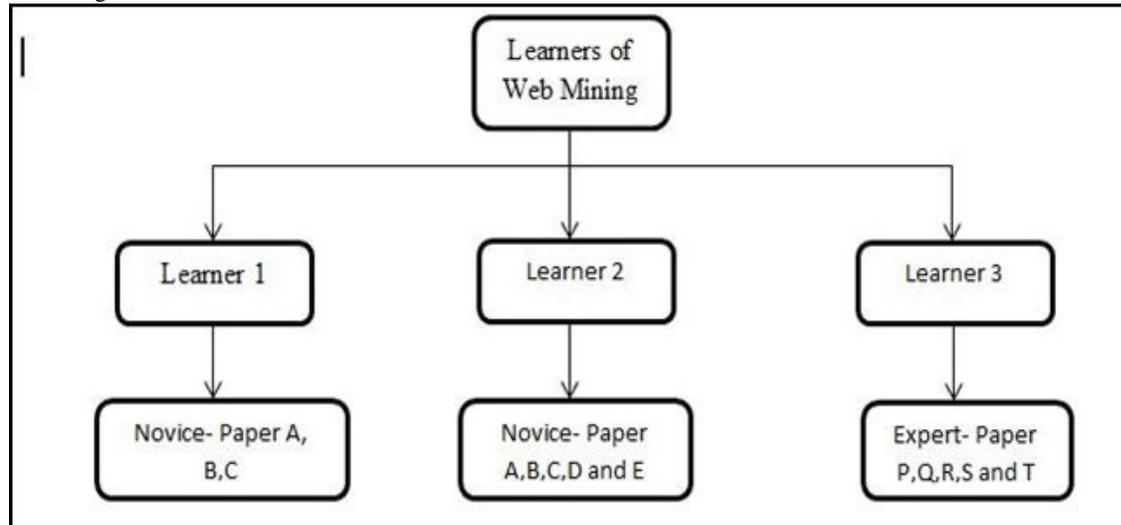


Fig. 2 Example showing recommendations to different users.

4. Intelligent tutoring System (ITS)

It is a technical platform that enables learners to customize its learning pattern and courses d per its individual ability. An intelligent tutoring system (ITS) is a computer system that aims to provide immediate and customized instruction or feedback to learner, [6] that too without any interference of physical teachers. Using various techniques, ITS provides an effective manner for E-Learners to learn in such a vast domain of knowledge. The main objective behind concept of ITS is that the E-Learners learn maximum by customising their own study schedule of their own interest and favours.

ITS is not only about selecting one's liking subject and course material instead its expanded by added functionality of "POST and GET". Student can post their doubts, queries, suggestions or questions which will be later replied by ether other students of same domain or by "hidden teachers". For example three ITS projects [7] based on conversational are "Auto Tutor" – answer queries regarding computer technologies [7], "Atlas"- refer to quantitative problems [7] and "Why2"- refer to answer about quality of physical systemand "Andes"- provide hints [7] and accept feedbacks as student stuck at some instance. Intelligent tutoring system consist of four basic components to integrate all together and be a concise model namely "The domain model", "The student model", "The tutoring model" and "The user interface model". All components are self-described here below [8,9,10,11, 12]. The domain Model- It is an inventory including all related solution, hints and clues as possible steps to solve any problem.

More specifically, this model "contains the concepts, rules, and problem-solving strategies of the domain to be learned. It can fulfil several Roles: as a source of expert knowledge, a standard for evaluating the student's performance or for detecting errors etc." [13]. The Student Model- As process of learning goes on this model updates an every instant. It keeps record of student from initiative stage of username, password and area of interest till its last traversing phase. If any students stuck at some instant and take help (from domain model, as it have all steps to solve every problem) a "flag" is raised saying an error has made by student while his learning. The Tutor Model- Upon accepting knowledge from domain model and student model, it will decide teaching pattern that had to be followed for solving any problem where so ever students stuck. This decision of moving on further is based on learner's current location in student model. The user interface Component- It reassures that student has reached right result along with correct reason or explanation. Such reacting to student action and work is responsibility of user interface component.

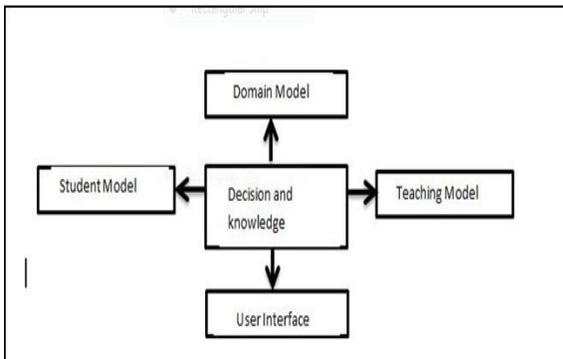


Fig. 3 Component of Intelligent Tutoring System

Remarkable achievement of ITS is providing feedbacks, customize course selection and hints and clues but on other hand its expensive both to develop or to implement. A high portion of that cost is a result of content component building. [14].

5. SLAP

Based on concept of intelligent tutoring system, my work is in the direction of building a platform enabling student over web to learn their own preferable course content. By using a computer system at their own end and an internet connection is all that required by an E-Learner.

A model named SLAP (Self learning and assessment platform) enables its authorised E-Learners to access course material stored in repository under various domains. Working of SLAP begins with registration of E-Learners with their course of interest though a unique username and a password. Once a student is enrolled for any of course, multiple suggestions regarding course content will be listed for every student according to its level of expatriation. SLAP has an added feature of rating along with display of recommended course material, so student according to its preferable liking can undergo for reading a course material for its own and get himself ready for unit-wise test to jump to next unit and finally to finish its selected course student has to achieve minimum passing grades. Failing at any point while learning chapter either student can take help from “hint and clues” option provided or may post its question and queries which will be later responded by members of same domain. As names says its medium though which student itself plan its study cycle and work in similar fashion as he or shelikes and assessment of his or her work is done gradually to keep a check over work.

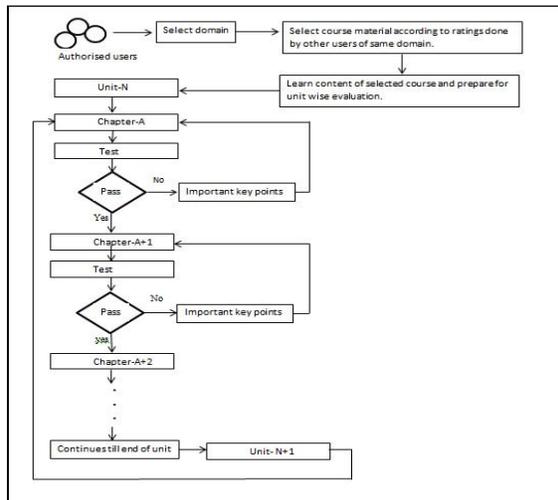


Fig. 4 Architecture of workflow of proposed model (SLAP)

Features like recommendation of course material along with rating by all users under same domain, unit wise test, hints and clues, suggestions and quizzes makes SLAP more interactive and likely to use.

Architecture of workflow proposed model is below.

6. Conclusion and Future Scope

Proposed model “SLAP” enables users of domain to select the course content as displayed by search engine of Recommender system as per details of user’s profile. User has to complete a course by reading content and pass it with at least minimum passing marks. Student can select course content out of multiple content depending on rating done by other users of same domain. In proposed system SLAP rating is done in critical manner. In order to prevent integrity a single authorised user is allowed to rate single content of certain course only once. In order to rate some other content under same course, user has to un-rate it’s previous selection. This provides more accurate and reliable recommendation to authorised users.

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