ABSTRACT

Believing the fact that modern means of learning systems can act as catalyst to elevate the quality of education. Hence, the e-learning system guarantee not only the delivery of learning objects but also maintains a high standard with the desired learning output. Since e-learning system is focusing on an approach which is learner centric still the major problem with the current e-learning system is the approach of one-size-fits-all that does not allow catering the individual learner interests and requirements. As a result, personalization of content, courses and other educational objects has become an essential issue in e-learning system as the basic users of the system are the learners with an almost different style of learning, background, capabilities, interests and the personality.

Most of the times learners would come across a condition where it is difficult to choose the courses to learn and to decide more appropriate ones for self interest. The set-up of having numerous choices in course selection is perhaps a good thing but for a student it is hard and time consuming to stride through each of the courses and it's associated the information. The knowledge in the domain of computer science is huge and also disseminated that makes it difficult for humans to expertise it, and as far as stability and quality is concerned, the pedagogical context of the domain is not clear. Even if institutes will employ counsellors, but the majority of the learners will not be pleased by the echelon of knowledge the possessed by the counsellors. In such conditions, Recommendation System (RS) is the only way out that can help a learner to choose suitable courses by recognising the learner’s domain of interest and then by searching the appropriate courses to make them available for a learner. Based on the concept of personalization and to support the activities that are learner-centric a hybrid recommender system is proposed to maximize the learning experience of a learner because the course selection will have a direct influence on the learner’s performance.
Personalization can enhance the learning quality by recommending the courses which are otherwise go unobserved by the learners. RS support its users in retrieving and accessing the items of interest either by checking the user preferences, demography, history or query provided by the user. Personalization, in the past decade, has gained a lot of attention because of the problems associated with the information overload.

In recent years, various recommendation approaches in e-learning systems have been developed using modern computational methodologies with the aim of personalizing the learner related activities. But most of these approaches suffer from a cold start, rating, sparsity, new user, new item and overspecialisation problem. Hence there is a definite need for developing an effective recommender system that provides better and accurate suggestions resulting in the development of hybrid recommendation system that overcomes the drawbacks of existing systems and minimizes learner’s efforts.

The research study provides an insight of the underlying algorithms which finds the latest applications in the area of recommendation systems. A framework is propounded for generating course recommendations, similar learners and course and learner ontology. The Sem-gram based recommendation technique is well-equipped with some essential abilities of retrieving the learning resources by matching the key terms accurately. The proposed algorithm can also handle the important issue concerned with the ambiguity and the imperfection of the query words, and then suitable query transformation will help to retrieve more valid and related information. The results suggest that the performance of the hybrid technique is much enhanced as compared to other individual algorithms in retrieving the course information for the recommendation.

The research work made four research contributions. First, the domain Ontology for Computer Science was developed using a clearly defined Architectural Methodology (AM), and Learner Ontology (LO) was captured so that learners can be analyzed graphically. Second, the query based recommendation approach (Sem-gram) was studied to provide personalized courses to the learners by mitigating the complex issue with query word ordering and
disambiguation. Third, the Threshold Based Nearest Neighbourhood (TBNN) technique is used to generate similar learners for a targeted learner. Fourth, the external constructs were studied to reveal the feasibility and effectiveness of the proposed system for facilitating better technology acceptance from the users with the help of modified Technology Acceptance Model (TAM).

In precise, proposed research work proposed a rational solution to the issue of personalization and provided an insight of how to deal with the challenges of traditional approaches using simple yet effective recommender framework. The Sem-gram, Ontology and TBNN methodology is a semantic way to approach the personalization by finding the semantic connotation of query words, searching semantic course information in domain ontology, and generating similar learners from the knowledge base for a target learner and display it to the user. The study also evaluates the user acceptance of RS using different constructs. The ontology development and the algorithms have been tested having a standard test bed as a benchmark, and also a comparative study is furnished. The results from the experimental research have also shown a considerable improvement in enhancing the recommendations provided to a learner.

**Keywords:** E-learning, Higher Education, Ontology, Recommender System, Educational Data Mining, Internet Technologies, Higher education.