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Semantic Web Based Recommendation System for Efficient Learning

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Abstract: The challenge of the Semantic web technologies in the e-Learning domain can be identified with the arrangement of personalized encounters for the users. Especially, these applications can think about the individual necessities and prerequisites of learners. In this study, we propose a model for personalized e-Learning based on domain and aggregate usage profiles. The advantages of using this model, it presents an intelligent recommendation agent for personalized e-Learning course browsing. The main aim to use the technologies of semantics is to index information from various user's usage and by providing with suggestions/recommendations based on the tracking data in one personalized search page.

Key words: Semantic web, e-Learning, personalized learning, ontologies, recommendations

INTRODUCTION

In recent trend the new data/information and communication technology, it's not just conceivable to study utilizing locally accessible technical support. The e-Learning is an aspect of abstracted learning where tutoring materials are get hold of through electronic media and where students and lecturers can reach out electronically (chat rooms, Wiki) (Shrivastava *et al*., 2012). Adaptive e-Learning is subjected for selecting materials that are utilized for learning as indicated by students style, interest, profile, goal, current and previous knowledge level (Khemaja, 2014; Hammami *et al*., 2012).

In fact, it is considered as a standout amongst the most critical means for sharing and conveying data and services. In the meantime, this data volume causes numerous issues that identify with the increasing difficulty of finding, sorting out and keeping up the required data by clients. All these have influenced incredibly the way electronic applications are composed and executed and e-Learning frameworks couldn't involve an exception (Jing and Quan 2008; Walia *et al*., 2015).

Moreover, in the majority of prior e-Learning frameworks, the instructive materials and courses are exhibited complicated structuring or too much static presentation. Also, therefore might not react adequately to the necessities furthermore the skills of the learners, bringing about the poor acquaintance.

For the most part, the learners pick or choose the navigational path which in turn allowed by hyperlinked course materials and the substance designers or website designers (who have a particular navigational illustration previously in mind) provide a dictated structure which can be not truly utilized.

This open door may demonstrate a blocking component since much of the time learners don't have the fundamental/key development and expertise to take a successful way and it could be expected as frequently that they ponder/contemplate over around topics that is either excessively/unnecessarily troublesome, excessively basic or essentially immaterial, making it impossible to individual adapting needs.

Moreover, semantic web is used to add a layer of intelligence to the model. Semantic web ends up being one most exceptionally appropriate platform to develop e-Learning. Ontology which implies the meta-information or information are associated in-between, propelling people attributes of information and to guide them to be more precise about information, the set of facts which in turn make them better in e-Learning environment (Jing and Quan 2008; Melishte, 2014).

Semantic web is the augmentation for web, it gives a measures through world wide web consortium. The benchmarks which it gives advance regular information formats and protocols exchange on the web. Generally on a very basic level can be the Resource Description Framework (RDF) (Ghaleb *et al*., 2006).

Semantic web provides facilitate solutions by consolidating various technologies such as Resource Description Framework (RDF), Extensible Markup Language (XML) and Ontology Web Language (OWL) which are used keeping in mind the end goal to give depictions that can replace documents of the Web contents (Berners, 2000).With the assistant of the

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ontology the explicitly dispersed concepts of any domain coeval on the web can relate among themselves and come up with unanimous answers which offers not only syntax but semantics as well.

In this study, we discuss how semantic web can be included in e-Learning technology to enable precise recommendations for people to access data anywhere and anytime. Semantic web can be applied in various areas. This can be made in two folds, first by collecting the materials and organizing semi-automatic annotation for materials used for e-Learning. And secondly annotation, with the metadata help, we can define the annotation-ontology knowledge base for docs and clustered can be used for hierarchy concepts coming under it.

MATERIALS AND METHODS

Semantic web and customized learning: There are many obstacles while exploring required web benefits by client mainly because of the increase in web services and not involving semantic components in current web benefit technologies. Mainly because of this web needs system that is smart which may be invoked by semantic web. Whereas in complex adaptive e-Learning system affirms complexity and whose members are lively, adaptive and active agents. The researchers outline a method in which the functions of system can be enlarged to personalize the concealed CAS system to individual users which makes machines automatically observe web services according to the requirements of a user (Jing and Quan, 2008).

The e-Learning points to learning which is enabled or delivered via electronic technology. Learning is a comminative activity that various for each individual. Personalization concept is a method of tailoring pages individual characteristic user's or preferences. The e-Learning contribute set of functionalities such as learning materials, learning plans, test and needed instant messages, etc. (Jamuna *et al*., 2009).

User-based and content-based techniques are included in traditional approaches for personalization (Dai and Mobasher, 2004). Suggestion are produced on similarity content to the personal profile of the users, whereas the other one focus on similarities to other users (Mobasher *et al*., 2003).The main drawback may concern the trouble to catch semantic learning of the application domain, i.e., connections among various concepts, inheritance associated with those concepts or other rules.

An intelligent recommendation system based on semantic is used to recommend suggestion based on user's interest. Helps the user's to learn and understand on a particular domain in an effective way. To guide the learner in understanding and learning on a specific domain, a subject network which is used in order to get the subject relationship that exist among the subjects. Network of subjects will be represented in a list which in turn will be used for learning order. The proposed model by Paryudi (2011) needs the user's query for processing. User's interest provided by the user data. This data is used to locate subject network for an individual user. This model does not crawl through the learning materials on web. But instead, searches for previous learning materials that are downloaded at a database.

In study by Jamuna *et al*. (2009) presents an approach personalization e-Learning that is based on ontology and data exchange based on service oriented architecture. Which in turn enhances process of learning by contributing to personalized learning content to the learner in a dynamic intelligent way. The approach is based on SOA and ontology. The use of this feature facilitate information extraction, information retrieval, information interpreting, information representing and finally information maintaining in an effective intelligent way.

RESULTS AND DISCUSSION

Implementation: Semantic web based recommendation system for efficient learning. In our plot for auxiliary recommendation e-Learning, the information structure and metadata assume a decisive part. This system recognizes the online personalization segments and the disconnected errands of usage mining, information arrangement and ontology creation. The related content management for a specific lesson or course easily helps in structuring by the proposed architecture based on ontology concept. Moreover, aggregate usage profiles and the field area ontology are used for personalization framework.

The introduced ontology-based management assist the architecture along with content managing with respect to time spent on the related browser. Specifically, the model for recommendation is based on ontology creation and utilization of profile usage data.

Starting with pre-handling undertakings which result in an aggregate configuration, for example, useful files from the client exchange/transaction. In this model, we focus on association rules identifications, utilizing Apriori Algorithm. The model uses client log documents which outlines client navigation movement (Fig. 1).

Essentially, the documents incorporate all the data identified with the e-Learning usage. In this stage, the philosophy should be made to site documents/records. It desires descriptive information/data framework keeping in

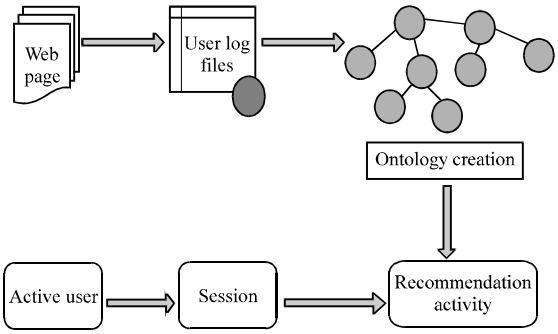

Fig. 1: The proposed recommendation model for e-Learning system

mind the request to choose which get to page record subsidize to a one browser dash and all the more accurately which content coincide to client's demand.

Algorithm:

Inputs: Active session (user session), i.e., window size maximum m
Minsp threshold σ.
Mincn threshold α.

Association rules and frequent item sets.
Ontology of domain
Set of recommendation s = Ø.
Potential set of Suggestion su = Ø.
Potential set of Suggestion su rendering to ontology su = {su1,s u2, su3, ……, suk}.

The pre-processing tasks illustrated above results in the following outcome: m pageviews, V= {v1, v2, v3……., vm}
and, with individual page view uniquely identified by URL associated with it and as an outcome of: n user transaction, T={t1, …….., tn} (Markellou et al. 2005).

Having the transaction set T, the association rules for mining problem is to generate rules of association that may confidence α, support σ greater than peculiar minimum confidence (called mincn) and minimum support (called minsp), respectively (Agrawal and Srikant, 1994).

Apriori is enforced to a transaction to discover associations rule set. The apriori algorithm fundamentally discovers item bunches that are regularly happening every now and again together in more transactions. Those items are known as the set of frequent item (Fig. 2).

For guaranteeing successful proposal/suggestion, we join presence ontology content with client navigation path knowledge. We will utilize the late data with a specific end goal to derive the way that the student will take in the idea. Proposals/suggestions are made to clients in regards to the ontology relations.

The depiction of the ontology is to settle on which learning materials are most appropriate as for the client and properly to late regular item sets (client way route) which choice have a maximum support. As it concerns to online part, the framework monitors the dynamic client session which delineates the later past client's decisions. As indicated by his present stage, a recommendation tracker prescribes clients the following more fitting link. This web engine accepts dynamic client session furthermore takes into scrutiny the ontology for the particular field area and the arrangement of association standards which originated from customer exchanges amid the online and as well as the disconnected part.

In particular, the recommendations is based on the following base: the extracted association rule files, these files consist of the rules which are created during the user's transaction. The trackers' part is to consider a suggestion set which comprises of connections with pages that the client might need to visit. This fundamentally addresses a brief point of view of possibly accommodating connections in light of the client's navigational action through the site. Prior to that page is sent to the client browser these prescribed connections are added to the uttermost page got by the client in the session. By utilizing a window tracker over the present element session, we can get the present client's history significance.

Next, we will figure the potential suggestion set using the ontology of the field area. We will likely find suggestion/recommendation set according to the field area followed by the ontology. These sets are then filtered through item sets that are visited frequently and found amid the preprocessing phase. Recurring itemsets basically delineates the learning that turns out from navigational movement of various clients who act for the most part with the present client.

This system recognizes the disconnected errands of information arrangement, usage mining, ontology creation and the online personalization parts. Beginning with the disconnected portion, the advance processing assignments proceed in cumulative structures, for example a client navigation document figuring important semantic units of client action to be utilized as a part of the mining phase. Given the advance processed information an assortment of information mining undertakings can be made. In this approach, the attention is on the disclosure of association guidelines, utilizing apriori algorithm.

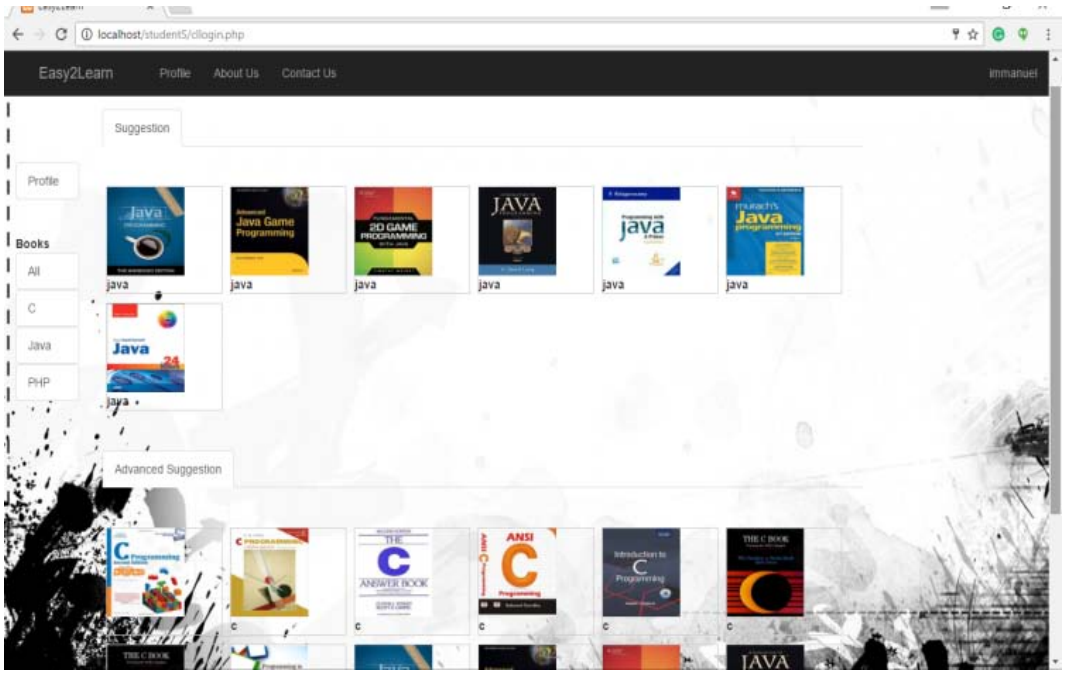

Fig. 2: A snapshot of the proposed system

CONCLUSION

The proposed scenario firmly conceives that blend of ontology domain's and itemsets frequent occurrence which includes the data about client's state of mind navigational path, upgrades the procedure all in all and techniques for unrivaled recommendations. The model system above all else finds an underlying arrangement of recommendation and enrich it by successive itemsets, taking into consideration user's navigation furthermore other client's navigational activity. Along these lines, it decreases the time spent on parsing all regular itemsets and standards of the affiliation (association). The principle center is only on those sets that result from a mix of dynamic client session and recommendations of ontologies.

Reduction of time arises mainly because of the fact that frequent item sets are refined through recommendations of ontology set results in reduced searching space. A limitation of approach chronicles to that the tracker engine won't for the most part give the best results due to straight dependence followed from a specific domain. Moreover, the ontology created portrays the way that the domain e-Learning should be taught to the students. Besides in view of the possibility of the designer/architect. On the off chance that the ontology isn't correct, then the initial set of proposals/suggestions would be a long way from the domain area in which clients learn and this scheme cannot change that. This approach does not reckon any new recommendations or proposals at an underlying arrangement of recommendations. It just backtracks and excludes items.

RECOMMENDATIONS

Future work will concentrate on further tries with different distinctive blends of the framework's functionalities and an assessment of the proffered/proposed approach concerning learning reinforcement.

REFERENCES

Agrawal, R. and R. Srikant, 1994. Fast algorithms for mining association rules in large databases. Proceedings of the 20th International Conference on Very Large Data Bases, September 12-15, 1994, San Francisco, USA., pp: 487-499.

Berners-Lee, T., 2000. What the semantic web can represent.http://www.w3.org/DesignIssues/RDFnot.html.

Dai, H. and B. Mobasher, 2004. Integrating Semantic Knowledge with Web Usage Mining for Personalization. In: Web Mining: Applications and Techniques, Scime, A. (Ed.). Idea Group Publishing, Hershey, Pennsylvania, pp: 276-306.

Ghaleb, F., S. Daoud, A. Hasna, J.M. ALJa'am and S.A. El-Seoud et al., 2006. E-learning model based on semantic web technology. Intl. J. Comput. Inf. Sci., 4: 63-71.

Hammami, S., S. Qassem and A.S. Muhaideb, 2012. Adaptive E-learning using the semantic web: A comparative survey. Intl. J. Inf. Commun. Technol. Res., 2: 366-372.

Jamuna, R.S., M.S. Ashok and K. Palanivel, 2009. Adaptive content for personalized E-learning using web service and semantic web. Proceedings of the International Conference on Intelligent Agent and Multi-Agent Systems (IAMA09), July 22-24, 2009, IEEE, Puducherry, India, ISBN:978-1-4244-4710-7, pp: 1-4.

Jing, C. and L. Quan, 2008. A complex adaptive E-learning model based on semantic web services. Proceedings of the International Symposium on Knowledge Acquisition and Modeling (KAM'08), December 21-22, 2008, IEEE, Wuhan, China, ISBN:978-0-7695-3488-6, pp: 555-559.

Khemaja, M., 2014. Using semantic web services technology for simulating collaborative learning activities: An approach based on ITSs and e-learning standards extension. Proceedings of the International Symposium on Computers in Education (SIIE), November 12-14, 2014, IEEE, Tunisia, North Africa, ISBN:978-1-4799-4428-6, pp: 145-150.

Markellou, P., I. Mousourouli, S. Spiros and A. Tsakalidis, 2005. Using semantic web mining technologies for personalized E-learning experiences. Proc. Web Based Edu., 1: 461-826.

Melishte, A., 2014. An approach of an intelligent semantic agent for personalized E-learning courses. MSc Thesis, Polytechnic University of Tirana, Tirana, Albania.

Mobasher, B., X. Jin and Y. Zhou, 2003. Semantically enhanced collaborative filtering on the web. Proceedings of the Conference on Web Mining: From Web to Semantic Web (EWMF), September 22, 2003, Springer, Cavtat, Croatia, pp: 57-76.

Paryudi, I., 2011. Proposed intelligent E-learning system using semantic web. Proceedings of the 2011 International Conference on Advanced Computer Science and Information System (ICACSIS), December 17-18, 2011, IEEE, New York, USA., ISBN:978-1-4577-1688-1, pp: 133-136.

Shrivastava, G., K. Sharma and A. Bawankan, 2012. A new framework semantic web technology based E-learning. Proceedings of the 2012 11th International Conference on Environment and Electrical Engineering (EEEIC), May 18-25, 2012, IEEE, Noida, India, ISBN:978-1-4577-1830-4, pp: 1017-1021.

Walia, A., N. Singhal and A.K. Sharma, 2015. A novel E-learning approach to add more cognition to semantic web. Proceedings of the 2015 IEEE International Conference on Computational Intelligence and Communication Technology (CICT), February 13-14, 2015, IEEE, Meerut, India, ISBN:978-1-4799-6023-1, pp: 13-17.