ACO in e-Learning: Headed For an Adaptive Knowledge Conduit Method

Ashok babu, Balaji kadiravan

PG Students, Department of Computer Science and Engineering,
PSG College of Technology, India.

Abstract— nowadays we are in an epoch where extreme advancements in networking and in sequence technology are in exploit. The learning progression has also in use these advancements, as an outcome of which e-learning came to the prospect. Personalization in e-learning will advance the presentation of the system. Topical researches are absorbed on providing adaptableness to the knowledge administration systems, depending upon the varying user needs and contexts. Adaptability can be provided at different levels .Providing an adaptive learning path according to the situation of the learners' is an imperative concern. An most advantageous adaptive learning path motivation help the learners in tumbling the cognitive overwork and incomprehension, and thereby improving the effectiveness of the Learning Management System (LMS). Ant Colony Optimization (ACO) is a broadly established practice since it provides an adaptive knowledge path to the learners. 3Meta-heuristic which is worn in intellectual tutoring systems provides the learning path in an adaptive approach. The most appealing attribute of ACO is its adaptation and toughness in surroundings where the learning equipment and learners are varying recurrently. In this paper we can have a look throughout the existing ACO approaches headed for providing an adaptive learning path and an introduction towards a superior attribute ant for construction the e-learning system more adaptive.

Keywords- Adaptive learning path; ACO; e-Learning

I. INTRODUCTION

In computer science and operation research, the **ant colony optimization** algorithm (**ACO**) is a probabilistic performance for solving computational tribulations which can be condensed to sentence superior paths throughout graphs. The conventional learning systems follows "one size fits all" move toward. Somewhere all the learners are provided with identical learning contented. But the learners'

Necessities and goals energetically revolutionize over time which can't be addressed by the conventional advance. The adaptive learning provides a substitute to the established approach, where learning substance can be provided energetically as per learner preferences and requirements. An e-learning system with the condition of adaptableness, will act as a fundamental teacher who is openhanded personality care to each apprentice. Provided that malleability is a conception which considers the apprentice distinctiveness such as his preferences, acquaintance levels, erudition style, interest, goal, learner presentation etc. Thus by allowing for such learner contexts and provided that the learning objects depending up on these contexts will appreciably progress the effectiveness of the e-learning. The alteration can be done at dissimilar levels such as arrangement level adjustment, Link level revision, contented level adaptation and adaptive learning path. In a web based erudition situation the enormous quantity of accessible knowledge objects will augment the cognitive overwork for the apprentice and it will lead towards incomprehension. These troubles can be trounced using an adaptive erudition path. Provided based on the customer circumstance. By means of an optimal learning path the erudition objects can be provided in a successful way for the beginner. With the intention of is each learner can be provided with an individualized knowledge objects depending upon their requests and contexts. Pronouncement out an optimal erudition path is an NP-hard predicament. Ant colony optimization plays a most important role in providing adaptive knowledge path. In addition ACO many other approaches are there in continuation for this prospectus sequencing predicament.

This paper is as follows: Deals with the accessible approaches for erudition path adaptation difficulty, elaborates the ACO for adaptive learning path and particulars the planned approach with conclusion.

II. OBTAINABLE APPROACHES FOR KNOWLEDGE PATH VARIATION

There exists a quantity of approaches, just before pronouncement out optimal knowledge path in an adaptive manner, this includes techniques based on

i. *Evolutionary Computation Approaches*

The Evolutionary Computation (EC) methods are extensively in use for verdict out the adaptive learning conduit. The EC methods used for adaptive learning path are confidential as social sequencing and individuality sequencing approaches. In the social sequencing move toward the choice of the optimal learning path is based on the combined path and presentation of the entire learners' civilization. The second come near is based on the individual apprentice to a certain extent than a group's distinguishing.

The main Techniques worn for social sequencing is Genetic Algorithm. For personality sequencing also GA is worn. Other EC techniques such as Mimetic Algorithm are largely used for individual sequencing. Constituent part Swarm Optimization is also used in personality sequencing. Surrounded by these, in the bearing of social sequencing ACO provides more adaptive and forceful explanation.

ii. *Other Approaches*

An additional approach is with a Learning path graph. A Learning Path Graph is an acyclic diagram which describes the configuration of domain acquaintance and the connected learning goals. It matches all the probable learning paths and goal in tender. Based on learner's attributes in the customer representation, a personalized knowledge path is preferred from the diagram that contains all the accessible knowledge paths. User model consist of beginner level of expertise and characteristics approximating learning style and preferences.

The complete courseware construction and core knowledge about a subject matter domain can be undoubtedly revealed using the graphical demonstration of ontology called perception map. Learning commotion graph is used to systematize learning resources in a knowledge task. Based on apprentice preferences and level of proficiency Learning Activity sequencing algorithm integrates the use of novice representation and learning movement diagram.

By using the clustering technique, the learners are grouped addicted to clusters according to their learning styles. A Self Organizing Map (SOM) neural network is worn for federation the learners and provided that path appropriate for the cluster in which the apprentice belongs. Bayesian probability theory is worn for pronouncement the adaptive learning conduit. At this time to begin with a node prospect table based on Bayesian outlook theory is fashioned. The prospect value is assigned based on the beginner level of proficiency, associate style and education pace, which are called aspirant learning paths. Subsequently a Bayesian network is constructed to compute prospect value which represents for each familiarity unit in knowledge path. An undeviating path is elected from this to provide a suitable learning path for a beginner. Petri Net based draw near is accessible in to make available adaptableness to the learning system.

III. ACO FOR ADAPTIVE KNOWLEDGE PATH

Ant Colony Optimization is a multitude intellect procedure which is stimulated from the foraging performance of the natural ant variety. It is inhabitants based universal search practice worn to locate out most favorable solutions for multifaceted combinatorial problems which is aggravated by the pheromone shadow laying performance of real ant colonies. In the authentic world circumstances the ants roam in investigate of food and upon sentence out the sources they lay chemicals called pheromones on the position all the way through to food foundation and back to case. This act as a stigmergy for extra ant's .This stigmergic action is worn for circumlocutory and local announcement. Consequently the further ants in the colony go behind the path where pheromone concentration is advanced. In attendance by to conclude next an optimized conduit. Larger than the laid pheromones will ultimately evaporates over instance, which will stay away from the junction to a locally most favorable resolution. There is a multiplicity of ant colony algorithms in subsistence which includes: Ant coordination, Elitist ant system, ANT-Q, Ant colony system, Max-Min ant system, Rank based ant system, ANTS, Hypercube AS etc.

In E-Learning, ACO is the majority used meta-heuristic for pronouncement out an adaptive as well as best possible learning path. The expected behavior of ants are replicated with the help out of a colony of reproduction ant agents .This agents will considerably work towards verdict out the adaptive learning path by means of the pheromone trails and heuristic in sequence. Depending upon the appointment of other ants throughout the path some trails may be shatterproof and others paths may be permissible to disappear. Both the investigation and development nature of ACO algorithms helps in pronouncement out the finest path. For illustration the discriminatory ant system is more explorative, i.e. the algorithms roughly permit to search during the explanation liberty. Whereas the max-min ant arrangement is more unequal in scenery i.e. the algorithm has the capability to search systematically in the confined vicinity where excellent solutions

encompass beforehand been found. For verdict out an adaptive knowledge path both these uniqueness are utilized. An appealing property of the ant colony classification probabilistic come near is that the personage learners can assistance from the cooperative activities of their peers. Next we can have a look at the accessible ant dependency approaches towards adaptive knowledge path.

An ant based arrangement for a preschool is accessible. This is considered to provide a mechanical smart system, devoid of manual involvement which could adapt according to varying users. This is attained by construct the structure individual detailed from the measured adjustment of knowledge path recommended by teachers. The site steering is made adaptive to customer according to the history of the system.

Depending in the lead the learning style, a pedagogical path for a beginner is provided. This takes the Kolb's learning style replica. At this time the e-learning configuration is represented by means of a graph with treasured arcs. The arc weights are optimized by fundamental ants (learners) which discharge essential pheromones beside their paths. The weights on the arcs imitate the probabilities to recommend succeeding nodes to learners.

An arrangement of Bayesian network and ant colony coordination for modified learning path is provided where the system considers the private needs such as language, capability, complication, understanding level etc. These considerations can facilitate the LMS to make available varying personalized paths to the identical goal (i.e.) learners with equivalent learning goal can be provided through different learning path. Here, to address the dilemma of learning together, shared filtering techniques are worn, while maintenance individual organize over their liberty, time, activity, presence, identity and connection. A Bayesian network is used to compute the fittingness feature of an arc.

An attribute based ant colony system (AACS) Considers the association among the learners attributes such as field acquaintance, learning style and learning object's (LO) attributes. The "attribute ant" planned in this paper combines the Kolb's learning style reproduction as well as learner's sphere familiarity level with learning substance attributes to make available an adaptive best possible commendation of the learning substance for the learners.

An enhanced ACO algorithm is formulated for addressing the difficulty of adapted commendation. It utilizes the downy acquaintance removal model. By discovering efficient learning paths from the folder all the way through ant colony model it extracts adapted suggestion acquaintance. To triumph over this, segmented-goal instruction and Meta search manage strategies are provided. Here they considered the learner characteristics such as learning style and learner capability. The Kolb's learning style reproduction is adopted. Proficiency is represented as a mathematical value. Coding the level of the learner's expertise in a certain concept of an explicit domain.

IV. PROPOSED APPROACH

i. Need for the proposed approach

Most of the obtainable ACO based approaches considers the knowledge style of the beginner. None of the accessible systems considers all the customer situation parameters. When more apprentice contexts are incorporated, then the effectiveness of the e-learning classification will be enhanced. Making an allowance for the beginner attributes and corresponding it with the erudition object's characteristic will help in provided that more appropriate learning article and thereby provided that the most apposite learning path for individualized learners.

ii. An 'enhanced attribute Ant' for providing adaptive learning path

The beginner attributes like learning style and learner preceding acquaintance level and identical these attributes with corresponding knowledge object attributes will help in humanizing the stipulation of appropriate knowledge substance. But both the wisdom style and learner knowledge level are motionless distinguishing of a beginner. There survive other characteristic for a beginner which may enthusiastically transform over time such as learner predilection. Learner preference of a learner may modify over changeable sessions of learning progression. So considering beginner preference along with the above mentioned learner attributes will progress the presentation of the system by provided that most suitable learning entity in a energetic approach.

For this the probable system believe the subsequent learner parameters and contest that with the equivalent LO attributes .A match allowance is provided as the heuristic in sequence for the attribute ant (i.e.) the planned system enhances the characteristic ant with an further apprentice attribute 'learner preference' and LO attributes' 'learning

entity orientation'. The detailed explanation of the apprentice attributes and information object attributes. Corresponding is done by comparing the equivalent attributes such as knowledge style with LO type, awareness level with LO Level and apprentice preference with LO direction and the match allowance is premeditated which is used as the heuristic value given to the ant colony coordination.

V. CONCLUSION

The knowledge object attributes beside with the beginner individuality, will improve the provision of most suitable learning objects. For improving the degree of adaptableness, the learner characteristics such as dynamic learner preference is added along with static learning style and learner knowledge level. The adaptive learning provides a substitute to the conventional move toward, where learning substance can be provided energetically as per learner preferences and desires. Provided that an adaptive learning path is an advance towards construction the online knowledge with passion adaptive. A most favorable adaptive learning path can diminish the cognitive overload as well as perplexity for the learners. Ant Colony Optimization is a probabilistic approach which is widely used to provide the adaptive learning path. For this an enhanced characteristic ant is planned, which combines the Kolb's knowledge style model, apprentice knowledge level and learner predilection with learning objective attributes. Thus by considering mutually static and dynamic attribute of the learner alongside with the erudition object attributes will construct the learning system supplementary adaptive to the learners in a personality comportment.

REFERENCES

1. Pushpa. M, ACO in e-Learning: Towards an adaptive learning path, International Journal on Computer Science and Engineering, Vol. 4 No. 03 March 2012.

2. Brusilovsky, P., Adaptive hypermedia. In Alfread Kobas (Ed.), User modeling and user adapted interaction. Ten year anniversary issue (Vol. 11, pp. 87–110), 2001.

3. Jeroen J. G. van Merriënboer Paul Ayres Research on Cognitive Load Theory and Its Design Implications for E-Learning. ETR&D, Vol. 53, No. 3, 2005, pp. 5–13 ISSN 1042–1629

4. Jin-Cherng Lin; Kuo-Chiang Wu; Finding a Fitting Learning Path in E-learning for Juvenile; Seventh IEEE International Conference on Advanced Learning Technologies, 2007.

5. Kwasnicka, H, Szul, D, Markowska-Kaczmar, U, Myszkowski, P.B.; Learning Assistant - Personalizing Learning Paths in e- Learning Environments; Computer Information Systems and Industrial Management Applications, 2008.

6. Lopes RS, Fernandes MA, Adaptative instructional planning using workflow and genetic algorithms. In: Proceedings of the eighth IEEE/ACIS international conference on computer and information science, pp 87–92, 2009.

7. Samia A, Mostafa B Re-use of resources for adapted formation to the learner. In: Proceedings of the international symposium on computational intelligence and intelligent informatics (ISCIII), pp 213–217, 2007.

8. Feng-Hsu Wang, Personalized Recommendation for Web-based Learning Based on Ant Colony Optimization with Segmented-goal and Meta-Control Strategies; 2011 IEEE International Conference on Fuzzy Systems June 27-30, 2011.

9. Halina Kwasnicka, Dorota Szul, Urzula Markowska-Kaczmar, Pawel B, Myszkowski. "Learning Assistant – Personalizing learning paths in relearning environments."7th Computer Information Systems and Industrial Management Applications. IEEE, 2008.