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Discover Learning Path for Group Users: A Profile-based Approach[☆]

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Abstract

With the explosion of knowledge and information in the big data era, learning new things efficiently is of crucial significance. Despite recent development of e-learning techniques which have broken the temporal and spatial barriers for learners, it is still very difficult to meet the requirement of efficient learning, as the key issues involve not only searching for learning resources but also identification of learning paths. People from diverse backgrounds, in most cases, also need to work as a group to acquire new knowledge or skills and complete certain tasks. As these tasks are normally assigned with time constraints, employment of e-learning systems may be the optimal approach. In this research, we study the issue of identifying a suitable learning path for a group of learners rather than a single learner in an e-learning environment. Particularly, a profile-based framework for the discovery of group learning paths is proposed by taking various learning-related factors into consideration. We also conduct experiments on real learners to validate the effectiveness of the proposed approach.

Keywords: Group modeling, user profile, learning path, e-learning, collaborative learning

1. Introduction

In the big data era, 2.5 quintillion bytes of data are being produced every day [42], placing a call for efficient learning in the context of explosively increasing amount of knowledge and information. Although recent development of e-learning techniques has broken the temporal and spatial barriers for learners, enabling them to access learning resources via smart phones, PDAs or laptops anywhere and anytime, the requirement of efficient learning has not been met satisfactorily, as the key issue relates not only to the identification of learning resources but also the discovery of suitable paths for learning. In most cases, learners with a variety of expertise need to work together as a group on certain tasks, e.g., make a business plan, write a survey report or propose a research project. In addition, to complete a group task, group members are usually required to learn new knowledge and skills. As these tasks are normally assigned with time constraints, the use of e-learning systems may be an optimal approach.

In response to the need of identifying effective learning paths for a group of learners rather than a single learner in e-learning environments, we conduct the present research. Specifically, we propose a profile-based framework to discover group learning paths that assist group members to learn a new topic of knowledge efficiently and effectively. Our research objective,

from the perspective of efficiency, is to enable each group member to achieve his or her intended learning outcomes through the assigned learning paths within a limited period of time; from the perspective of effectiveness, the research objective is to ensure that the union of knowledge learnt by each member is sufficient for the whole team to complete the group task.

Consider a realistic task as an example: a group of 3 to 5 students with different academic majors is asked to write a report on the topic “Enterprise Resource Planning System in Sony” within two weeks so as to fulfill the requirement of a Massive Open Online Course (MOOC) they take together. In this context, the group members may decide to analyze the topic from different disciplinary perspectives, each of whom contributes his/her disciplinary expertise; and the final report would be a combination of their efforts. This being the case, it is time-consuming and unnecessary for every group member to learn all aspects of knowledge on the topic. As long as the combination of all group members’ knowledge is adequate for the whole team to complete the task, there is no need for each member to develop a thorough understanding of the entire task which involves aspects irrelevant to his or her major.

The key issue here, therefore, is how to make use of the background knowledge of each group member and identify an effective and efficient group learning path for the whole team. Also, it is useful to take into account the learning preferences of each group member if adequate time is given, thereby maximizing learning enjoyment. Specifically, the following characteristics of a group are taken into consideration.

- **Knowledge Diversity.** Members of a group often have

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