

Internship Offer - Master Level: Computer Science, Artificial Intelligence, E-Education

Supporting Self-Regulation Learning Using Dynamic Bayesian Networks

Abstract. Self-regulation is a well-established concept for which we already know different learning strategies, including cognitive strategies (reviewing courses, organizing information, memorizing), metacognitive strategies (self-assessment, planning) and strategies for seeking additional information (using documentary resources, asking others for help) [1]. Many recent studies agree on the relevance of Self-Regulated Learning (SRL), and point out the need for more empirical analysis of learner's activities. One of the main objectives of such research is to reduce the number of drop out students, to enhance learners' motivation and increase learning success [2],[3].

This project aims to design and develop a modeling approach based on Dynamic Bayesian Networks (DBN), to provide students with SRL features and foster their autonomy. DBNs are used in different domains in decision making [4]. At the intersection between Knowledge representation and Machine Learning in Artificial Intelligence (AI), both the structure and the conditional dependencies of a DBN, can be learned using a variety of possible algorithms or specified by hand [4],[5].

This approach will be implemented as an extension of an existing online platform developed by [France-IOI](#). France IOI has developed a small LMS (Learning Management System) which is used to organize large scale online contests, such as Castor Informatique France (700 000 participants in 2019) and the Algorea programming contest (220 000 participants in 2020). The LMS also includes learning tracks on programming basics and other related topics, dedicated to students starting from the 4th grade. A typical learning track is composed of interactive programming exercises sequences, along with small courses or videos and quizzes. Many of the exercises are composed of several versions (up to 4) of increased difficulties. Students who solve the hardest versions are awarded with the highest scores. Based on students' interactions with the learning platform, and embedded SRL features, such as perceptions of progress, the designed approach will help student to:

- define specific goals, plan and monitor their activities, and make decisions.
- select strategies, based on the set of available exercises, and their difficulty levels.
- monitor their activities as effectively as possible, to optimize their learning with a high level of autonomy.

Keywords. Dynamic Bayesian Network (DBN), Student Modelling, Artificial Intelligence, Self-Regulation Learning (SRL)

References

1. Zimmerman B. & Martinez-Pons M : Development of a structured interview for assessing student use of self-regulated learning strategies. *American educational research journal*, vol. 23, n° 4, p. 614-628 (1986).
2. De Barba, P., Kennedy, G.E., Ainley, M.: The role of students' motivation and participation in predicting performance in a mooc. *Journal of Computer Assisted Learning* 32(3), 218-231 (2016).

3. Riel, J., Lawless, K.A.: Developments in mooc technologies and participation since 2012. In: Encyclopedia of Information Science and Technology, Fourth Edition, pp. 7888-7897. IGI Global (2018)
4. Alpaydin, E.: Introduction to machine learning. MIT press (2020)
5. Murphy, K. P. (2012). *Machine learning: a probabilistic perspective*. MIT press.

Candidate Profile

The candidate should be a master 2 level student in Computer Science, with a good or basic knowledge in Data Science and JavaScript API.

Knowledge in Bayesian Networks and Probabilistic are desirable but not mandatory.

Interest for research in Artificial Intelligence and E-Education (AIED) is appreciated.

This Master Internship can lead to a 3-year thesis starting from September 2021 under the ANR program.

Location. IMT Atlantique, Lab-STICC Laboratory, Technopôle Brest-Iroise CS 29 238 Brest. France

Duration. 5-6 months from the beginning of February, 2021

Contacts

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