Dynamic Case-Based Reasoning Based on the Multi-Agent Systems: Individualized Follow-Up of Learners in Distance Learning

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Outline

1. E-learning and Intelligent Tutoring System
2. Learners Drop-out
3. Our Contribution
4. Conclusion and Perspectives
E-learning: A Definition (European Commission)

"The use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration”
[europa, 2012]

E-learning a Necessity in Today’s Society

- Learners remote from each other
- A lack of trainers or training rooms
- Many learners training in a short span of time
- Students can follow the training at other universities without leaving their country
- Lower costs of training
- ...

...
Intelligent Tutoring System: Definition and Architecture

Intelligent Tutoring System

ITS are computer systems designed for supporting and improving learning together with teaching process in the domain knowledge.
The Limits of E-learning Platform

- The e-learning platform does not allow an individualized learner follow-up;
- They are specific to learning object;
- Learner sociological isolation;
- The loss of motivation and autonomy of the learner;
- ...
The learners drop-out rate is very high:

- 1996: The rates of learners who left their training, increased from 30 to 80%, [Bourdages, 1996]
- 2001: According to [Gauthier, 2001], the drop-out rate was over 50% as an average
- 2008: The drop-out rates passed from 20 to 70%, [Audet, 2008]
- 2011: According to [usamvcluj, 2012], The drop-out rate for Distance learning Bachelor study, 2010-2011 academic year was over 20% as an average.
ITS: our Goals

- To initiate learning and provide a individualized learner monitoring
- To react according to learner’s profile
- To predict and reduce the number of drop-out

⇒ Collaboration between virtual and human tutors
Case-Based Reasoning Systems

**Definition**

Case-Based Reasoning is an artificial intelligence methodology which aims at solving new problems based on past experience or the solutions of similar previous problems in the available memory [Kolodner, 1993].

**Case definition**

A case is represented by the formalized description of an episode, and the proposed solution to the episode.

**We distinguish the source case and target case**

The solved problems are called source cases and are stored in a database. The problem to be solved is stored as a new case and is called target case.
Components of a Case-Based Reasoning Systems
Categories of Applications in Case-Based Reasoning Systems

Applications dealing with situations known as ”static”
- In this approach, the problem must be completely described before the research begins in the case base
- Example systems: CHEF [Hammond, 1986] and CREEK [Aamodt, 2004]

Applications with dynamic situations
- They differ when we compare them to static cases by the fact that they deal with temporal target cases (the situation)
- Example: REBECAS [Rougegrez, 1998], CASEP2 [Zehraoui, 2004] and S-MAS [Cristian Pinzón et al., 2011].
The CBR which we propose offer important features:
(1) It is dynamic;
(2) It is incremental: For the same target case, the trace evolves in a dynamic way.
Multi-Agent Dynamic Case Based Reasoning

Diagram showing the process of Multi-Agent Dynamic Case Based Reasoning, including layers for Factual Agents, Clustering Agents, Interpretation Agents, and Decision Agents. The process involves retrieving, presenting, retaining, revising, and validating solutions, with traces leading to learner profiles.
Learner Traces

The traces contain:
- History
- Interactions chronology
- Productions left by the learner during his/her apprenticeship
- We formalize the learner traces through the concept of semantic feature

Semantic Features

A semantic feature is a description of an object with a set of couples (qualification, value).

Example

(Patrick, (IP Address, 192.168.1.1), (exercise, 2), (time, 5pm))
Conclusion and perspectives

Intelligent tutor based on:
- MAS multilayer
- Trace / learner profile
- Kernel portability MAS (JADE)

Work in progress:
- Implementing a new similarity measure in interpretation layer
- Developing the decision layer
Thank you for your attention!
Bibliography


Bibliography


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Bibliography

