Overview

CHAPTER 6 –Understanding Current Learner Modeling Approaches

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1 Introduction

- Challenges and design recommendations for GIFT based on a current **perspective of learner modeling tools and methods**.
- Learner model would also be flexible.
- Realistically, such a model does not exist among current learner modeling research.

2 Current State of Learner Modeling Research

Learner models are built for different purposes:

- Recognizing solutions paths
- Evaluating problem-solving abilities
- Describing constraints for violations made by the learner

2 Current State of Learner Modeling Research

Current techniques of generating learner models include :

- Bayesian networks
- Belief networks
- Case-based reasoning
- Expectation maximization

2 Current State of Learner Modeling Research

The content within learner models is usually categorized in two components:

- Domain-specific
- Domain-independent information

2 Current State of Learner Modeling Research

First-generation ITS implementations primarily adapted instruction based on learner performance and current state of knowledge domain-specific information.

Lacked any strategic, diagnostic, or predictive capabilities.

2 Current State of Learner Modeling Research

Primary sub-research areas of current learner modeling include, but are not limited to:

- Learner state classifications
- Cognitive modeling
- Affect modeling
- The impact of individual differences
- Behavioral and physiological sensing performance assessments

2 Current State of Learner Modeling Research

As the demand for higher adaptation and flexibility of learner models increases, so does **the necessity to understand** the interrelationship between all aspects of learner modeling content and assessment accuracy.

Within the past 10 years, learner model research has extended to **consider a broader range of learner characteristics** as difficulty in addressing learner’s knowledge gaps has become more apparent.

2 Current State of Learner Modeling Research

the learner modeling research community continues to help address this two-part question:

- *What aspects of the learner should be modeled*
- *How can we achieve the best possible levels of state and performance classification and predictive accuracy?*

2 Current State of Learner Modeling Research

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2 Current State of Learner Modeling Research

2.1.Affective-Behavioral-Cognitve (ABC) Learner Modeling

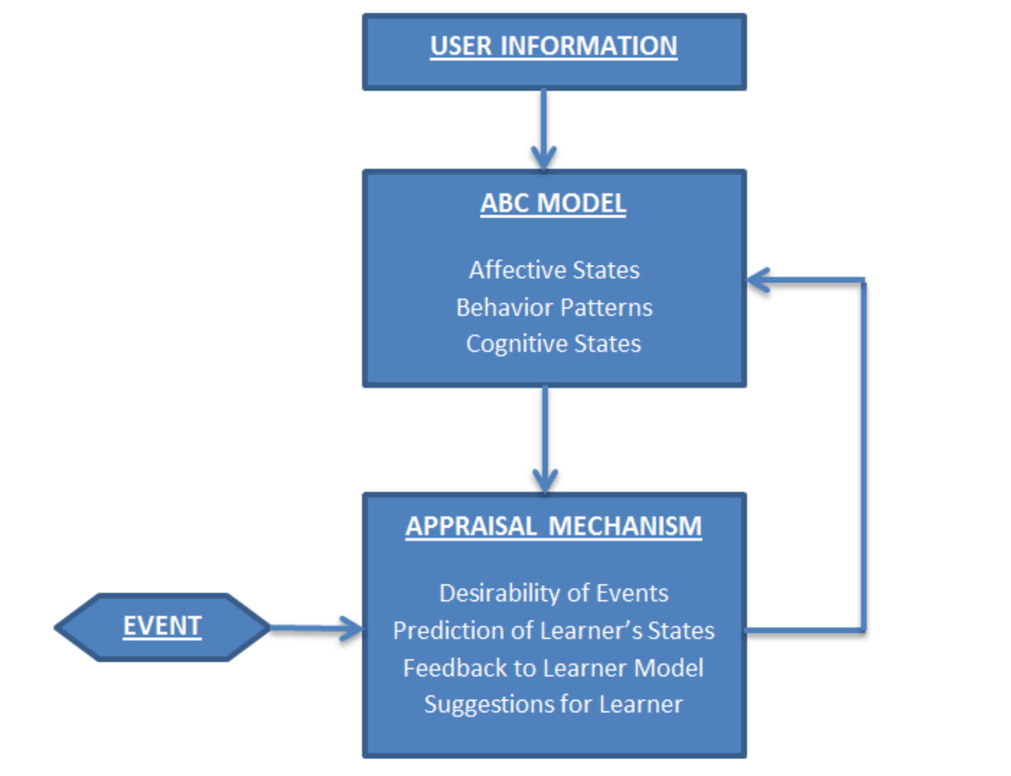

Figure1 The ABC Model

2 Current State of Learner Modeling Research

2.2. The Need for Empirical Evaluation of Learner Model Elements

Highlight issues with the lack of standardization on the structure of learner models and modeling techniques as it inhibits the validation and reusability of learner model elements.

Such factors include:

learner’s expertise, skills, attitudes, perceptions, and self-efficacy

2 Current State of Learner Modeling Research

2.3. On the Use of Learner Micromodels as Partial Solutions to Complex Problems in a Multi-agent, Conversation-based Intelligent Tutoring System

a general-purpose system will at some point employ an open, multiagent architecture . Some of these agents will perform simple tasks , while others will take on more complex ones.

2 Current State of Learner Modeling Research

2.4. Learner Models in the Large-Scale Cognitive Modeling Initiative

introduces the LSCM initiative and explains how learner models are represented and used in the systems developing in its scope.

3 Recommendations for GIFT's Immediate Direction

After reading these chapters, we can see that the lack of consensus and standardization for developing learner models.

Each of the chapters within this section provided recommendations for GIFT in regards to its learner modeling approaches. In sum, they are as follows:

3 Recommendations for GIFT's Immediate Direction

1.GIFT should consider incorporating the ABC model to observe learner performance over a period of time and to create affective and cognitive profiles which have threshold values and decay rates associated with the states in consideration.

3 Recommendations for GIFT's Immediate Direction

2.Future learner modeling researchers should consider using GIFT for their research since the system provides plans to have the ability to interchange and learner models and its elements.

3 Recommendations for GIFT's Immediate Direction

3.GIFT should consider adopting a common agent communication language (ACL) as the bases for a new generation of agent-based intelligent learning systems that are capable of autonomous cooperation.

3 Recommendations for GIFT's Immediate Direction

4.Integration of AFRL's LSCM/RML and ARL's GIFT would be an advantageous system