Dialogue in Tutoring Systems

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Readings


General Model:
Intelligent Tutoring Systems

User

Student Model

Pedagogical Module

Communication Module

Expert Module
Compare and Contrast

ITS
• Guidance to prevent student confusion
• Allow student control to support learning
  – System determines curriculum goals
• Make task challenging

DS
• Guidance to prevent user frustration
• Allow user control determine dialogue topic
  – User determines task
• Make task easy
To develop computer tutors that collaborate with students on tasks in simulated environments….

ITS Focus
• Focuses on computer tutors that adapt to individual students
  – Using target knowledge that student is expected to learn
  – Presumed state of the student’s current knowledge

DS Focus
• Focuses on computational models of human dialogue for collaborative tasks.
  – Linguistic structure groups dialogue history into a hierarchy of discourse
  – Attentional state represented by “focus stack” of discourse purposes
  – Intentional structure of “plan trees” represent system’s decisions based on preceding actions and utterances
To develop computer tutors that collaborate with students on tasks in simulated environments….

ITS Shortcomings
• Lacking general models of collaborative dialogue
• Simple heuristics determine dialogue content and intention
• Enable more sophisticated conversations
• Task reasoning capabilities

DS Shortcomings
• Lacking attention to tutorial issues
• System’s own priorities decide next action
To develop computer tutors that collaborate with students on tasks in simulated environments….

**ITS Wish List**

- Enable more sophisticated conversations
- Task reasoning capabilities

**DS Wish List**
To develop computer tutors that collaborate with students on tasks in simulated environments….

**ITS Wish List**
- Enable more sophisticated conversations
- Task reasoning capabilities

**DS Wish List**
- Enable assessment of user knowledge
Intelligent Tutoring Systems (ITS)

Simple heuristics determine dialogue content and intention

No dialogue construction mechanisms

Enable more sophisticated conversations

Dialog Systems (DS)

Simple dialogue parse determines user needs

No understanding of user knowledge

Enable assessment of user knowledge

Integration of ITS and DS
Intelligent Tutoring Systems (ITS)

Simple heuristics determine dialogue content and intention

No dialogue construction mechanisms

Enable more sophisticated conversations

Dialog Systems (DS)

Simple dialogue parse determines user needs

No understanding of user knowledge

Enable assessment of user knowledge

Integration of ITS and DS (Take the best of both systems!)
Tutorial Dialogue System

Both student and computer system speakers have goals and a plan to achieve it, and the other agent’s job is mainly to go along with the plan. (Reva Freedman, AAAI 1997)
General Model: Tutorial Dialog Systems

- Task-oriented Tutoring System (TOTS)
  - Infrastructure to support representations of procedural tasks.
  - Dynamic interleave of teaching and coached practice based on student model.

- Soar Training Expert for Virtual Environments (STEVE)
  - Tutorial dialogue focus.
  - Face-to-face intervention in a shared environment.

- Pedagogical Agent for Training (PAT)
  - Task-oriented, tutorial dialogue on the web.
  - More complete model of task-oriented dialogue.

- Pedagogical Agent for Collagen (PACO)
  - Build a computer tutor on top of a general model of task-oriented dialogue.
Modular Architecture: Tutorial Dialog System (Zinn et al. 2002)

Control

- Interpretation
- Update
- Response Generation

Information State

- Tutorial Strategies
- Curriculum
- Domain Knowledge
- Student Model