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24

Course Notes

Smart Animated Agents

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NEW ORLEANS
SIGGRAPH 2000

SMART ANIMATED AGENTS

SIGGRAPH 2000 Course #24

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Interactions with animated characters should be through the modalities that we share among real people such as language, gesture, and shared perceptions of the world. This course will explore several ways that real-time, animated, embodied characters can be given more human-like intelligence and communication skills so that they can act, react, make decisions, and take initiatives.

As real-time characters become almost commonplace, we begin to face the next challenge of making those characters interact with real people. Interactions with these characters should be through the modalities that we share among real people: especially, language, gesture, and shared perceptions of the world. This course will explore several ways that real-time, animated, embodied characters can be given more intelligence and communication skills so that they can act, react, make decisions, and take initiatives. Applications to collaborative groups, interactive training, and smarter games will be addressed.

Actions required for animated agents (faces, arms, legs, and eyes.) Knowledge and action representation. Commonsense and logical reasoning. Agent architectures. Learning. Smart conversations. Agents for pedagogical interaction. Managing multi-agent interactions. Language and gesture as control modalities.

Some experience with graphical modeling and animating human-like characters would be an asset, but not strictly essential.

Tentative course syllabus:

8:30 - 8:35 Badler (5 min.)

Welcome and Overview

8:35 - 10:00 Badler (85 min.)

Action Primitives
- Attribute Taxonomy for smart embodied agents
- Application Domains

Action Representation
- Parallel Transition Networks
- Parameterized Action Representation (PAR)

Agent Models
- Components
- Construction

Natural Language Interfaces
- Action dictionaries
- Standing Orders

Cognitive and Empirical Models of Behavior
- Visual Attention
- Agent manner via the EMOTE model
- Building PARs by demonstration

10:00 - 10:15 (break) (15 min.)

10:15 - 11:45 Cassell (90 min.)

Conversational Agents
What It Means to be "Smart" about Conversation
- conversation is composed of propositional & interactional smarts
- conversation is advanced by verbal and nonverbal means

How Humans are Smart about Conversation
- we pick up on very tiny cues in both speech and non-verbal channel

The Role of Conversational Smarts in Animated Agents
- Increased smoothness of interaction with humans

- Less disfluency
- Allows both system & human to take the initiative in the interaction

Agent Integration
- How to incorporate conversational smarts into agent architectures
- KQML frames for verbal & nonverbal, propositional & interactional data
- Maintaining verbal and non-verbal focus throughout the architecture
- Modeling social and goal-oriented behaviors
- Some examples of smart conversational agents

11:45 - 12:00 Questions and Issues

12:00 - 1:30 (lunch) (90 min.)

1:30 - 2:30 Punge (60 min.)

Introduction to Cognitive Modeling
Case Study 1: Prehistoric World
- Knowledge Representation
- Planning
- Goal-directed Behavior Specification

Case Study 2: Cinematography
Case Study 3: Undersea World
- System Architecture
- Uncertainty
- IVE Fluents

Conclusion

2:30 - 3:00 Rickel (30 min.)

Task-Oriented Collaboration
- Plan construction, revision and execution
- Plan recognition
- Task-oriented dialogue
- Teams

3:00 - 3:15 (break) (15 min.)

3:15 - 3:45 Rickel (continued) (30 min.)

3:45 - 4:45 Blumberg (60 min.)

Learning the Consequences of Behavior and Learning as Behavior
Why should characters learn?
What sorts of things should they learn?
How can they learn the things they should?
Using animal learning and training as a model
Types of learning: Context, Consequences, Control
What animals learn: consequences of action
Terms of the trade: Reinforcement, Behavior, Context
If it is so hard how do you train an animal to do anything?
The secrets of great animal trainers
- Event markers
- Shaping
- Behavior, then context
- Generalization
- Training for variability vs. consistency

Examples of computational learning inspired by learning in animals
Lessons and Caveats

4:45 - 5:00 Questions and Issues (15 min.)

Course presenter biographies.

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