INFO 550 (Grad AI) Term Project Proposal

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Project Title

“Simulating Personality, Scheduling, and Social Behaviors for Non-Player Characters (NPCs) within Video Game / Simulation Environments”

Description

In my opinion: one of the most fascinating Artificial Intelligence topics and immersive video game features are the implementation of Non-Player Characters (i.e. NPCs) which can express their own unique personalities, autonomously go about their lives via routine schedules and disruptions thereof, and form relationships with other NPCs and even human players. This is especially true for implementations supporting dynamic change: wherein each NPC’s personality traits, daily routines, and disposition towards other characters and objects in the world can evolve over time just as it does for humans. Beyond video games: these also encompass major topics for similar realizations in Virtual Assistants and Robotics (especially androids e.g. Data from Star Trek).

Personality Simulation encompasses the implementation of Emotions, Attitudes, and Preferences for NPCs based on their Needs, Goals, and Desires (roughly speaking); of which some are more dynamic than others WRT the progression of the world they live in. Schedule Simulation encompasses how a character 'goes about their day' in terms of the events and tasks of which they are compelled / decide to act upon at certain times therein; of which most are routine, others are variable, and all need to be dynamic WRT the state of the world and character. Social Simulation involves how NPC's interact with one another, form and grow relationships with each other and humans over time, and participate in the social dynamics of the societies within their world.

Deliverable

Having only gotten slight glimpses of how these features are realized throughout my studies: I will now take a long-awaited closer look into both the theory and implementation thereof. I plan to read the papers and articles listed below which discuss the data structures and algorithms composing the methods and techniques which implement such simulations; as well as case studies for realizations thereof via where and how these features were applied to video games and other simulations (i.e. Maxis 'The Sims', Bethesda Studios 'The Elder Scrolls IV: Oblivion', etc.) This plan thus encompasses Option #2 of the term project, for which a paper will be written.

I plan to partition my paper into 5 main parts, with 2-3 pages for each part. Part 1 will be an introduction to the topics and discussion therein. Parts 2, 3, and 4 will discuss Personality Simulation, Schedule Simulation, and Social Simulations for NPCs respectively. Part 5 will discuss my concluding remarks: wherein I hope that my research yields enough insight to speak about the near to far future potential of such simulations in the video games and virtual worlds of tomorrow. Can we implement the realism, accuracy, interactivity, and subsequent immersion potential of the NPCs portrayed within the virtual worlds implemented by Star Trek’s Holodeck?

Current References

Papers

- "Needs-Based AI" (Robert Zubek)
- "Gameplay Design Patterns for Game Dialogues" (Brusk and Bjork)
- “General Lightweight Scheduling in Game Artificial Intelligence" (Trevor Adams et.al.)
- "Using Cyclic Scheduling to Generate Believable Behavior in Games" (Zhao and Szafron)
- "Simulation of the Dynamics of [NPC] Emotions and Social Relations in Games" (Magalie Ochs et.al.)
- “Applying Goal-Oriented Action Planning to Games” (Jeff Orkin)

Articles Via Game AI Pro Anthology [link]

- Volume 1, Chapter 36: "Breathing Life into Your Background Characters"
- Volume 1, Chapter 43: "An Architecture for Character-Rich Social Simulation"
- Volume 3, Chapter 09: “Overcoming Pitfalls in Behavior Tree Design”

Wikipedia Articles for basic Referential Info:

- Belief-Action-Desire Model
- Procedural Reasoning System
- Conceptual Graph (SOWA)
- Blackboard Design Pattern / Architecture