Project Proposal:

Modelling Game NPC's Using Deterministic Finite Automata

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The presence of non-player characters (NPC's) who behave believably in response to a player's actions, and sometimes the actions of other NPC's, is essential in many videogames. In order to behave realistically, a representation of an NPC must be able to respond based on both the action of the player, and other events which have happened in the game. Other events might include a change in time of day, attacks by the player against the NPC in the past, or a change in attributes of the player character. Using deterministic finite automata as a component of the NPC class, I plan to model a series of unique NPC's which respond believably to events within the game. Three possible NPC's to create are a basic enemy who patrols and attacks, a shopkeeper who may sell a player items depending on a number of factors, and a player companion who follows the player and may provide a variety of services.

Figure 1. A finite state machine for a basic enemy NPC.

Two potential problems with this approach are that the number of states and transitions will grow very quickly as the game becomes more complex, and that the states and transitions cannot be reused when creating another NPC although it may only need minor differences in behavior. To mitigate these concerns, I plan to devise a hierarchical arrangement for the state machines that make up my NPC's. This will hopefully allow for simplification of the states and transitions in each state machine, as well as the reuse of states and transitions between different NPC's.