Feeling the Ambiance: Using Smart Ambience to Increase Contextual Awareness in Game Agents

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ABSTRACT

The behaviour of non-player character game agents can be made more interesting and believable through the use of increased contextual awareness. In this paper, we present smart ambiance which allows information about the ambiance of an environment (determined by the environment itself, objects in the environment and recent events) to be used in agent plan generation. We demonstrate how this leads to contextually influenced action selection and, in turn, more interesting and believable character behaviour.

1. INTRODUCTION

In many commercial games non-player characters act the same regardless of their context. For example, in Fallout 3 (fallout.bethsoft.com) a village populated with friendly townsfolk is attacked by mutants whom the player must repel. After the attack surviving villagers still give the player a friendly greeting even though they are surrounded by the corpses of their neighbours. Furthermore, people newly arriving into the village have no misgivings despite the fact that they have to walk past a pile of dead bodies to enter. This inappropriate behaviour hurts the believability of the characters and the immersion of the gameplay.

This paper introduces smart ambiance as an attempt to address the problem of contextually unrealistic behaviour by having the objects in the environment of an agent implicitly affect the actions selected by the agent. We will present the mechanics of smart ambiance and through examples illustrate how it can create more interesting and believable game agent behaviours.

2. RELATED WORK

Amongst a variety of other techniques, planning systems have become a popular choice to drive the behaviours of non-player characters in games. The literature contains numerous examples of approaches using reactive planning [15], deliberative planning [13, 7], or some hybrid of both [4, 9].

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There are three sources of ambiance used in the smart ambiance system: environmental ambiance, event ambiance and object ambiance. Environmental ambiance is the inherent ambiance of a space. It is implemented by attaching action ambiance effects directly to a space in the virtual world. For example, a library might have an environmental ambiance associated with it to favour quiet actions. Environmental ambiance is defined by a game designer to capture the general mood of different environments.

Using this library example we can illustrate how environmental ambiance effects and action ambiance details interact to produce more contextually appropriate agent behaviour. The library has a smart ambiance with the volume descriptor. The chat action bears the same descriptor. The check social network action has no relevant descriptors. When cost is being calculated for chat while in the library, it increases to become higher than the cost of the check social network action, which just uses its default cost because it has no descriptors in common with the agent environment. This will cause the ambiance aware agent to select the more contextually sound action of using the computer in the library.

Event ambiance is an ambiance effect produced through the execution of an action. For example, a pedestrian crossing has several people standing at the edge of a road. They all have the goal of getting to the other side. Some agents are nervous and others aren’t. The light turns green and all agents start to walk across the road. When the light turns amber, nervous agents begin to run. Soon after, the agents who weren’t nervous to begin with will break into a run because seeing the other agents run made them nervous.

No agents would have run at all if there had been no nervous agents present at the crossing but their actions affected the ambiance of the crossing that caused other agents to run with them. The walk and run actions have the nervousness descriptor. The smart ambiance of agents at the crossing will share this descriptor which means that the cost of these actions will be altered by the nervousness ambiance action effect cost modification function. This means that agents will choose the walk or run actions depending on the value of the nervousness property within their smart ambiance.

Object ambiance is the effect an object has on the smart ambiance. New ambiance action effects are added to a smart ambiance as soon as an object enters that smart ambiance. This allows objects to dynamically generate and alter ambiance. For example, a library is in a room in house and wants to entertain himself. He knows that he could play games on his computer but his creative surroundings from the books of Shakespeare to the paintings on his walls seem to compel him to do something more interesting and unusual, causing him to instead write a funny limerick.

The man in the example had the goal of being entertained. In this scenario, two of the possible actions that result in being entertained are the play computer and write limerick actions. The write limerick action had creative as a descriptor. The smart ambiance of an agent planning in the room will have been given the creative ambiance effect by the paintings and books in the room. The function for this ambiance action effect relating to the creative descriptor greatly decreased the cost of all creative actions, making them more likely to be selected.
Objects automatically generating an ambiance is useful because it means that designers wouldn’t have to manually specify the ambiance for each area. Instead, they could just place objects inside an area and the combined ambiance effects would create the smart ambiance. This is also interesting because the cost functions will interact in unpredictable ways, creating emergent behaviour. Actions will always be influenced by the surroundings of the agent, making them more contextually logical.

4. CONCLUSIONS & FUTURE WORK

The behaviour of autonomous agents is becoming a more important part of computer games. While there are a few techniques that combine smart objects and planning to control these agents, none have used the ambiance of an area with an industry standard planner to create more contextually appropriate behaviour. Using the proposed framework, agent action selection is altered by a smart ambiance modifying the costs of particular actions.

There are several advantages to using smart ambiance: (1) emergent behaviour is quite likely to occur through the interactions of several objects altering ambiance properties, consequently less scripting on agent behaviour will be needed; (2) agents will perform more contextually sensitive actions; (3) information about how an agent should behave is decentralised away from the agent and across the environment; (4) and many popular game engines already have the data structures (such as triggers) required to implement smart ambiance.

But smart ambiance also has several disadvantages: (1) a new cost function must be made for each ambiance property, (2) smart ambiance can at times be computationally a little bulkier than what is strictly necessary to create the effects that it leads to; (3) and emergent behaviour is often seen as bad by game designers as there is a loss of control from the perspective of the designer. The system is also more computationally demanding than ordinary GOAP, which is already considerably more demanding than other agent behaviour control systems.

Despite these weaknesses, we believe that the smart ambiance presented in this paper offers interesting and realistic improvements to the behaviours of planning agents and that the demonstrations illustrate the usefulness of our approach.

The development of smart ambiance is still in its earlier stages and so there is work remaining in further developing it. For example, we are working on the composition of the list of possible ambiance effects and the interactions between different ambiance effects. The work has a number of interesting potential additions that could make smart ambiance even more powerful. The first of these is in exploring the different uses of object ambiance beyond automatically creating a smart ambiance. Objects could also have a proximity-based ambiance that is felt more strongly as an agent is closer to the object. For example, a Dementor from *Harry Potter* causes anyone nearby to feel great fear, which would make them more likely to perform actions associated with fear, such as screaming or fleeing. A focus on planning through the manipulation of ambiance to increase the probability of action success could help create more realistic behaviour too. For example, a boy is in a house with a girl and he has the intention of kissing her. Rather than just trying to immediately kiss her, he could make her more likely to kiss him by dimming the lights and putting on some romantic music. We will also develop how smart objects can be used to express inter-agent relationships. For example, a man may act differently in a room full of only men as he would in a room full of only women. Before any of these extensions are developed, we will first analyse how the different types of ambiance can combine together in a single environment.

5. REFERENCES


