Game research for training and entertainment

Ga{t\m}e Over

The GATE project (Game research for Training and Entertainment) is running towards its end. The goal of the project is to develop awareness, insight and technology that can be used both in the entertainment gaming industry and in the serious gaming industry, with a special focus on learning and training experiences. We have worked in various forms on success factors for effective gaming and training transfer:

- Realistic and challenging problem situations and scenarios.
- Realistic behavior of computer controlled entities.
- Realistic modeling, visualization, and simulation of the environment.
- A high level of interaction.
- Options for analysis of skills, effectiveness of procedures, fitting with training goals.

The project started in 2007, funded from the FES funds for strengthening the infrastructure in the Netherlands. GATE is strengthening the game research infrastructure. The project has been successful in its research, taken the number of scientific papers and PhD projects. The project has also been successful in the transfer of knowledge to companies; they can develop new initiatives they couldn't have done without GATE. And,the project is fruitful in terms of raising awareness: both nationally and internationally, the Netherlands have a very strong reputation in (serious) gaming.

'Challenges for Serious Gaming Research' was the final symposium organized by the GATE project. In this symposium we showed results from pilots, research, and innovation, and looked ahead at future developments. How will game technology help address the grand challenges for our society? What is needed for creating engaging virtual worlds, populated by meaningful virtual characters, which initiate natural interaction, and result in effective transfer of gaming? The program consisted of a mix of presentations, and demo's. Anyone could play with the results of our innovative game pilots in education, health, and safety. The participants were enthusiastic, and there was a lot of playful interaction.
For GATE it is game over, up to level 2!

Remco Veltkamp
Utrecht University

Level 2: GATHER

Now that the GATE projects ends, let's move on!
The government has appointed a number of Top Sectors in the Dutch industries, one of which is Creative Industries, www.top-sectoren.nl/creatieveindustrie, which contains the innovation network for gaming: GATHER - GAmes for SafeTy, Health, Education, and IndustRy. The GATHER innovation network aims at growth of the sector by increasing competitiveness and increasing productivity. It is broader than the GATE project. There are three action lines in this innovation program: strengthening the gaming eco-system in the Netherlands by organizing a constant match-making between parties; developing games, demonstrators, and innovative pilots; a research agenda on game worlds, users and interaction, and transfer of gaming. Funding agencies and participating parties are currently assigning budgets and developing plans to implement this innovation network.

Using semantics to improve the design and quality of game worlds

A (semantic) world of difference!

Game world objects are often limited to the visual representation. Embedding them with richer information opens up whole new procedural generation possibilities for designers, and gives players more creative, diverse gameplay.

The visual quality of game worlds increased massively in the last three decades, from pixelated two dimensional drawings to highly detailed three dimensional visualizations. However, the closer game worlds depict reality, the more noticeable it is for gamers when objects do not behave accordingly. To overcome this problem, game worlds and their objects need more 'semantics', i.e. information about their functionality and roles, including relationships to other objects. We found out that semantics is instrumental both to improve procedural content generation and to specify detailed object behavior, offering more diverse, emergent gameplay to gamers and sparking their creativity while playing.

Semantic game worlds

Semantic game worlds are populated with semantic objects enriched with information about, for example, the kind of object they are, their characteristics and material, their relations to other objects, and their behavior and interaction possibilities. We developed a semantic specification model for game worlds that provides designers with a convenient vocabulary to (i) specify the semantics for generic concepts and object classes, and (ii) associate these generic concepts to basic game content, like 3D models, 2D sprites, sounds and animation. In this way, semantic objects are highly reusable throughout multiple game projects, regardless of their disparate appearance in each game. In addition, this enables that the task of specifying and fine-tuning object characteristics and behavior can be distributed among various people.

Sensibly stuffed game worlds

We developed layout solving methods that use these semantically-rich objects to automatically produce plausible layouts for virtual environments, e.g. building interiors, gardens or city streets. Using an intuitive scene description language, you can specify how a particular scene should be populated, e.g. which objects you would typically find in it, and how they should be placed around. Based on these descriptions, the semantic layout solver can, for example, generate an entire office building, complete with hundreds of different offices, meeting rooms, common areas, etc. Similarly, every such environment can also be automatically furnished and, eventually, decorated, by applying so-called procedural filters. These filters can further help customize virtual worlds, for example to make a living room appear like after a party, make a building look old and deteriorated, or make a whole street look vandalized.

Smart object behaviour

Using the above descriptions and layout solver, level designers can quickly create consistent virtual worlds. And once these already contain semantically-rich objects, which know e.g. about their functionality or physical characteristics, that information can most naturally be used while playing the game. Our semantic modelling approach embeds objects with real-world behaviour so that whenever a player interacts with them, they behave as one might reasonably expect. Besides, the immediate effects of any action undertaken by a player or agent are handled automatically, as well as their long term results over time.
In conclusion, this semantic approach brings two significant contributions: (i) virtual environments can be quickly generated with all desired detail and consistency; and (ii) designers are empowered to more intuitively specify smart object behaviour, ultimately enabling a richer gaming experience.

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