

DEPARTAMENTO DE INFORMÁTICA

Automatic Level Generation for *Platformers*

MULTIMODAL SYSTEMS



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Objectives

This work consists on exploring new methodologies and algorithms in the context of automatic level generation for platform videogames, such as *Super Mario Bros.* or *Sonic, the hedgehog*. The idea is to not only represent valid challenges but also include context and meaning in the actions that ought to be performed. The intended contributions were set as follows:

- Definition of a level representation framework;
- Conception of novel generation algorithms;
- Inclusion of personalization features in the generation algorithms;
- Progresses on understanding the concept of *difficulty*.

Methodology

As a starting point, a level representation framework was defined as a common base to study different videogames. Levels from different games can be mapped into this representation scheme. A generic level editor was developed using the referred framework (Fig. 1). Distinct tools have been implemented to extract semantic level information, namely a graph extraction tool to retrieve the possible routes (Fig. 2). A Genetic Algorithm generator was created as an experimental study on possible alternatives (Fig. 3) and game design patterns have been mapped in graph situations, resulting in a level adaptation algorithm (Fig. 4). Currently, the main focus goes to gameplay data gathering and statistical studies on that data, to improve the personalization features included in the generators.

Expected Results

As a confirmation final step, a global system was envisioned to embrace the previous contributions, organized in 3 modules:

- A generation module, where the different created approaches are implemented;
- A statistics and profiling module that gathers data from user gameplay, establishing a skill based profile for users and difficulty measurements for levels and gaming situations;
- A game engine, allowing to play the generated levels as a front-end to players.

In the end of this work we expect a full integration of the 3 modules in an effective form, allowing users to play automatically generated levels that were created specifically tailored to their profile (skills and preferences).

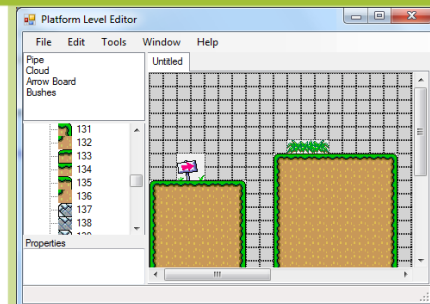


Fig.1 – Level editor created with the implemented representation Framework

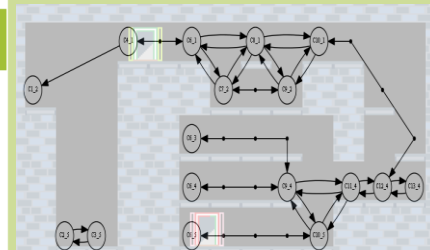


Fig.2 – Computed graph for an existing level structure

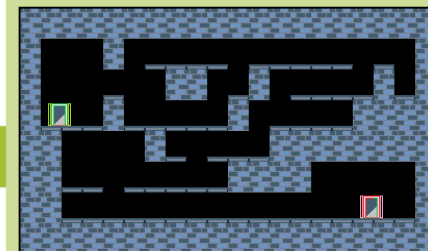


Fig.3 - A level structure for the game Prince of Persia, created with a G.A. Generator.

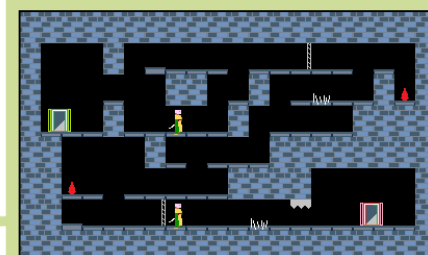


Fig.4 - A level that was enhanced with the created Level Adaptation Algorithm

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