Procedural Generation and Replayability in Video Games

Introduction

Every game can inherently be replayed (replay), in other words, it can be played multiple times. Replayability however refers to what makes people return to the game beyond replay.

Procedural generation can be used to randomise many elements of a game including but not limited to: dungeons or maps, none playable characters (enemies), loot and spawn points. Procedural generation therefore can add excitement and variation.

The aim of this project is to demonstrate how procedural generation affects replayability in video games, specifically dungeon crawlers and rogue likes. It will show how the lifespan of a game is extended by procedural generation, or randomness, when compared to manual dungeon creation.



Models and Design

This prototype is built on top of Blackthornprod's "Random Dungeon series Generator" [1] procedurally generated to create environments/dungeons.

Figure 1 and 5 show two procedurally generated maps. Each play through would be different and not memorable to the user, creating a new sense of immersion and adventure each time the game is played.

	Т	R	В	- L
т				
R				
В				
L				

fig 2: Symmetric matrix to calculate all possible tile shapes required for single and two point entry/exit points. 11 tiles in total including the starting room (4 exits/entry points).



Fig 3: Example of tiles sprites during design.

11 tiles in total, including start room.



[1] Youtube. Blackthornprod. 2018, March, 13. "Random Dungeon Generater". Available: https://www.youtube.com/watch? v=qAf9axsyijY&ab_channel=Blackthornprod





Fig 4: Character sprite and a range random, procedurally of generated objects within the dungeon levels.



Results

UNIVERSITY

In manually created dungeons, players are able to memorise possible routes; hereby making it easier to complete levels. However this removes the challenge, reduces immersion and adds repetitiveness.

In procedurally generated levels, players are forced to explore the area; thus adding a layer of randomization and replayability.



Future Work

Explore how additional procedurally generated content can further improve replayability:

Loot

Enemies (AI)

Explore procedural generation in other game genres and how it affects replayability.

Author

Dewi Brightman dwb18kjb@bangor.ac.uk

Supervisor

Dr Llyr Ap Cenydd llyr.ap.cenydd@bangor.ac.uk