Simplification of Game Development with a Generic Universe Related Non-Player Character Generator

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ABSTRACT

Non-player characters (NPC) are more and more a key part in story related games, even if they are not part of the main plot and do not affect playability of the game. In this paper we want to illustrate how the generation of NPCs can be simplified and how these non-player characters can increase the attractiveness a game. We are building on earlier research work of our research group which developed a semi automatic NPC generator, called NPCAgency. It is a system which can generate many conversational NPCs as packaged narrative assets that can be shared and imported into various projects to increase story-world immersion. In this paper we are pairing the NPCAgency with a 2D world as a test environment in order to evaluate the benefits of the generator and let game developers experience all steps for the NPC generation up to the interaction in a game. Every developer of our user study can create its own NPCs with attributes drawn from the "Game of Thrones" (GOT) universe, and see them being a part of the game.

The study with twenty-four computer science students indicates that a majority of 82% would use this tool for their own game to create generic NPCs from the GOT universe. The research work provides a first confirmation that generic NPC generators can simplify and improve game development and attractiveness.

1 INTRODUCTION

It is very common in story related games like role play games or adventure games to use non-player characters (NPCs) in the main plot of the game to lead the player through the story. Game designers are spending significant time and effort in the creation of NPCs to make them believable. This is not the same with NPCs which are not part of the main plot. However, these characters are important as well for the scenery and atmosphere which the gamer will experience while playing. In most of today's well known high quality games these characters are not believable as they appear robotic, lifeless and bland. Interaction with such NPCs is simplistic and limited to short phrases or gestures [1, 11].

Instead of spending too much time with non story related and non game affecting features, the industry likes to focus on the official plots to make the main story of the game as enjoyable and attractive as possible. The effort to write dialog trees, backstories and believable personality traits for every NPC in the game is just too time consuming and would distract the developer from the main part of the game.

We believe an automation of the creation process, including the generation of dialog trees, background stories and believable personality traits is possible and could contribute a tool and process that would allow the efficient and economical generation of higher quality NPCs.

In this paper we are continuing the research work of our research group by presenting a game, NPCAgency Game, as a test environment for a non-player character generator, called NPCAgency which has been presented in *anonymous*. The generator creates conversational NPCs based on predefined universe models and author specifications. The generator is designed to provide game designers with a large number of NPCs, associated with a story universe such as Game of Thrones or Startrek. The chosen universe affects the attributes, personal histories and personalities of the generated NPCs. The systems supports multiple ways (Inform7 code and JavaScript Object Notation (JSON)) of exporting the characters to game engines and allows to create games with NPCs which are less robotic and bland and more content rich and believable. For this paper we developed a 2d game by using the phaser2/phaserCE engine [5], and paired it with the generator. This allows us to demonstrate to the developers the creation of NPCs from the generation process up to the interaction in the game. The developer can generate their own characters, import them to the game and interact with them in the game. We are evaluation the approach with a group of 24 students of an interactive entertainment engineering class.

2 BACKGROUND

There are many character generators available for non computer games such as dungeons and dragons or other pen and paper type games which can generate characters based on predefined rule-sets to provide the user with numerical attributes but also descriptions of the character personality, such as RpgTinker [2]. These generated characters do not include predefined responses, but need to be interpreted by the user during the game. They are a combination of random traits from a database and not based on a story universe, e.g. NpcGenerator [8]. Kathryn Merrick explained in her paper [6] the fixed set of pre-programmed behaviours of many non-player characters in games and a missing ability to adapt and evolve in the environment over time. Henrik Warpefelt [10] described the significant and fast growth of the video game industry and indicates that the development of non player characters is lacking behind. He mentions shortcomings with NPCs such as lack of believability and the reasons and consequences thereof. He describes various types of

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Figure 1: Screenshot from the test game for the user study: Interaction with a NPC with questions and answers

NPCs in games, their design elements and how they are interpreted by the players. Petri Lankoski and Staffan Björk discuss about the believability of non-player characters in games. Based on several required qualities such as human body, selfawareness, intentional states, self impelled actions, emotions and natural language they analyzed whether the performance of a NPC in *The Elder Scroll IV: Oblivion* could be considered as believable.

The NPCAgency focuses on making conversational connected characters that are not part of the main plot and do not have any influence on the protagonist or antagonist. With the universe specific character creation there is no need to be familiar with the story of the game while creating those personalities, whereas the developer is still able to provide the user with suitable personalities for their game. The NPCAgency characters could be replaced by non conversational non intelligent characters which would not affect the playability of the game.

3 SYSTEM ARCHITECTURE

3.1 Overall

The system consists of the generator and the game. The game comprises a dialog manager and game assets, such as the game map and NPC sprites, as shown in figure 2. The generator (NPCAgency) is used to configure the NPC the developer wants to generate. By defining traits and eras, the desired NPC is created. The generator outputs the NPC information in multiple ways, namely in an inform7 code, JSON and a seed. The inform7 code, which is a popular declarative interactive fiction programming language, can be downloaded and imported to an Inform integrated development environment (Inform IDE). The JSON stores the same information, i.e. all the traits, timeline and generated dialogs and can be imported by developers into their games. For our game we are using to a seed to communicate the NPC characteristics from the generator to the game. [3]

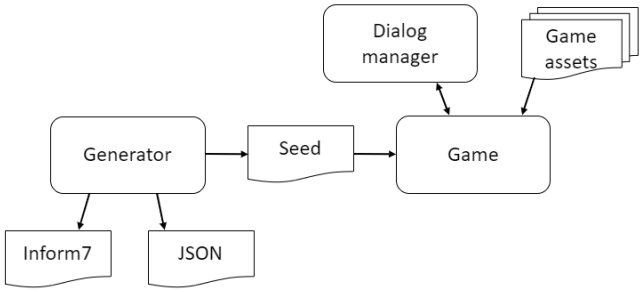

Figure 2: Architecture of testing environment

3.2 NPCAgency

The NPCAgency is a universe specific personality generator which contains for the proof of concept over 1000 facts about GOT characters. Additional facts could be imported to the generator by using JSON conventions and internal consistent reflexive references. GOT provides a variety of regions and social classes in a medieval world with a feudal system. It was chosen in order to have the ability to generate many characters which are very different from each other.

Characters can be created over a web-based interface, either with a single click that generates a random personality based on the stored data in the database or with a more specific creation of the character by the user with adjusted characteristics such as basic information, traits and eras. The basic information is describing where the person was born, how old they are, the profession and the social class. The traits define which events a person has experienced and their description. The eras influence whether the events are more positive or negative. The characteristics of the NPC as defined by their basic information, traits and eras relate to each other in order to prevent random values and such to intensify believability.

The NPCAgency generates next to the Inform7 code and JSON a seed, which is used as an input into the game. The seed stores all the characteristics the user has chosen: traits, eras, profession, origin and will be used in the game as an input to create characters based on the given options but with slight variations. For example, if the user chooses 80% intelligence, this is stored in the seed and if used in the game, it will generate characters with an intelligence around 80% and not exactly 80%. This helps the user to create many NPCs

with similar personalities with less effort. All the dialog options are generated automatically based on the created personality and are stored in a JSON, next to all the other information about the character. One key feature is the creation of kins (communities). This increases the believability by creating groups of NPCs and giving a more realistic scenario [9]. These kins are based on a the combination of the social class, the age and the origin. The kins are created after all characters are imported into the game. The NPCs in the same kin know about each other. Dialogues are generated with stored information about other kin members to enable a conversation with one NPC about an other NPC of that kin. In addition the system can identify housemates based on their common house name. Housemates know even more personal information about each other than kins.

3.3 Game

The game was developed to demonstrate the advantages of the NPCAgency. For this, the NPCs generated by the user are part of the main plot (which would not be the case for the normal use of the NPCAgency as there the NPCs would not be part of the main plot). To show the full strength the game is all about conversations. The goal is to find a group of NPCs, which can be chosen by the user at the beginning of the game. After adding all characters to the game, the map will be generated and spawn points and walking paths of the NPCs are picked randomly. A short introduction to the user is shown to help achieving the goal. As mentioned above, the goal is to find a group of people which are either blacksmiths or farmer and fishermen. This goal can be achieved by talking to every NPC independently and asking about their profession or talking with one NPC about other NPCs to find out if there are characters with the wanted profession in the same kin. The character of the player has a relationship to every NPC, which the player is asked to increase by talking about general topics. When a certain level of relationship is reached, the player can also ask about more personal details. An example of stored dialog options of one generated NPC is shown below.

first greeting:
"Hello. I'm Jaeda Norrey. The noble family is good to us."
home:
0: "I am from a small village in The North"
1: "I was born in 267 to a poor family."
adolscene:
0: "My brother a cold that lasted for months. We went to several doctors who were not sure what it was."
2: "I did lots of chores around the house."
others:
8: name: "Meya", line:
0: "Meya is a fisherman from the middle of The North"
1: "Meya is a mid-life person"
2: "Meya is a female"
3: "Meya is somewhat agile"

The characters differ their walking behaviour and in their look depending to the region they are from and their physics. These features will help an attentive player to easier find specific characters they are looking. A character can be tall or large (figure 3), energetic or agile. Energetic and agile characters are walking slightly different than other NPCs. All these information are given in the conversation with NPCs about other characters.

Figure 3: Tall character compared to a large character

The game map has been created with TILED [4], a free map editor, and loaded into the game as a JSON file. Spawn areas are predefined, sometimes related to a profession, and shown as a colored square (in figure 4).The exact spawn point of a NPC is randomly chosen by the game. Walking paths for the characters are also predefined and related to a spawn area and sometimes also to the profession and shown as a sign (in figure 4).

Figure 4: Spawn areas and paths in TILED map editor

One main part of the game development was the implementation of the dialog manager. The dialog manager is where all the character specific information and dialogues stored in a JSON will be read out and presented to the player as an interactive graphical overlay which is a compound of multiple images.

4 USER STUDY

To evaluate the system (Generator and game), a pilot study was performed in an university class for interactive entertainment engineering with 24 students.

The study was conducted in four steps:

(1) Demonstration of the generator and game to explain their purpose
(2) Survey about game preferences and knowledge about GOT (10 questions)
(3) Test of generator and game
(4) Survey about generator and game experience (10 questions)

After a short presentation of the generator and the game the students were asked to fill a short survey about their about game preferences and knowledge about GOT. Then the students were

asked to use the generator and play the game multiple times. For this purpose the generator and the game were hosted on a website as a browser game[1]. The students created various characters with the NPCAgency web interface and imported any quantity of NPCs into the game. The students were instructed to achieve the goal: to find farmers, fishermen or blacksmiths. After the game, the students were asked to fill the second part of the survey.

The survey generated two major findings: Firstly, the NPCAgency was considered as helpful and efficient to generate a large number of generic NPCs. Secondly, the role of the NPCs in the game was perceived as less helpful for achieving the goal and with limited enjoyment.

82% of the participants would use the NPCAgency to create NPCs for their game if they need a large number of generic characters (figure 5). The effort to generate NPCs was perceived differently by the survey participants, however 82.6 % recognized that the effort to generate multiple NPCs would be proportionally lower. Not all participants have recognized that for creating dozens of NPCs with random traits there is no need to adjust any input to the generator which lessens the effort for an unlimited amount of characters to almost one.

Table one presents the feedback of the pilot users concerning the helpfulness and enjoyability of the NPCs and the repetitiveness of the dialogues. The results are less positive then expected and less positive than the results of the first user study which was conducted with a text based game, using Inform7 [7]. This indicates further potential for the better integration of the NPCs into the game

The overall impression is that this tool is a good start and could be useful for the generation of a large number of NPCs. A few interesting suggestions were given by the study participants to improve the generator to minimize the repetitiveness of the dialogues, optimizing traits and connectivity of traits and reflection of character feelings in the dialogues. Recommendations for minor game adjustments were also given to improve NPC authenticity and behavior.

Table 1: Pilot Survey Results

	No	⟸⟹			Very much	
Question	0	1	2	3	4	Average
Did you notice GOT content?	6	4	4	5	5	1.96
Did talking to NPCs help you find the NPCs you were looking for?	5	4	6	7	2	1.87
Did you enjoy talking to NPCs and hear about their life	1	9	7	6	1	1.87
Do you perceive that the characters correspond to the characters in GOT?	1	4	5	4	0	1.86
Do you think the dialogs were repetitive?	0	4	5	11	4	2.62

[1]Interested readers can try the generator and the game themselves: www.npcagency.github.io

The intention, to simplify the generation of many NPCs, was achieved according to a user comment: *"If I just want generic NPC characters, and especially if I want a large number of them, I would likely use the tool. [...] if I only want a few characters, [...] I would unlikely use the tool."*

Some recommendations from the user study provide indications on how to further improve believability: *"Try to make behavior more variant. Have NPCs that don't really want to talk to you or need to be convinced."*, *"Maybe you want a system of traits that are connected to each other...i.e. an NPC that is huge can't be agile."*

5 CONCLUSION AND FUTURE WORK

In this paper we presented a 2D World game to demonstrate the advantages of the generator with two main output formats and a seed which can be easily imported into the provided 2D World. This systems was validated by students, familiar with games and interactive entertainment. A significant part of the project was the implementation of the dialog manager and the adaptation of the NPC generator. The chosen game engine (phaser 2) did not turn out as the best choice for dialog heavy games as scaling of fonts led to blurry non readable text which caused problems and major efforts to fix them.

Overall the result of the pilot study was promising as most students found the tool helpful to generate a large number of generic NPCs, which was the intention of the NPCAgency paired with the 2D World.

Future work will address the improvement of the generator and game in order to expand the physics and behavior of the characters to increase the attractiveness of the test environment. The planned features for the generator include additional options such as group creation based on life events, connected traits so that characters who are huge cannot be agile, improvement the dialog creation and different ways how NPCs talk, so that the NPCs have distinct personalities and that the user gets a more natural game experience.

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