NPCAgency: Conversational NPC Generation

Grant Pickett
California Polytechnic State University
San Luis Obispo, USA
gpickett@calpoly.edu

Allan Fowler
California Polytechnic State University
San Luis Obispo, USA
alfowler@calpoly.edu

Foaad Khosmood
California Polytechnic State University
San Luis Obispo, USA
foaad@calpoly.edu

ABSTRACT

The NPCAgency project aims to automatically create deep, believable and interactive agents that can be easily generated and imported into game projects. These agents can be used as non-player characters (NPC) whose traits, personalities, personal histories and action conform to a "universe" selected by the user at creation time. The idea is that using NPCAgency would significantly reduce the game designer's authorial burden, at least for NPC creation. Dozens, even hundreds, of characters, can be created and imported into a game engine using this web-based tool. We demonstrate the concept by encoding the "Game of Thrones" (GOT) / "A Song of Ice and Fire" universe. Users can parameterize the generative process and export the characters in the form of extensions to be included in Inform 7 based interactive fiction projects. The authors conduct a 37-person user study whereby subjects familiar with Inform 7 created 50 unique GOT NPCs for their Inform 7 games. The majority of the users indicate they could use the tool on their own projects. Our results demonstrate this technique could work on a larger scale, and in principle, with graphical game engines.

1 INTRODUCTION

The NPCAgency[1] tool is designed with a model store, a generator and multiple translators. The model store is where a universe-specific sets of traits are kept in JSON format, independent of any particular engine or environment. Various model stores are possible with trait layers appropriate for their respective universes. To support a new universe, we encode facts with sets of tokens (names, places, characteristics). Some traits are physical, affecting appearance; others are psychological affecting only behavior or mannerism. Characters also have temporal eras such as "childhood" and "elder years" with labels that can be changed depending on the universe. These eras serve as containers for "life events" which manifest themselves as memories or psychological dispositions for each character. Some NPC may have had an adverse childhood and perhaps lost a parent at that time, leading to traits such as "self-reliance" or "bitter". This system also allows generation of characters of different ages. Many traits have numerical "likelihood" data associated with them, as well as inclusion/exclusion lists preventing them from appearing in certain combinations.

[1] Readers are encouraged to visit the UI and game used for this study
http://users.csc.calpoly.edu/~foaad/NPCA_FDG2015

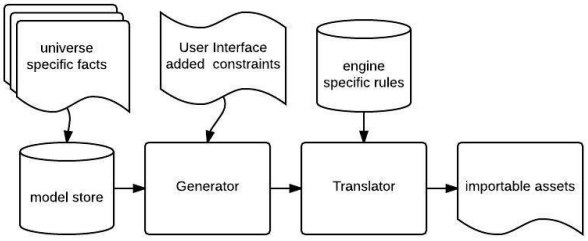

Figure 1. The NPC Agency components

The generator uses traits, hard-coded, universe-specific likelihoods and restrictions, as well as user adjustments to further constrain the possible characteristics of an NPC, before stochastically generating them.

The last major component of the system is a set of "translators" which transform the generated traits into code that can be used by various game engines or interactive simulation development environments. Due to the extra burden of having to support 3D models and artistic depictions, we concentrate on interactive fiction translators. While physical characteristics and attributes are very much part of our NPC models, only verbal descriptions are necessary to support interactive fiction projects.

2 SYSTEM STRUCTURE

2.1 Universe Definition

This project intends to be as modular as possible. To allow flexibility for generating characters, the tool requests from users universe appropriate facts. These would be things like locations for characters to live, the list of physical and mental traits to use and all the events a character might encounter in their life. The imported files use JSON conventions and internal consistent reflexive references for the tool to process and parse the material in these files.

2.2 Demonstration Universe

To use the tool a universe must be selected for the character(s). The universe of *A Song of Ice and Fire* from the book series by George R.R. Martin is chosen to demonstrate the proof of concept in this project.

2.3 The Character Model and Generator

A character or up to 100 can be generated. Users can preemptively fill out a webform, constraining some choices that

the generator will follow before producing the remaining gaps in a character.

The first traits to be created for a character are those present from birth. These would include any number of physical traits (blue eyed, tall, strong, etc.) and a limited number of psychological traits (such as level of intelligence and initial temperament). Values are given in fifteen traits to form a personality.

2.4 Character Life Events

The next step in creating a character is to give them a series of life events to build a story arc for the individual. For the purpose of this generator, the characters' life has been broken into different life event stages from include early childhood traumas to marriage to late life changing events. These influencing traits help to create a story where the character has pseudo-realistic life events. Every event can have a list of requirements and effects, setting up an influence graph of life events.

Events and traits can manifest in a weighted fashion so the generator will produce a more focused world with that extra layer of restriction. For this demonstration the sample size of the crowd are small enough that demographic restrictions are not enabled. Instead, a highly diverse cast was presented to demonstrate the range the generator could provide.

A character after being generated in a child state, will "age" by having events pushed on to the character's time-line. Using the correlations and restrictions mentioned before a character will not have paradoxical events in their lives. Emergent narrative assets can form from this process. Characters may get married only to have their spouse die for one of several reasons and then have a chance to remarry.

The end result of the generator is a person model with attributes relating to their life events, their traits, their location, their name, and other key features. It is up to the translator component to take this model of a person and translate it into an interactive format.

2.5 The Translator

The translator takes the model generated from the model for the character and transforms it into usable Inform 7 code. The Inform 7 environment was chosen due to the ease of generating text as opposed to other environments necessitating visual representations of characters. Translation plugins, however, could be written for other engines like Unity and Unreal.

Inform 7 code is generated line by line as the system reads the JSON person-trait file and follows conventions about which pieces end up doing specific things inside of Inform.

A user may add more material to the characters. The characters provided by this tool are primarily meant to be NPCs that fill out the background of scenes and help provide immersive experiences.

The conversations that the users have with the characters are facilitated by one of the many extensions available to the Inform 7 IDE, Conversation Rules by Eric Eve. The "topics" command provides a list of suggestions for a player to ask a character about.

3. User Study

To validate the tool, a demonstration and survey is conducted at a college campus with students who have had assignments in Inform 7 and consider themselves familiar with the development environment. The goals of this experiment is to determine if a product like this would be well received as having real world application or that it could be useful to interactive fiction authors.

A website hosting the project is made available for live testing. After hearing a presentation on this tool, the students are encouraged to use the tool to create characters. They also collectively create a custom character using the web interface and then follow a different link to play a small web-embedded Inform 7 game containing 50 characters generated by this tool in addition to the collectively created custom character. In the game, the users are instructed to walk around and talk to the NPCs and try to find the character they collectively created.

37 users, about half (19) of them familiar with GOT, fill out a survey asking about the project.

We use a three-point scale to indicate agreement with 11 different statements. Some of these are shown in Table 1. The responses are very encouraging, telling us the characters are believable and interesting. Participants thought the tool would be easy to use whether they were familiar with the Inform 7 language or just starting out. A majority stated they would consider using this tool in creating their own Inform 7 stories. We attribute the high number of neutral responses to the fact that only about 50% of the participants indicated familiarity with GOT. A vast majority understood the utility of a tool like this for developers.

Table 1. Selected Survey Results

Statement	Agree	Neutral	Disagree
The characters I encountered had believable backgrounds in the GOT universe	17	20	0
There were some interesting characters that I wanted to engage with further	18	14	5
I would consider using characters like these as background characters for my own Interactive fiction story set in the GOT universe.	26	10	1
I played with the tool myself and created characters	13	10	14
A tool like this can easily be adapted for another universe	31	6	0
Tools are easy and intuitive to use for someone familiar with Inform 7	29	8	0

4. CONCLUSION

In this paper, we demonstrate a proof-of-concept tool capable of producing usable universe-specific characters that can be easily imported into game engines (in this case Inform 7), thus saving resources. The concept is validated with a survey that shows actual authors familiar with the genre and technology consider adopting the characters in their own stories.