Modelling Cultural, Religious and Political Affiliation in Artificial Intelligence Decision-Making

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Abstract. This paper examines cutting-edge work in the generation of individual AI actors who behave according to procedurally-generated social, cultural, political and religious norms. Based on the author's ongoing development of the game *Ultima Ratio Regum* (URR) – built with a hand-made game engine in Python – the paper explores three core aspects of URR's AI actors. Firstly, the generation of a full world population of AI actors and ensuring that they are distributed appropriately and logically for a culturally-varied world; secondly the procedural generation of densely complex religious, political, cultural and socially normative values to assign to these AI actors, and how their decision-making processes are determined by these allegiances; and thirdly and lastly how this game, among other objectives, seeks to forward what I term "qualitative AI" where culture and society, not pathfinding and "optimal" decision-making, are the primary determinants of behaviour. The paper concludes with a summary of both these three points and the future plans for the game's AI systems.

1 INTRODUCTION

This exploratory paper is based on the author's own work, having been for the last three years the sole developer of the roguelike game "*Ultima Ratio Regum"* (URR). Set during the Scientific Revolution, almost everything within the game is procedurally generated – this ranges from the "macro" level of 2000+ years of detailed history, historical figures, empires and nations, religions, wars, dozens of vast cities and a vast world population of procedurally-generated non-player characters (NPCs) unique to each playthrough, to the "micro" level of individual towns and cities, individual NPCs, specific buildings and items, and flora and fauna. Inspired by the works of Umberto Eco and Jorge Luis Borges, the game is an exploration of a number of themes including historiography and the writing of the historical record, metanarrative and political ideology, and the philosophical idealism of George Berkeley. Most crucially the work aims to specifically integrate this "thematic" content with the game's mechanics, rather than leaving such content as "background" or "lore" that the player can take or leave. Much of this will be achieved through the use of innovative AI actors currently being developed at time of writing. Every aspect of the behaviour of these actors – their greetings, their insults, their dress, their farewells, their behaviour in challenging situations, their reaction to those from other nations, and much else – is procedurally generated, and fore-grounded in their decision-making algorithms. It is these actors and the roles they play which this paper focuses upon, and the break they represent from much traditional AI research into decision-making optimization [1] and pathfinding [2].

2 PROCEDURAL GENERATION AND ARTIFICIAL INTELLIGENCE

Firstly, the paper explores the procedural content generation of the game, and how this affects the AI actors. An "average" generated URR world has a population of approximately ten million NPCs. Naturally for such numbers, the management of these NPCs takes place at a number of different "levels" in the game depending on the player's activities – many of the NPCs are "abstracted out" at any given time. The game also contains a system which identifies the most "important" NPCs and ensures that their actions and decisions are always simulated regardless of the player's location (roughly 500-700 NPCs on average are considered "important" by the game's algorithm at any one time, and their actions are carried out constantly, unless one falls below the metric for "importance", at which point that actor is then abstracted out once more). NPCs within the game vary according to a significant range of variables: according to their race, language, cultural background and cultural norms, sex and gender, age, political alignment, religious beliefs (if any), national citizenship, and interests and agendas. A rough calculation currently suggests that there are over 1 trillion possible AI actors that may be procedurally generated within the game world who will, crucially, behave differently according to the social and cultural context within which they are generated. The agendas of these actors (returned to later in this abstract) are largely dependent on their cultural and religious backgrounds, leading to a densely complex world within which the player will uncover information about religious feuds, cultural differences, long-standing war bitterness, language difficulties, and many similar concepts of a sort not normally explored in games. The paper will therefore examine the generation of the AI actors from a creative standpoint; the management of so many AIs from a technical standpoint; and the integration of the two into a culturally and socially variegated and dense world.

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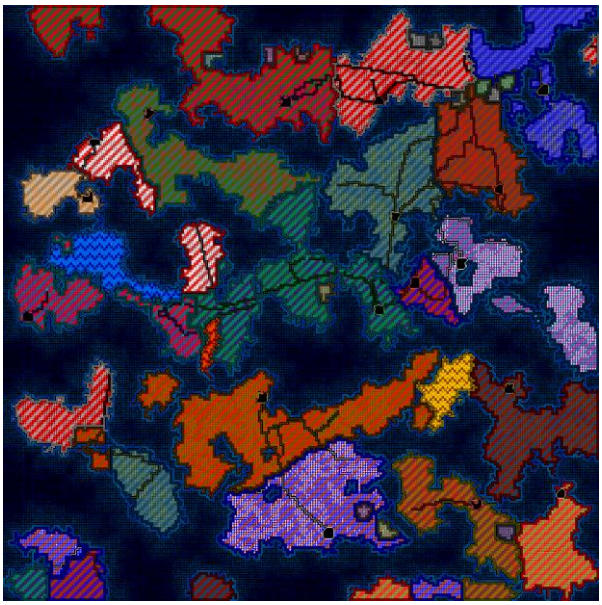

Figure 1. Example of Generated Political Divisions

Secondly, the paper explores how this content generation creates a deeply complex environmental simulation, arguably one of the most detailed and dense generated worlds ever created in a game. As above, the agendas of these AIs are dependent on the procedural generation of their *origins*. A generated URR world contains approximately forty civilizations (Figure 1) designed to emulate the massive variety in real-world civilizations from this historical era. Some may be nomadic desert peoples who travel in lengthy caravan routes across the world, or hunter-gatherer tribes in close to the Arctic Circle who construct their buildings from ice and stone and have limited trading relations with a nearby civilization, or feudal civilizations who range from the imperialist and the expansionist to the protectionist or isolationist, and have widely differing cultural preferences on issues such as aesthetics, slavery, gladiatorial sport, ethics and morality, and so forth. This variety extends into other areas, such as religion, where a complex algorithm can procedurally create over a million detailed religions with information about their beliefs, their god(s), what festivals or special events are on their religious calendar, their relationships with other religions, their presence in civilizations, eschatological and creation beliefs, the appearance of their altars, expectations from worshippers, etc. All of these "cultural actors" inform the creation of the AI actors who exist *within these contexts*. Crucially, therefore, rather than presenting this civilizational/cultural/religious detail as "background" or "lore" as many games do, they are foregrounded in the AI actors, whose motivations, interests and agendas can only be understood via a detailed understanding of the generated cultural backgrounds from which they originate. In turn, this affects their willingness to interact with the player, to assist or communicate with the player, and to potentially oppose the player if the player has aligned themselves with religions or cultures inimical to those of other NPCs. At the same time, it is a game of incomplete information [cf 3] where both the player, and NPCs, must make judgements about the opinions of others based on the data they possess. The actions of AIs are dependent upon the social conditions and expectations into which they are "born", and therefore strongly differentiate between all the procedurally-generated AI actors in a given instance of the game. Equally, the greater the knowledge the player has attained about the world's culture, the more able the player is to make their wishes felt within the game world.

3 TOWARDS QUALITATIVE AI

Thirdly, the paper brings these together to explore the use of this integration of procedural generation and sociological concepts as a method for game-based learning in the fields of philosophy, sociology, and the humanities more generally. AIs respond and behave according to their political, cultural, social and religious affiliations, and this transforms these concepts in the social sciences into gameplay mechanics that affect the behaviour of AI and the world the player explores, rather than simply a method for *constructing* a game world which then has no further impact upon the player's experience. This is in part akin to the world by Mateas on "expressive AI" [4] and Gruenworldt and Katchabaw's "Realistic Reaction System" [5] but develops it into further qualitative and social science domains, and integrates far broader "relationship" structures of religions and cultures into the interpersonal dimension previous focused upon. The paper therefore explores how the game depicts the influence of these many factors on social interaction, and how these influences are represented in the actions, decisions and interests of the game's AI. In turn, this leads to game-based learning where understanding the cultural, political and religious motivations of AI actors is actually essential to success or failure within the game world. Lastly, this also serves to illustrate the potential for the development of 'qualitative' game mechanics in video games more generally, and highlights the potential for the use of complex AI actors in moving away from the ubiquitous stat-based gameplay of levels, items, rewards, and so forth, and towards developing "AI" that can be understood in terms of their as full actors with a range of interest and agendas, rather than as only actors in combat or strategy situations.

4 CONCLUSIONS

The paper explores three central components to the game's AI – the emphasis on procedural content generation and the integration between that and artificial intelligence; the emphasis within this on creating cultures, societies and religions, and having these directly influence AI decisions; and thirdly the potential for this game to develop "qualitative AI" and to create gameplay mechanics based on political, sociological and humanist concepts rarely explored in interactive media. It notes the potential educational and pedagogic value of these, the potential for new forms of gameplay rarely explored in computer games, and the paper lastly notes the planned future developments of the game's in-development system.

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