Human Behaviour Modelling for Gaming Using Agent Technology

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Declaration

I declare that this dissertation does not incorporate, without acknowledgment, any material previously submitted for a Degree or a Diploma in any University and to the best of my knowledge and belief, it does not contain any material previously published or written by another person or myself except where due reference is made in the text. I also hereby give consent for my dissertation, if accepted, to be made available for photocopying and for interlibrary loans, and for the title and summary to be made available to outside organization.

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Dedication

"To the person who taught us not only the technical theories, but also many lessons to the real life – Professor Asoka S. Karunananda"

"To my soul, my life and my wife – Kavija Sachinthani Gunathilake"

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Abstract

The incorporation of real human behaviour for non-player characters (NPCs) in games is a significant research challenge. The nature of events and actions within a game scenario is associated with temporal and spatial redundancies. Such data cannot be considered in isolation, and should be processed in sequence. Multi Agent Systems are proposed as a potential technology to model natural human behaviour into non player characters in game environments. A three phase solution is proposed for this purpose. During the first phase real data in a game are collected by letting a human player play the game unconditionally and naturally as possible. All objects around the player and each action executed by the player are recorded against the time. The second phase involves the cleaning and normalization of the noise present within data gathered during phase 1. Then for each sequence of data are modelled as HMM along with player current action. Rules are generated with these HMM and player actions. The NPC decision making strategy, consequently are implemented by agents using these rules. HMMs are mapped as resource agents and the NPC in the game is mapped as a request agent. Based on the observation sequence that NPC receives, it broadcasts those information to the resource agents and bid for the best deal and try to find the most suitable state sequence (that is action sequence). Jade is used as the agent framework and Jahmm is used for HMM modelling. As the test bed (simulation platform) of this experiment, Virtual Battle Space2 (VBS2) along with the VBS2Fusion library is used to prototype the approach. The validity of the proposed method is verified by experiments in two major aspects. One is to check hiding of the facts that NPC behaviours are artificial. The other one is to check the time performance to achieve the target during the game. Experimental results show that difference of recognizing the artificial facts of NPC is comparatively low and it proves the proposed method of applying the human behaviours in a complex scenario like game can be proven statistically.

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