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Designing Human-like Video Game Synthetic Characters through Machine Consciousness

Abstract: *In recent years we are witnessing a huge growth of the video game industry. One of the factors that have contributed to current technology in video games is the improvement of Artificial Intelligence bots (AI bots for short), which are software agents able to autonomously interact with other AI bots and human players. However, the latest great figures achieved by the video game industry are actually due to the proliferation of online games. Why online gaming is so appealing to players? We believe one of the main reasons is the intelligence and consciousness showed by opponents in these scenarios. In a multiplayer online game, the player competes and collaborates more or less directly with other humans, hence obtaining an engaging experience. Although current AI bots can be intelligent to some extend, they cannot provide the same level of conscious-like behavior as produced by a human player. In multiplayer games, like for instance First-Person Shooters (FPS), best AI bots are able to run, hide, make surprise attacks, and even taunt opponents with well-chosen gestures. However, current AI bot implementations are either frustrating to play because they never make mistakes, or predictable and boring because they always use the same strategies. In the recent 2K Bot Prize competition (IEEE Symposyum on Computational Intelligence and Games, Perth, Dec. 2008), none of the competitors was able to pass the adapted bot Turing test (which is based on observed behavior rather than any linguistic capability). The overall conclusion of the competition was that all humans were rated by judges as more humans than all the bots. In this paper we propose a consciousness-centric approach to the design of AI bots with the aim to perform better in terms of these sorts of Turing tests adapted for video game bots. We have integrated CERA (Arrabales et al. 2007), a novel Machine Consciousness implementation mostly based on Baar's Global Workspace Theory and Haikonen's cognitive architecture, into a development framework for AI bots. Using CERA we can develop Machine Consciousness bots (MC bots) that can be endowed with human-like cognitive features like attention, Theory of Mind, or imagination. Preliminary results in the development of MC bots are being obtained and analyzed using the FPS game Unreal Tournament III (Epic Games, 2007). Usually AI bots are based on mechanisms for real-time selection of basic behaviors. A number of different computational techniques are used like finite state machines, fuzzy logic, artificial neural networks, decision trees, Bayesian programming, evolutionary algorithms, etc. Nevertheless, consciousness has not been seriously considered as the missing ingredient in the design of AI bots. We believe the main reason why consciousness has been largely ignored is the poor understanding of this phenomenon within the field of classical Artificial Intelligence (in contrast to current Strong AI or Artificial General Intelligence initiatives). Rather than considering a fixed repertory of behaviors and isolated cognitive skills, we argue that next generation MC bots should integrate cognitive aspects and behavior learning under the umbrella of a computational model of consciousness.*