

# Interactive Computer Games As An Emerging Application Of Human-Level Artificial Intelligence

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## *Abstract*

*Emerging Technology as fundamental goals of AI is to understand and develop intelligent systems that have all the capabilities of humans, there is little active research directly pursuing this goal. This leads to the propose AI for interactive computer games is an emerging application area in which this goal of human-level AI can successfully be pursued. Inter active computer games have increasingly complex and realistic worlds and increasingly complex and intelligent computer-controlled characters. This paper presents further motivate, proposal of using interactive computer games for AI research, review previous research on AI and games, and present the different game genres and the roles that human-level AI could play within these genres. This paper also discusses the research issues and AI techniques that are relevant to each of these roles and methodology which is very interactive computer games provide a rich environment for incremental research on human-level AI.*

## **Keywords**

Human-Level AI, EmergingTechnology, Interactive Applications, Computer Games

**1. Introduction:** AI has fragmented into more and more specialized fields in Research since long time. It's working on more and more specialized problems, using more and more specialized algorithms. This approach has led to a long string of successes with important theoretical and practical advancements. However, these successes have made it easy for us to ignore our failure to make significant progress in building human-level AI systems. Human-level AI systems are the ones that you dreamed about when you first heard of AI: HAL from 2001, A Space Odyssey; DA TA from Star Trek or CP30 and R2D2 from Star Wars. They are smart enough to be both triumphant heroes and devious villains. They seamlessly integrate all the human-level capabilities: real-time response, robustness, autonomous intelligent interaction with their environment, planning, communication with natural language, commonsense reasoning, creativity, and learning.

**2. Concept Of Paper :**In this paper we propose a best technique for recognize different Intelligent games of AI as Human Level. These techniques are based on typical features of computer games. In which it contains Role playing games, Strategy games, God Games, Adventure Games, Team sports, Individual Sports e.tc. The above techniques as well as intelligent programming which supports best aspects.

**3. Generation of Computer Games and its related Work:** It has been started to look for another application area, one where we could use what we learned from computer generated forces and pursue further research on human-level intelligence. It has been found it in interactive computer games. The games we are talking about are not Chess, Checkers, Bridge, Othello, or Go, which emphasize only a few human capabilities such as search and decision making. The types of game we are talking about use the computer to create virtual worlds and characters for people to dynamically interact with games such as Doom, Quake, Tomb Raider, Starcraft, Myth, Madden Football, Diablo, Everquest, and Asheron's Call. Human-level AI can have an impact on these games by creating enemies, partners, and support characters that act just like humans. The AI characters can be part of the continual evolution in the game industry toward more realistic gaming environments. Increasing realism in the graphic presentation of the virtual worlds has fueled this evolution. Human-level AI can expand the types of experiences people have playing computer games by introducing synthetic intelligent characters with their own goals, knowledge, and capabilities. Humanlevel AI can also recreate the experience of playing with and against humans without a network connection. Current players of computer games are driven to networked games because of the failings of the computer characters. In massively multiplayer online games, human-level AIs can populate the worlds with persistent characters that can play the game alongside humans, providing opportunities for interesting interactions that guide players in the game and enhance the social dynamics between players. Our hypothesis is that populating these games with realistic, human-level characters will lead to fun, challenging games with great game play. From the AI researcher perspective, the increasing realism in computer games makes them an attractive alternative to both robotics in the real world and homegrown simulations. By working in simulation, researchers interested in human-level AI can concentrate on cognitive capabilities and finesse many of the pesky issues of using real sensor and real motor systems; they must still include some sensor modeling to get realistic behavior, but they don't have to have a team of vision researchers on their staff. They can pursue AI research in worlds that are becoming increasingly realistic simulations of physical and social interactions, simulations of physical and social interactions, without having to create these worlds themselves. Computer games are cheap, reliable, and sometimes surprisingly accessible, with built-in AI interfaces. Moreover, computer games avoid many of the criticisms often leveled against simulations. They are real products and real environments on their own that millions of humans vigorously interact with and become immersed in. Finally, unlike military simulations, we do not need to hunt out experts on these games they surround us. Another reason for AI researchers to work in computer games is that if we don't start working in this area, the computer game industry will push ahead without us. Already there are at least five AI Ph.D.s working in the industry AI researchers have the opportunity to team with an aggressive, talented, and caffeine-charged industry in the pursuit of human-level AI. Here is a list of reasons for AI researchers to take the computer game industry seriously.

- i. Computer game developers are starting to recognize the need for human level AI. Synthetic human-level characters are playing an increasingly important role in many genres of computer games and have the potential to lead to completely new genres.

ii. The computer game industry is highly competitive, and a strong component of this competition is technology. AI is often mentioned as the next technology that will improve games and determine which games are hits. Thousands of new computer games are written every year with overall development time averaging nine months to two years, so technological advances sweep through the industry quickly. Already, many computer games are marketed based on the quality of their AI. This field is one in which AI will have a significant impact.

iii. Game developers are technologically savvy, and they work hard to stay current with technology. *AI programmer* is already a common job title on game development teams.

iv. The game industry is big. In terms of gross revenue, the computer game industry is bigger than the movie industry (Croal and Totilo 1999).

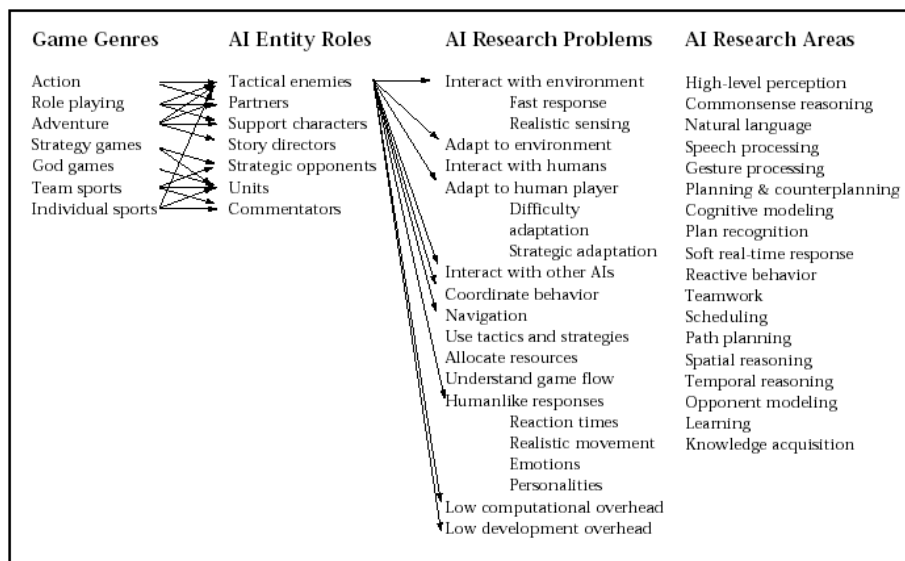
v. Computer game hardware is going to provide cheap, high-end computation power for AI in computer games in the next five years. The newest PC 3D video boards and the next - generation consoles, such as Sony's Playstation2 and Microsoft's Xbox, move the entire graphics pipeline off the increasingly powerful central processing unit, freeing it for AI. It is not at all unthinkable that in five years, there will be dedicated AI processors in game consoles—we just have to tell them what we need.

vi. **Computer** games need help from academic AI. The current emphasis in computer game AI is on the illusion of humanlike behavior for limited situations. Thus, most, if not all, of the current techniques that are used for controlling game AIs (such as big C functions or finite-state machines) will not scale up. However, just as computer game graphics and physics have moved to more and more realistic modeling of the physical world, we expect that game developers will be forced into more and more realistic modeling of human characters. More over, as researchers, we can get a step ahead of the game designers by using their environments for research on human-level AI. One thing that is missing in the computer game field is significant research funding. Some of the military funding to support computer-generated forces is spilling over to computer games research, 1 and some of the biggest computer game companies (for example, Electronic Arts in England and Sony) have started research centers that include research in AI. More funding could become available as more game developers discover they need help with the AI in their products to push for a competitive advantage. Much of the research could get done in nontraditional ways, with the involvement of undergraduates, game developers, and game players. Thus, we can move AI research out of the labs and into the hands of millions.

4. **Research Methodology in AI:** The main our area of specification is to introduce some research methodology with the aspect of technique. Other researchers have argued that great game play comes from “believable” agents. These agents don't necessarily have to be human level in their intelligence, as long as they have a façade of intelligence supported by great personality. Joe Bates's (1992) OZ research group at Carnegie Mellon University and Barbara Hayes Roth's group at Stanford University (Hayes- Roth and Doyle 1998) have worked on developing believable agents for interactive fiction and related computer games. Their research emphasized personality, AI agent-to-human

interaction, and shallow but broad agents. We think these aspects are important but want to emphasize that computer games provide an arena for attempting to also build knowledge rich, complete, integrated AI that incorporates many “deep” capabilities. John McCarthy has also argued that interactive computer games should be considered as a topic of study for AI, where we can study how an AI system could play a game and solve problems that a human attempts. 2 Other researchers have used other computer games such as Pengi and SIMCITY. Our extension is to propose research on the AI characters that are part of the game. Clearly, these efforts are related because human-level AI characters often require the skills of human players. One advantage of creating game characters is that we can in hence how games are made and played. The current emphasis on violence in computer games is partially owed to the inability of the AI in these games to support more interesting social interactions. Although computer games will probably always include violence, human - level AI in games will give the game designers freedom to explore other forms of player-character interaction. RoboCup (Asada et al. 2000) is another related project where competitors develop AI systems to defeat other AI systems in both real robotic and simulated soccer games. In RoboCup, the goal is to build the best soccer playing robots, not to create the best game play or humanlike behavior. RoboCup is stimulating the development of integrated systems but none with the variety of capabilities we expect to see in interactive computer games.

**5. Genres of AI Level Games:** In this section, we review the major genres of computer games to which human-level AI is relevant. There are other game genres, such as hunting games, fishing games, and lifelike creatures games, where deer-level, fish-level, or dog-level AI is necessary. For each of the genres in this section, we discuss the different roles that human-level AI can play: enemies, partners, support characters, strategic opponents, low-level units, and commentators. Other roles are possible, but these are the most common. In the following sections, we go through these roles and discuss how AI could improve the games and how these games provide research problems for human-level AI. Finally, we review the areas of AI that are applicable to these problems. This information is collected together in figure-1.



*Figure: 1 AI Roles in Game Genres*

Although we list specific genres, the genres are fuzzy concepts, with many games being hybrids, incorporating components of multiple genres. For example, there are strategy games (*Dungeon Keeper*) that allow the human to “jump in the body” of one of their units and play as if it is an action game for a while. Also, there are action games where you must also manage resources and multiple units (such as *Battlezone*). Although there will be a continual blurring of the genres, the basic roles for AI stay the same: enemies, partners, support characters, strategic opponents, units and commentators.



Figure 2: A Screenshot from the Popular Action Game Half-Life from Valve

**i. Action Games:** Action games involve the human player controlling a character in a virtual environment, usually running around and using deadly force to save the world from the forces of evil. These games vary in the perspective that the human has of his/her character, be it *first person*, where the human sees what the character would see, or *third person*, where the player looks over the shoulder of the character. Popular examples include *Doom*, *Quake*, *Descent*, *Half-Life* (figure 2), *Unreal* and *Tomb Raider*. In pure action games, AI is used to control the enemies, which are invariably alien monsters or mythical creatures. Realism in graphics has been the point of competition for these games; however, the graphics race seems to have run its course, with better AI becoming the point of comparison. Recent games, such as *Rainbow Six*, have extended the genre so that the human player can be part of a team, which includes either human or AI partners.

**ii. Role-Playing Games:** In role-playing games, a human can play different types of character, such as a warrior, a magician, or a thief. The player goes on quests, collects and sells items, fights monsters, and expands the capabilities of the character (such as strength, magic, quickness), all in an extended virtual world. Example games include *Baldur's Gate*, *Diablo*, and *Ultima*. Recently, massively multiplayer role-playing games have been created where thousands of people play and interact in the same game world: *Ultima Online*, *Everquest*, and *Asheron's Call*. In both types of role-playing game, AI is used to control enemies, as with action games; partners who travel and adventure with the players; and supporting characters, such as shopkeepers. The massively multiplayer games provide an additional opportunity to use AI to expand and enhance the player-to-player social interactions, perhaps with AI-controlled kings who war by sending player controlled knights to battle each other.

**iii. Adventure Games:** Adventure games, and the related genre of interactive fiction, move further from action games as they deemphasize armed combat and emphasize story, plot, and puzzle solving. In these games, players must solve puzzles and interact with other characters as they progress through an unfolding adventure that is determined in part by their actions. Early adventure games, such as *Adventure* and *Zork*, were totally text based, but more recent games sport 3D graphics (sometimes using the graphics engines developed for action games). Example games include the Infocom series, *King's Quest*, and many games from Lucas Arts, such as *Full Throttle*, *Monkey Island*, and *Grim Fandango* as well as *Rubu Tribe* (figure 3) from Outrage. AI can be used to create realistic supporting goal driven characters that the player must interact with appropriately to further their progress in the game. One of the Holy Grails of interactive fiction is to have a computer director who can dynamically adjust the story and plot based on the actions of the human. The majorities of games have fixed scripts and use many tricks to force the human player through essentially linear stories. However, a few games, such as *Blade Runner*, have incorporated some autonomy and dynamic scripting into their characters and story line.

**iv. Strategy Games** In strategy games, the human controls many units usually military units, such as tanks, or the ever-present alien war machines) to do battle from a god's eye view against one or more opponents. Strategy games include reenactments of different types of battle: historical, alternative reality. The human is often faced with problems of allocating resources, scheduling production, and organizing defenses and attacks. AI is used in two roles: (1) as a control for the detailed behavior of individual units that the human commands and (2) as a strategic opponent that must play against the human. The AI needs of the individual units differ from the enemies and partners of action and role-playing games because they are not meant to be autonomous but are meant to be good soldiers who "follow orders."

**v. God Games** God games give the player godlike control over a simulated world. The human can modify the environment and, to some extent, its inhabitants. The entertainment comes by observing the effects of his/her actions on individuals, society, and the world. *SimCity* is the classic example of a god game where the human acts as mayor, and the AI controls individual units or citizens of the simulated city. *The Sims* is probably the most intriguing example (figure 4). The player creates individual characters (units) that have significant autonomy, with their own drives, goals, and strategies for satisfying these goals, but God (the human player) can come in and stir things up by managing both the individual characters and their environment.



Figure 4: AI Characters, Called Sims, in the God Game the Sims

vi. **Team Sports:** Team sports games have the human play a combination of coach and player in popular sports, such as football, basket ball, soccer, baseball, and hockey. AI is used in two roles that are similar to the roles in strategy games: The first is unit-level control of all the individual players. Usually, the human controls one key player, such as the quarterback, while the computer controls all the other members of the team (figure 5). Figure 5: A Team Composed of AI Controlled Players in Madden NFL™ 2000 Football.



Figure 5: A Team Composed of AI Controlled Players in Madden NFL™ 2000 Football.

A second role is the strategic opponent, which, in this case, is the opposing coach. One unique aspect of team sport games is that they also have a role for a commentator, who gives the play-by-play and color commentary of the game.

6. **Conclusion:** Computer games offer interesting and challenging environments for many, more. isolated even if there is no Human Level AI concept, research problems in AI. We are most interested in human-level AI and wish to leverage computer games to rally support for research in human-level AI. One attractive aspect of working in computer games is that there is no need to attempt a “Manhattan Project” approach with a monolithic project that attempts to create human-level intelligence all at once.

7. **References:**

1. Agre, P. E., and Chapman, D. 1987. *Pengi: An Implementation of a Theory of Activity*. In *Proceedings of the Sixth National Conference on Artificial Intelligence (AAAI-87)*, 268–272. Menlo Park, Calif.: American Association for Artificial Intelligence. Asada, M.; Veloso, M.; Tambe, M.; Noda, I.; Kitano, H.; and Kraetzschmar, G. K.2000. Overview of RoboCup-98. *AI Magazine* 21(1): 9–19.
3. Atkin, M. S.; Westbrook, D. L.; and Cohen, P. R. 1999. Capture the Flag: Military Simulation Meets Computer Games. In *Papers from the AAAI 1999 Spring Symposium on Artificial Intelligence and Computer Games*, 1–5. Technical Report SS-99-02. Menlo Park, Calif.: AAAI Press.
4. Bates, J. 1992. Virtual Reality, Art, and Entertainment. *Presence: The Journal of Teleoperators and Virtual Environments* 1(1):

5. Takahashi, D. 2000. Artificial Intelligence Gurus Win Tech-Game Jobs. *The Wall Street Journal*, March 30, 2000, B14.
6. Tambe, M.; Johnson, W. L.; Jones, R. M.; Koss, F.; Laird, J. E.; Rosenbloom, P. S.; and Schwamb, K. 1995. Intelligent Agents for Interactive Simulation Environments. *AI Magazine* 16(1): 15–39.
7. Wallace, S., and Laird, J. E. 1999. Toward a Methodology for AI Architecture Evaluation. In *Intelligent Agents VI*, eds. N. R. Jennings and Y. Lespérance, 117–132. Berlin: Springer-Verlag.
8. Current State of Human Level Artificial Intelligence in Computer Simulations, [www.gilgameshcontribute.com/Research/ReadingsForResearch.pdf](http://www.gilgameshcontribute.com/Research/ReadingsForResearch.pdf)