



## ARTIFICIAL INTELLIGENCE FOR INTERACTIVE COMPUTER GAMES

Habeebullah Hussaini Syed

Department of Information Technology

### ABSTRACT

While one of the basic goals of Artificial Intelligence (AI) is to understand and develop intelligent systems with all the potential of human beings, there is little practical research that directly follows that goal. We suggest that AI for shared computer games is an emerging platform where this goal-level AI goal can be successfully tracked. The interactive computer games have many complex and logical worlds, as well as more comprehensive and comprehensive computer-controlled characters. In this paper, we also emphasize our proposal for interactive computer games, discussing previous research on AI and games and highlighting the different game types and roles that human AI plays in these genres. We then explain the research issues and AI strategies that are relevant to that field. Our conclusion is that compatible computer games provide a rich environment for further research on human AI.

### INTRODUCTION

Thirty years ago, research on AI was divided into many specialized fields, working with more and more specialized problems using even greater expertise. This approach has led to a long series of successes with significant theoretical and practical developments. However, these achievements have made it easier for us to overlook our failure to make significant progress in building human-based AI systems. AI-level AI programs are the ones you dreamed of when you first heard about AI: HAL from "2001, a Space Odyssey"; Information from "Star Trek"; or CP30 and R2D2 from "Star Wars". They are smart enough to be victorious heroes and deceptive bullets. They seamlessly integrate all levels of personality skills: Real-time feedback, robustness, intelligent independent communication with their environment, planning, communication with natural language, general understanding, creativity, and learning.

If this is our dream, why can't progress be made? One of the last efforts identified in the merger was Vere's Homer, which was built a decade ago (Vere & Bickmore 1990). One reason is that no one (almost anyone) works at human-level intelligence because current AI systems do not require a complete human AI. In almost every system, the size and flexibility of human thought is not necessary - it is special, but solid and robust, cheap solutions. Without the need for an app, there will be no establishment. The paper's thesis is that the computer games it works with are a deadly application for human AI. It is an application that requires human-level AI, and they can provide it Areas of additional and collaborative research needed to achieve human AI standards.

### COMPUTER GAMES

Toward the end of 1997, we began looking for a new application, one where we would apply the lessons learned from computer-generated power and conduct further research on human-wise intelligence. We think we found it

in computer games that work with it. The games we are talking about are not for Chess, Checkers, Bridge, Othello, or Go, but computer games for virtual reality worlds and characters for people to participate firmly - games like Doom, Earthquake, Tomb Raider, Starcraft, Myth, Madden Football, Diablo, Everquest, and Asheron's Call. The level of human AI can influence these games by creating enemies, allies, and supporting characters that work as human beings. AI characters can be part of an ongoing emergence in the gaming industry to realistic gaming environments. The growing trend of the presentation of the image of the exhibition of the exhibition country has prompted this emergence. The level of human AI can enhance the variety of experiences people play computer games by introducing clever characters made for their purposes, knowledge, and abilities. The human AI level can also create a playful and combat experience without being connected to a network. Current computer game players were taken to network games due to computer failure. In many online multiplayer games, traditional AI can take over the real world that human players can experience, but it is necessary to create an experience - no one wants to be a gambler or a farmer. Our hypothesis is that filling these games with realistic, human-level characters will lead to fun, challenging games and great game play. According to an AI researcher, growing understanding of computer games makes them an attractive alternative to both robotic drugs in the real world and home-grown startups. By working in a simulated way, AI researchers can charge sensitive issues using real sensors and real automotive systems. They can do this in an increasingly visible world, without having to do it themselves. There is no end to the realities and proliferation of computer games as they add complex environments, more logical physics, and realistic social environments. Computer games are cheap (\$ 49.95), reliable, and sometimes surprisingly readily available, with a built-in AI interface. Additionally, computer games avoid many of the common criticisms that come their way. They are real products and real places for people to work with and millions are using them. It is not produced by AI researchers, who can unknowingly charge for complex research issues when building their own sites. Lastly, unlike military operations, we do not need to hunt for experts in these games; they surrounded us.

Another reason why AI researchers work in computer games is that if we do not start working in this field, the computer game industry will thrive without us (Woodcock 1999). There are already at least five AI Ph.Ds in the industry and two research institutes. This is an opportunity for AI researchers to partner with the aggressive industry, talent, and caffeine in the pursuit human level AI.

1. Developers of computer games are beginning to recognize the need for human AI. Characters made by humans play a more important role in many computer games and have the power to lead completely new genres.
2. The computer game industry is highly competitive and the strongest part of that competition is technology. AI is sometimes referred to as the following technology that will improve games and determine which games are the best. Thousands of new computer games are written every year during the nine-month to two-year development period, so technological advances are rapidly entering the industry. After all, most computer games are marketed based on the quality of their AI. This is a field where AI can have a significant impact.
3. Game developers have information technology and work hard to stay up to date with the technology. The AI system is already a common work theme for game development teams.
4. The industry is huge. More money is spent on computer games than in movies.

5. There will be cheaper, higher power to integrate AI into computer games over the next five years. New PC 3D video boards and next-generation consoles, such as the PlayStation 2, remove all paper clips from the more powerful CPU, freeing them with AI. It has never been imagined that in five years there will be dedicated AI investigators in gaming - we just have to tell them what we need.

One thing that is not in the field of computer game is the very important research revenue. Some of the money used by the military to support computer-generated forces is being spent on computer games research and some of the largest computer games companies have started research centers that include research on AI. More money can be made as more game developers find that they need help with AI in their products in order to take advantage of the competition. Much research can be done in non-traditional ways, with the involvement of undergraduate students, game developers, and gamers. This is a way to move AI research out of labs and into the hands of millions.

### **COMPUTER-RELATED RESEARCH**

Some investigators say that playing a great game comes from "believers". These agents do not have to have human standards in their intelligence, as long as they have a philosophy of intelligence supported by a great personality. Joe Bates' OZ team of researchers at Carnegie Mellon University (Bates 1992) and Barbara Hayes-Roth's team at Stanford University (Hayes-Roth & Doyle 1998) have worked to develop credible agents for active mythology and related computer games. Their research emphasizing personality, AI agent in human interaction, and shallow but broader agents. We think these are important factors, but we want to emphasize that computer games provide a platform to try to build and build more, more complete, integrated information that incorporates more "deep" skills.

John McCarthy (1998) also suggested that shared computer games should be considered as the subject of AI learning, in which we can study how the AI system can play a game and solve human-trying problems. Some researchers have used other computer games such as Pengi (Agre & Chapman 1987), and Simcity (Fasciano 1996). Our extension is to suggest research on AI characters that are part of the game. Obviously, these efforts are related because human-based AI characters often require the skills of human actors. Another advantage of building game characters is that we can influence how games are made and played.

Robocup simulation league is another related project where rivals develop AI systems to win other AI programs in regular football games. In Robocup, the goal is to build the best robots in football, not to create the best game play. Our concern is that Robocup-style competitions are advancing on the development of specific algorithms with the required skills to play simulation, but will not lead to standard algorithms that can be used to create human-grade agents.

### **TYPES OF COMPUTER GAMES**

In this section we discuss the major types of computer games in which a person's AI level works. There are other types of games, such as hunting games, fishing games and games such as animals (Stern 1999), where deer-level, fish-level, or A-level level AI, and god games, such as SimCity and -Sims, where the human AI of each citizen's level would pass. In each case

genres in this section, we discuss the various roles that human AI can play: enemies, allies, support characters, strategic opponents, sub-units and analysts. Other roles are possible, but these are the most common. In the following sections, we enter into these roles and discuss how AI can improve games and how these games

provide the challenges of human AI research. Finally, we review the AI areas used for these issues. This information is collected in Figure 1 at the top of the next page.

### **ACTION GAMES**

Action games involve a human player controlling a character in a visual environment, often running around using deadly forces to save the world from the forces of evil. These dramas differ from one person to another, either the first person to see the character or the third person, or the third person in the audience. Popular examples include Doom, Earthquake, Explosion, Half Life, and Tomb Raider. In pure action games, AI is used to control enemies, who are unique monsters or mythical creatures. The reality of the graphics has been the competitive point of these games; however, the graphics race seems to have begun a study, with better AI becoming a point of comparison. Recent games have expanded the genre so that the human player becomes part of a team, including human or AI partners.

### **ROLE-PLAYING GAMES**

In role-playing games, one can play different types of characters, such as a hero, a magician, or a thief. The player continues to interrogate, collect and sell items, fight monsters, and expand their character's abilities (such as power, magic, speed, etc.), all in a virtual enlarged world. Examples include Baldur Gate, Diablo, and Ultima. Recently, many multiplayer role-playing games have been created where thousands of people play and meet in one game world: Ultima Online, Everquest, and Asheron's Call. AI is used to control enemies, similar to those made in action games, moving and entertaining partners and players and supporting characters, such as

### **STRATEGIC GAMES**

In strategic games, people control many units (usually military units, such as tanks, or foreign military equipment) to fight the goddess's eyewitnesses against one or more opponents. Strategy games include narratives of various types of battles: history (Combat), other realities (Command and Conquer), the future of myths (Starcraft), and myths (Warcraft, Myth). One is often confronted with the problems of resource allocation, planning, and defense planning and attacks (Davis 1999). AI is used for two costs: to control the detailed operation of individual units commanded by a person, and as a strategic opponent to play the same type of game against a person. The AI requirements for each unit are different from enemies and allies of action and role-playing games in that they are not intended to be independent but are designed to be good soldiers, and to "follow orders".

### **TEAM GAMES**

Team sports games allow a person to play a combination of coach and players in popular sports, such as soccer (Whatley, 1999), basketball, soccer, baseball, and hockey. AI is applied to two identical roles and roles in Strategic Games, the first being the control unit for all players. Usually one controls one player's keys, such as a quarterback, while the computer controls all the other team members. The second role is like a strategic opponent, in this case the opposing coach. A unique feature of team games in games is that they also play the role of a commentator, who gives the game a play, and the color of commentary on games (Frank 1999).

### **INDIVIDUAL SPORTS**

For individual competitive sports, such as driving, flying, skiing and snowboarding, the computer provides game simulation games from a first or third person perspective. The human player controls the person who

participates in this game competing with other players or computers. A computer player is more like an enemy in an action game than an opposing enemy or unit from a strategy game because the game is often competitive, a real-time game. Individual games may also require commentators. Although we have written some types of genres, genres are an obsession, many games become fertile, including many genres. For example, there are Dungeon Keeper games that allow a person to "jump on the body" of one of their units and play as if it were a temporary game. Also, there are action games where you also have to manage multiple resources and units (like Battlezone). Although there will always be a fading of genres, the basic roles of AI remain the same: enemies, allies, support characters, system opponents, units and allies.

## ROLES

### Tactical Enemies

In early games, computer-controlled enemy tactics often limited the ability to run directly to a player. Enemies were later written or controlled by the simplest machines of the world. In these old games, enemies are made to be very challenging, not with advanced intelligence, but with great guns, solid hideouts, high prices and often "cheat" by being able to see through the walls. More recently, games such as Hal Life (birdwell 1999), Descent 3, Quake III (Keighley 1999), and Unreal Tourmet have included a lot of planning and strategy that makes these enemies more like human beings. Our study (Laird & van Lent 1999; Laird 2000) focuses on building Quake II enemies with the same strengths and weaknesses as human players. In order to beat them, you have to consider them as much as you need to get them out. Our Soar Quakebot is a real-time professional system with many objectives and many strategies and game knowledge. Built within Soar construction and has more than 700 rules. While exploring a certain level, it builds an internal model of its world and uses that model in its tactics, collecting weapons and health nearby, tracking the enemy, and setting ambushes. It also tries to think about the actions of human players by putting them in their shoes (creating an internal model of their status as critical from its perception of the player) and considering what it would have done if it had been a human player.

Creating human-level enemies in these games requires solving many common AI problems and integrating solutions into compatible systems. Enemies must be independent of their goals. They have to deal with complex energy situations, which require active operation, integrated planning, and general understanding. As they move forward, they will need high-quality vision models with the same strengths and weaknesses as humans. For example, when a person is in a dark room, it should be difficult for the enemy AI to hear, identify and locate the person. However, if a person is brought back by a bright hall, the enemy AI should be able to see and capture the person, but they probably will not find him. This is important in game play so that the same tactics and behaviors work well with people and work well with AI enemies. One common complaint among game players is that enemy AI is cheating that spoils the game's gaming experience.

There are many other AI programs to build clever enemies. Due to the expanded nature of the environment, he should be able to navigate, use route planning, spatial thinking, and temporary reasoning. As games become more difficult, enemies will need to plan, combine, and adapt to their enemies' tactics and tactics, using recognition techniques and tactics to oppose opponents, and to learn. Their responses need to be in the middle of the human range depending on the response times and the flow of facts. One can also think of adding basic emotional models, in which enemies become "frustrated" and change their behavior as a result.

## CONCLUSION

From the researcher's point of view, even if you don't care about human AI, computers. The games offer many interesting and challenging areas, solitude, and research problems in AI. We have a strong desire for human-level AI, and we wish to expand computer games to support research support for human-based AI. One good feature working on computer games is that there is no need to try the "Manhattan Project" approach with a monolithic project that tries to create human-level intelligence at all times. Computer games offer continuous space, continuous durability and a series of challenging challenges. With the advent of computers, it has become increasingly commonplace, computer games are becoming increasingly sophisticated, requiring more behavior on their characters. Now is the time for AI researchers to jump in and ride a computer game.

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