

Preface

Games has been an interesting domain for artificial intelligence (AI) research since the origins of the discipline back in the 1950s, although mainly board games such as chess, checkers, or backgammon. Nevertheless, it is between 1999 and 2000 when a number of researches on AI identify interactive video games as an interesting research domain for AI (see, for example, John E. Laird, Michael van Lent: “Human-Level AI’s Killer Application: Interactive Computer Games”. AAAI/IAAI 2000: 1171–1178). The long-term dream of AI research of building intelligent robots with human-like abilities for interacting in the real world is still far from being fulfilled due, among other causes, to the complexities of sensing and acting in the real world. Video games provide synthetic worlds where complex behavior can be shown but where perception and actuation are perfectly under control and, therefore, became a perfect platform for experimenting with software robots (i.e., agents).

Techniques used for AI in commercial video games are still far from state-of-the-art in academia, but with graphics in video games coming close to photo realistic quality, and multi-processor architectures getting common in console and PC game platforms, sophisticated artificial intelligence is getting into the focus of the video game industry as the next big thing for enhancing the player experience, while profiting from the number of spare CPU cycles available in modern hardware. For that reason, industry is getting interested in academic research in AI to provide rich, robust, and scalable techniques for controlling non-player characters and provide richer narrative schemes in games.

This book collects some of the most relevant results from academia in the area of artificial intelligence for games. The selection of contributions has been biased toward rigorous and theoretically grounded work that is also supported with developed prototypes, which should pave the way for the integration of academic AI techniques into state-of-the-art electronic entertainment games. The chapters in the book cover different areas relevant to AI in commercial games: pathfinding, decision making, learning, authoring, and storytelling.

Regarding pathfinding, the book describes recent real-time heuristic search algorithms that alleviate the scalability problem of A* techniques used in commercial games, which at the same time exhibit a visually appealing behavior. Techniques are also presented that, based on the semantic annotation of 3D virtual worlds,

can learn pathfinding behavior by analyzing traces from actual players. Tools and techniques are described for incorporating semantic information into the game design and development process, thus improving the embedded information contained in immersive game worlds, and leading to new possibilities for NPC constructions such as meaningful in-game learning and agent portability.

Regarding decision making, the book describes new techniques for authoring tools that facilitate the construction by game designers (typically non-programmers) of behavior controlling software, by reusing patterns or actual cases of past behavior, represented as behavior trees. Using domination games as a test bed, the book describes different approaches for building cooperative agents, with different requirements for knowledge engineering, from purely hand-coded to inductive approaches. Techniques for automatically or semi-automatically learning complex behavior from recorded traces of human players using different combinations of reinforcement learning and case-based reasoning are also described.

Much research on artificial intelligence in games has been devoted to creating opponents that play competently against human players, while an alternative goal is to try to deliver the best possible experience within the context of the game. This novel goal is much more attainable by approaching AI reasoning for games as “storytelling reasoning.” Several technological approaches are presented in the context of such a perspective, including the use of planning techniques for camera placement and sequencing of plot points in a game, and constraint optimization for automatically adapting lighting qualities of a scene to the player preferences.

Key results from applied research on AI within the last 10 years have been collected here to provide a reference work for both academia and industry that will help to close the gap between both worlds.

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