

# Preface

When students at MIT competed against each other in the first real-time graphical computer game *Spacewar* in 1962 (Graetz 1981), probably none of them could have dreamt how realistic and complex computer games would develop to be in four decades and how large a business would grow around them. Commercial arcade games such as *Pong* and *Space Invaders* arrived in the 1970s, and home computers brought computer games within the reach of all enthusiasts in the 1980s. Since then, game development and programming have turned from being small amateur enterprises into a more professional and larger-scale industry. Nowadays, the typical time span of development from an idea to a finished product is about two years and demands the work contribution of 20–50 persons. The current estimates of the annual revenue generated by computer games are around €25 billion and the annual growth is predicted to be over 10% over the next few years (Game Developers' Association of Australia 2003).

The game industry has slowly awakened to the possibilities of academic research. International Game Developers Association (2003) lists *game programming* among the eight core topics of game-related research areas. Game programming is defined to cover aspects of computer science relevant to gaming. This interest in novel solutions and improved methods is understandable, because the marketing of computer games is highly technology-driven. Earlier, the selling points were the amount of colours and real timeliness, then the amount of polygons and the frame update frequency, and now the amount of simultaneous players in a networked game and the realism of the simulation. These features also reflect what programming problems have been on the focus of the game developers at that time.

Apart from classical games with the likes of Chess, Backgammon and Go, computer games as a research topic remained on the margins of computer science for a long time. In fact, the turn of the new millennium saw the birth of several game-related academic conferences and journals and various game programming communities comprising also computer scientists. At the same time, the spectrum of the research topics has extended to cover problems encountered in real-time interactive computer games and networked multi-player games.

Game programming is not an isolated field of study but also includes many essential research areas of 'traditional' computer science. Solving an algorithmic or a networking problem is always more than just getting it done as quickly as possible; it is about analysing what is behind the problem and what possibilities there are to solve it. This is the direction where this book heads, and our intention is to provide the reader with a glance into the world of computer games as seen from the perspective of a computer scientist.

We assume that the reader is familiar with the fundamentals of algorithms and data structures (e.g. complexity analysis and graph theory). In case of uncertainty, they can be

refreshed by revising basic textbooks such as *Introduction to Algorithms* (Cormen *et al.* 2001) and, of course, the ever so inspiring *The Art of Computer Programming* (Knuth 1998a,b,c). We describe classical game algorithms as well as review problems encountered in commercial computer games. For this reason, selecting material for this book has been arduous tightrope between these two worlds. The current selection may seem a bit of a ragbag, but the common factor in choosing the topics has been a combination of algorithmic and practical interest.

While preparing the manuscript, colleagues and students, intrigued by the words ‘computer game’, have asked us: ‘Will it be a fun book to read’? After we have explained that it is really about algorithms and networking, they have concluded (perhaps somewhat disappointedly): ‘Oh, it’s a serious book then’. We hope the truth is neither black nor white (not that we are preferring dull grey), but we are sure this book will turn out to be both fun and serious – at least we have had serious fun while being funnily serious.

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