

Dimitri Plemenos and Georgios Miaoulis (Eds.)

Intelligent Computer Graphics 2011

Studies in Computational Intelligence, Volume 374

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Preface

Intelligent techniques are used since several years in various research areas using computer programs. The purpose of using intelligent techniques is generally to optimise the processing time, to find more accurate solutions, for a lot of problems, than with traditional methods, or simply to find solutions in problems where traditional methods fail. By “intelligent techniques” we mean above all Artificial Intelligence based techniques but not only. In some cases, simple human intelligence may help invent problem adapted new processing methods which greatly improve existing ones. In Computer Graphics, the use of intelligent techniques started more recently than in other research areas. However, during these last two decades, the use of intelligent Computer Graphics techniques is growing up year after year and more and more interesting techniques are presented in this area.

The purpose of this volume is to present current work of the Intelligent Computer Graphics community, a community growing up year after year. This volume is a kind of continuation of the previously published Springer volumes “Artificial Intelligence Techniques for Computer Graphics” (2008), “Intelligent Computer Graphics 2009” (2009) and “Intelligent Computer Graphics 2010” (2010).

What is Intelligent Computer Graphics? It is a set of Computer Graphics problems whose solution is strongly improved by the use of intelligent techniques. These techniques are mainly based on Artificial Intelligence. So, in Declarative scene Modelling, problem resolution, constraint satisfaction and machine-learning techniques are used. In scene understanding, as well as in improved Monte-Carlo Radiosity, heuristic search techniques allow to improve solutions. In virtual world exploration, efficient camera movement is achieved by strategy games techniques. In behavioural animation, multi-agent techniques, as well as evolutionary algorithms are currently used.

However, it is obvious that techniques based on Artificial Intelligence cannot resolve all kinds of problems. In some cases, the use of specific Artificial Intelligence techniques may become too heavy and even inefficient, while, sometimes, simple human intelligence, easy to implement, can help find interesting solutions in cases where traditional Computer Graphics techniques, even combined with Artificial Intelligence ones, cannot propose any satisfactory solution. Such a case is the one of visual scene understanding, where it is sometimes easy to know what kind of view is expected by the user. Another case where the use of simple human intelligence is often requested is data visualisation, when a little bit of imagination can give interesting results.

During a long time, Artificial Intelligence techniques remained unknown and unused for Computer Graphics researchers, while they were already used in other graphic processing areas like image processing and pattern recognition. We think

that the 3IA International Conference on Computer Graphics and Artificial Intelligence, organised since 1994, grandly contributed to convince many Computer Graphics researchers that intelligent techniques may allow substantial improvements in a lot of Computer Graphics areas. Nowadays, more and more researchers in Computer Graphics all over the world are interested in intelligent techniques. We think that the main contribution of techniques issued from Artificial Intelligence is to allow invention of completely new methods in Computer Graphics, often based on automation of a lot of tasks assumed in the past by the user in an imprecise, often inefficient and (human) time consuming manner.

For Computer Graphics researchers it is important to know how the use of intelligent techniques evolves every year and how new intelligent techniques are used in new areas of Computer Graphics year after year.

When the 3IA International Conference on Computer Graphics and Artificial Intelligence was first created by Dimitri PLEMENOS in 1994, its purpose was to put together Computer Graphics researchers wishing to use Artificial Intelligence techniques in their research areas, in order to create emulation among them. Nowadays, seventeen years after the first 3IA International Conference (3IA'94), the number of Computer Graphics researchers using Artificial Intelligence techniques became very important. Thus, an additional purpose of the 3IA Conference is to keep researchers informed on the existence of new intelligent methods, and even of corresponding software, for specific areas of Computer Graphics.

This volume contains selected extended papers from the last 3IA Conference (3IA'2011), which has been held in Athens (Greece) in May 2011. This year papers are particularly exciting and concern areas like virtual reality, artificial life, data visualization, games, global illumination, point cloud modelling, declarative modelling, scene reconstruction and many other very important themes.

We think that in Computer Graphics still exist a lot of areas where it is possible to apply intelligent techniques. So, we hope that this volume will be interesting for the reader and that it will convince him (her) to use, or to invent, intelligent techniques in Computer Graphics and, maybe, to join the Intelligent Computer Graphics community.

Dimitri Plemenos
Georgios Miaoulis

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