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Ruqian Lu Songmao Zhang

Automatic Generation of Computer Animation

Using AI for Movie Animation

Springer

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Preface

We are both fans of watching animated stories. Every evening, before or after dinner, we always sit in front of the television and watch the animation program, which is originally produced and shown for children. We find ourselves becoming younger while immerged in the interesting plot of the animation: how the princess is first killed and then rescued, how the little rat defeats the big cat, etc. But what we have found in those animation programs are not only interesting plots, but also a big chance for the application of computer science and artificial intelligence techniques. As is well known, the cost of producing animated movies is very high, even with the use of computer graphics techniques. Turning a story in text form into an animated movie is a long and complicated procedure. We came to the conclusion that many parts of this process could be automated by using artificial intelligence techniques. It is actually a challenge and test for machine intelligence. So we decided to explore the possibility of a full life cycle automation of computer animation generation. By full life cycle we mean the generation process of computer animation from a children's story in natural language text form to the final animated movie. It is of course a task of immense difficulty. However, we decided to try our best and to see how far we could go.

After nearly ten years of effort, we have been successful in developing a rough prototype of this technique which resulted in a software package called SWAN. A cartoon produced by SWAN, called "the three brothers", was shown on CCTV (Chinese Central Television Station) in October 1995. We are aware of the fact that this prototype is rough, because our technique is still far from being mature enough to produce delicate animated movies of commercial value. Nevertheless, we have been encouraged by the conclusion of an appraisal committee chaired by Academician, Prof. Yunmei Dong: the industrialization of the SWAN technique would hold great potential for economical and social benefits.

It is appropriate to make a note here about the contents of this book. Following the completion of our SWAN project, we carried out a review and assessment of the techniques developed in it. Based on the review, we have improved and redesigned many parts of its methodology, partly in the interest of scientific research, partly for the sake of preparing the implementation of the second version of SWAN. In this sense, the contents of this book conforms to the new design, not quite to the originally implemented one.

The SWAN project has received a grant from a special foundation of the President of the Chinese Academy of Sciences. We owe special thanks to the former President of the Chinese Academy of Sciences, Current President of the Chinese Association of Science and Technology, Academician, Prof. Guangzhao Zhou; the

former Vice-President of the Chinese Academy of Sciences, Current Vice-President of the Chinese Association of Science and Technology, Academician, Prof. Qiheng Hu; and the former head of department of the Bureau for High-Tech, current Vice-Director of the Institute for Software, Mr. Wenzeng Yang. We are grateful to the Institute of Mathematics, Institute of Computing Technology, Lab for Intelligent Information Processing, Lab for Management, Decision, and Information Sciences, Center for Brain and Mind Science of the Chinese Academy of Sciences for their financial support. SWAN has also been supported by the Chinese Natural Science Foundation (especially project 69733020), by Key Projects of the Ministry of Science and Technology and by 863 High-Tech Projects.

More than 30 graduate students have participated in the SWAN project and made their contributions. Following is a list of some of their names: Qing Geng, Wenhong Zhu, Xiaobin Li, Lixin Yu, Zhenghao Jin, Dejie Yang, Yue Xu, Haihu Shi, Ronglin Wan, Zhaobin Chen, Ying Zhao, Yuan Li, Yi Luo, Bo Gao, Yuejiao Zhou, Yinghao Ma, Yizhen Li, Yujie Wang, Haixia Du, Lu Li, Ping Yang, Lu Fan, Guangfeng Ji, Xuesheng Zhang, Lengning Liu, Fan Yang, Xiaolong Jin, Chengmin Sun, Xiangliang Meng, Jingwei Cai.

We are also very thankful to Prof. Zichu Wei, who has made an important contribution to the SWAN project during discussions about the design and implementation of the SWAN software, and through his involvement in the management of the project.

We thank Prof. Christian Freksa of the University of Hamburg, Prof Bernd Krieg-Brueckner and Prof. Manfred Wischnewski of the University of Bremen for their invitation to give a series of seminar talks about SWAN at these universities. We also thank Prof. Manfred Broy of the Technical University of Munich and Prof. Jörg Siekmann of the University of the Saarland for their invitation to introduce SWAN at these universities. We owe special thanks to Prof. Jörg Siekmann. Without his encouragement and support the publishing of this manuscript would have been impossible. While preparing the talks, the first author of this book had the opportunity to further improve the manuscript.

Last, but not least, we would like to thank Ms. Wenyan Zhang and Dr. Cungen Cao for their valuable help in the final editing of the manuscript. We also thank the editors of the LNAI series and Springer-Verlag, and Ms. Karin Henzold for their kind support and help in the editing and publishing of this manuscript.

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Ruqian Lu
Songmao Zhang

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