

Preface

General Video Game AI (GVGAI) was originally inspired by one of the previous work carried out at a Dagstuhl seminar in 2013, in which a group of researchers played with the idea of defining a language for video games and building a framework (and competition) around it for agents to play these games. The original ideas outlined in this work (general video game playing, game classification, game tuning and game generation) have materialized over the years in concrete software, general approaches, research projects and an international competition.

The GVGAI framework and competition were born at the University of Essex (UK) in 2014. Previous experience of organising competitions at this University made the Game Intelligence Group a perfect environment to start. Spyridon Samothrakis, Simon M. Lucas and Diego Perez-Liebana kick-started then this ambitious project, in collaboration with Julian Togelius (then at ITU Copenhagen, Denmark) and Tom Schaul (then at New York University, US), who developed the first engine for the Video Game Description Language (VGDL) in Python. The GVGAI competition was held for the first time in 2014 at the IEEE Conference on Computational Intelligence and Games. Since that first edition, focused on planning agents playing a total of 30 different games, the *GVGAI world* has kept growing. On July 2019, the framework counts on 200 games and 5 different competition tracks. Raluca D. Gaina joined the team to bring the 2-Player track, Ahmed Khalifa brought the Procedural Content Generation challenges and Jialin Liu led the (repeatedly requested) learning track. Since 2014, more than 200 students and researchers around the globe have submitted agents and generators to the challenge, and several high-level education institutions have used GVGAI to propose assignments and student projects at different levels (undergraduate, master and PhD). A recent survey on GVGAI cites around 100 papers that use GVGAI for research.

This book is a summary of our work on GVGAI for the last five years. This book presents the main components of GVGAI, from the Video Game Description Language (VGDL) used to generate games to the framework itself and the multiple opportunities for research it presents. The book is also a collection of what is, in our opinion, our most relevant work on this domain and dives deep into optimization and control algorithms. Finally, multiple exercises and project ideas are proposed at the end of each chapter as suggestions to take this research further.

The authors,
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