

Games and Computational Creativity

Computer games have for decades benefited from being a meeting point for both technology and the arts. The medium is both a producer and a consumer of the latest scientific innovations, while simultaneously a broad and diverse means of self-expression for the modern era. This complementary mix of scientific and artistic discovery is also what drives the cutting-edge research in computational creativity.

Computer games define the ideal application domain for computational creativity for the unique features they offer: being highly interactive, dynamic and content-intensive software applications. Their multifaceted nature is key as the successful orchestration of different art domains (such as visual art, audio and level architecture) with game mechanics is a grand challenge for the study of computational creativity. Computer games not only challenge computational creativity, providing a creative sandbox for advancing the field, but they also offer an opportunity for computational creativity methods to be extensively assessed (via a huge population of gamers) through commercial-standard products of high impact and financial value.

Games are arguably the only domain for computational creativity where the techniques studied and developed in this community are necessary, rather than just desirable. There is a commercial imperative for procedural generation in order to produce large-scale games on a realistic budget, and for enabling new types of games which feature generative aspects (e.g. Spore, Minecraft, Audiosurf). There is ample potential for specialized algorithms to be brought to bear on those problems of game design and development that are believed to require creativity when solved by people.



Computational Creativity Group at Universidad Complutense de Madrid

The NIL research group at Universidad Complutense de Madrid (nil.fdi.ucm.es) currently develops a number of technologies focused on shifting the possibilities of narrative and videogames to the next level. By creating tools that connect to interactive environments and feed them with narrative content, videogames users can experience adaptive stories in which the player takes a main role.

Various Artificial Intelligence techniques contribute towards this goal. Rich interactions require the use of additional techniques of Knowledge Representation, Expert Systems, Case-Based Reasoning, Evolutionary Algorithms, User Modeling and Computational Creativity. These technologies converge into

One of the systems the NIL group develops is STella (Story Telling Algorithm). STella is a software that generates narrative content by controlling intelligent avatars in virtual environments like videogames and let them behave in a way that the player experiences a meaningful story. STella uses both a model of world generation and a model of narrative quality and join them into a hybrid model of story generation.

Computational Creativity Group at Goldsmiths University of London



The Computational Creativity Group at Goldsmiths (cgg.doc.gold.ac.uk) runs research projects both on videogames or computational creativity, as well as ones which explore the confluence of the two areas. We are involved in a number of projects to bring greater formalism to the study of creativity in software, and are also well known for our applications in pure mathematics, graphic design, creative language, video game design and the visual arts.

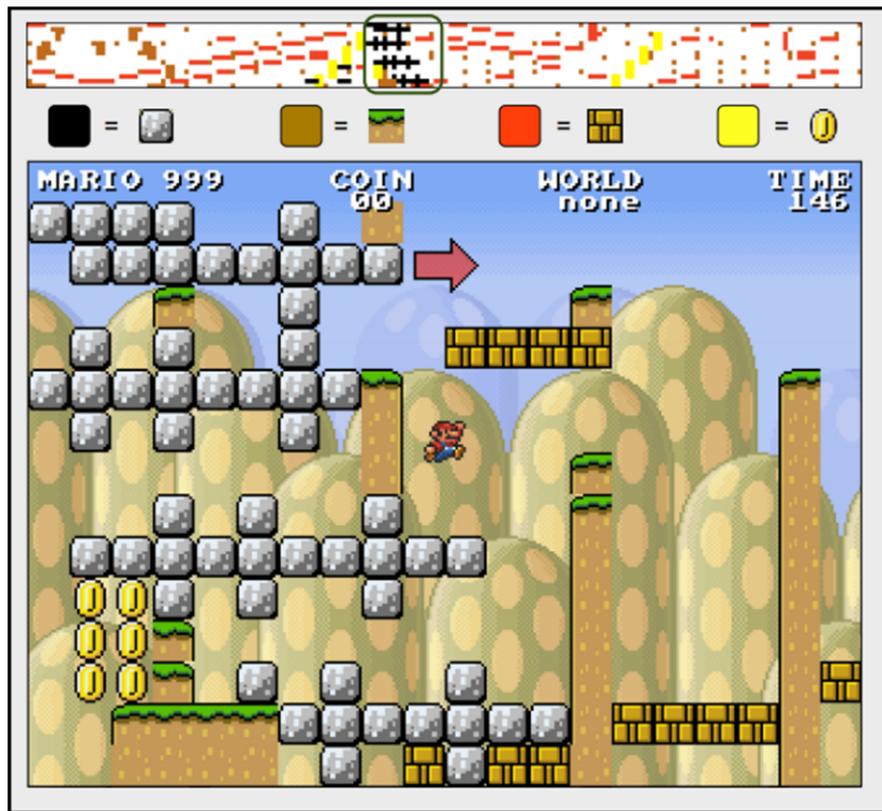
Our current projects include the WHIM project (www.whim-project.eu) on fictional ideation - building software which can propose fictional ideas and then, through collaboration with other research groups, evaluate and build these ideas into creative artifacts such as games. We are also the home of ANGELINA, a piece of software being built to investigate how software can act as an independently creative videogame designer. ANGELINA is currently being developed under the Creative Code Generation research grant, investigating how software can write its own program code to invent new ideas for games.

Center for Computer Games Research at IT University of Copenhagen

Formally established in 2003, the Center for Computer Games Research (game.itu.dk) houses a multidisciplinary research group with backgrounds in the Arts, Humanities, Social Sciences and Computer Science. The group performs basic and applied research, approaching games from a variety of perspectives including theoretical analysis, design, ethnographic and qualitative approaches, AI, user (cognitive and affective) modeling and player experience. In the field of procedural content generation for games, the center includes several renowned scholars in the field, focusing on using models of player experience to evaluate generated game content, AI-assisted design tools, as well as formalisms and experiments on the generation of complete games.

The center has participated in several national and international research projects, and is currently involved in the Nordic Games Research Network, the 'Serious Games on a Global Market Place' research project funded by KINO (Danish Strategic Research Council), and the 'Adaptive Game Content using Computational Intelligence' research project funded by FTP (Danish Technology and Innovation Research Council). Members of the center are involved in editorial boards of the most respected journals in the fields of game studies,

game culture, game AI and affective modeling and IEEE Task Forces focusing on games. Among ongoing projects is the authorship of the first comprehensive textbook on Procedural Content Generation for Games (www.pcgbook.com), which includes contributions from over 10 renowned scholars in the field.



Institute of Digital Games at University of Malta

The Institute of Digital Games (game.edu.mt) is the locus of game research and education at the University of Malta, and the entity responsible for coordinating the growing body of work in game research, design and development at the university. It was established in 2013 to deliver world-class postgraduate education and research in game studies, design and technology. The international team of researchers at the institute come from various disciplinary backgrounds including literature and media studies, computer science, human-computer interaction and design. Even though researchers at the institute engage in games research from various disciplinary backgrounds, a unifying focus among them is the intersection of player experience and game design. This focus is reflected in the M.Sc. programme, which includes courses that explore the play experience from myriad theoretical and practical perspectives.

Researchers of the institute are involved in numerous externally funded research projects. Of particular interest to computational creativity is the FP7 ICT project C2Learn (www.c2learn.eu) which aims to



combine digital gaming and social networking for the purposes of fostering co-creativity in learning processes in the context of both formal and informal educational settings, and the FP7 Marie Curie CIG project AutoGameDesign (www.autogamedesign.eu) which aims to combine machine learning with computational predictors of emotive creativity for the purposes of autonomous creative systems capable of generating a full-fledged interactive game experience.