

IAT 811 *Computational Poetics (Metacreation)*

3 credits

Spring 2008

Instructor: Philippe Pasquier

Draft course description – subject to change.

Course Description

In all classical creative practices, the creator of the work and the creator of the tools used to make the work remain distinct. There is the instrument maker and the musician, the camera manufacturer and the photographer, the software developer and the user, etc. Digital tools allow artist-programmers to design and build software tools that fit their continually redefined needs. This is the return of the artist-technician, artist-engineer, artist-scientist. With metacreation, the creators are the designers of generative and proactive computer softwares endowed with creative behaviour. Under this paradigm, the idea that the creation of the computer tool takes precedence over its utilization is born.

This core graduate course will provide you with the opportunity to study the theory and practice of metacreation. Tools and techniques from artificial intelligence, artificial life and machine learning will be introduced and exemplified through the study of previous artistic works using them. The course will be organized so that making a project by exploring metacreation in your area of research becomes the primary focus. The interweaving of related theoretical and practical issues will help you situate your work within a larger perspective on art, science and technology.

Pre-requisites and course enrolment

This is a core course, all SIAT graduate students can enroll. While it is not a formal pre-requisite, students will benefit from having completed a foundational multimedia programming computation course (e.g. java, processing) such as IAT 800 or have good knowledge of at least one prototyping environment (MAX/MSP/JITTER or Pure Data / GEM). Students without a strong background in computer science need to contact the instructor prior to enrolment.

Topics

- **Artificial intelligence** (autonomous agents, cognitive and reactive agent architectures, multi-agent systems, agent communication)
- **Artificial life** (evolutionary computing, cellular automata, swarm intelligence)
- **Machine learning** (artificial neural networks, instance-based learning, reinforcement learning)
- Related issues: theory of creativity, history of generative art, philosophy of science/technique (technophobia vs technophilia), philosophy of mind, cognitive sciences, validation techniques.

Outcomes

The goal of this course is to introduce theories and approaches to metacreation, that is, the design of machines endowed with creative behavior. Each student will exploit some of the techniques introduced through a project. By doing so, the students will deepen their understanding of a variety of techniques from the fields of artificial intelligence, artificial life and machine learning as well as exercise their research skills. The concrete goal of the course is to produce a research paper presenting the student's work (theoretical background, system and/or experiments, results, discussion and related work and conclusion) that is as ready as possible for submission in a high profile conference or journal.

Evaluation and Grading

This section particularly is in draft form and is subject to change.

30% Theoretical research (includes a presentation in class)

30% Project (10% process, 10% result, 10% presentation)

30% Research Paper (refining and presenting all of the above together)

10% Participation

References

This is a graduate course. In addition to the reference material, students will be responsible for finding research papers and texts suitable for the work undertaken.

Art and Science:

Metacreation: Art and Artificial Life, Mitchell Whitelaw, MIT Press, 281 pp., 2004, ISBN 0-262-23234-0

Information Art: Intersections of Art, Science and Technology, Stephen Wilson, MIT Press, 2002, 945 pages.

Artificial Life Models in Software, Andrew Adamatzky, Maciej Komosinski (Eds.), 2005, Springer, 344 p. ISBN: 978-1-85233-945-6

Creative Evolutionary Systems (With CD-ROM), by David W. Corne, Peter J. Bentley, The Morgan Kaufmann Series in Artificial Intelligence, 2002, 684 pages, ISBN: 978-1558606739

Music and Artificial Intelligence, Christina Anagnostopoulou, Miguel Ferrand, Alan Smaill (Eds.), Proceedings of the Second International Conference, ICMAI 2002, Edinburgh, Scotland, UK, September 12-14, 2002, Lecture Notes in Computer Science, vol. 2445, Springer, 2002, ISBN 3-540-44145-X.

Evolutionary Computer Music, Miranda, Eduardo Reck; Biles, John Al (Eds.), 2007, Springer, 259 p. With CD-ROM., ISBN: 978-1-84628-599-8.

Artificial Life For Computer Graphics, Terzopoulos, D., (1999), in Communications of the ACM, Vol 42, No. 8, p32-42

Science:

Multiagent Systems: A Modern Approach to Distributed Artificial Intelligence, Gerhard Weiss, The MIT Press, *1999, 643 pages, ISBN: 978-0262232036*

Machine Learning, Tom Mitchell, McGraw Hill, 1997.

Introduction to Evolutionary Computing, Eiben, A.E. and J.E. Smith, Springer, Berlin, 2003.

An Introduction to Genetic Algorithms, Mitchell, M., MIT Press, Boston, Mass., 2002.

Computational Intelligence: an introduction, Engelbrecht, A.P., John Wiley & Sons, Chichester, England, 2002.

Artificial Life: The Quest for a New Creation, Stephen Levy, Random House Value Publishing, 1994, ISBN: 978-0517118085

Swarm Intelligence, Russell C. Eberhart, Yuhui Shi, James Kennedy, Morgan Kaufmann; The MIT Press, 2001, 272 pages, ISBN: 978-0262041942

Links:

Instructor's Web page: <http://www.sfu.ca/pasquier/>

Course's Web page: <http://www.sfu.ca/pasquier/IAT-811/>