

Algebraic, logical, and computational approaches to dynamic geographic phenomena

Mike Worboys

This seminar will survey past and current approaches to representing and reasoning about dynamic aspects of the world, particular in the context of occurrences at geographic scales. We will begin by a discussion of the ontological foundations related to notions such as event, process, change, action. The discussion will then move to graphical, logical and algebraic theories, particularly as they may be used in representations leading to information system modeling. The seminar concludes with application to a general event-based representation of dynamic geographic phenomena.

Audience

This seminar could be of interest to computer scientists, information systems engineers, and mathematicians, particularly those with a spatial focus. Faculty, staff, and graduate students are most welcome to attend.

Schedule and credit rating

We will meet for one hour each week during Spring Semester, 2005. The exact time will depend on the commitments of participants.

For those who wish to take it for credit, the course will be registered as a 1 credit 598 course. Grading will be dependent on participation and an extended piece of work to be agreed between participant and instructor.

Selected Reading (* indicates major source, ~ indicates background)

~ Allen, J.F., Towards a general theory of action and time. *Artificial Intelligence*, 23:123-154, 1984.

~ Allen, J.F. and Ferguson, G., *Actions and events in interval temporal logic*. Technical report TR521, Computer Science Department, University of Rochester, 1994.

Baeten, J.C.M. A brief history of process algebra, *Rapport CSR 04-02, Vakgroep Informatica, Technische Universiteit Eindhoven*, 2004

~ Best, E., Devillers, R. and Koutny, M., *A unified model for nets and process algebras*, in *Handbook of Process Algebra*, ed. Bergstra, J., Ponse, A. and Smolka, S., Amsterdam: North-Holland, 873-944, 2001.

~ Brookes, S.D., Hoare, C.A.R., Roscoe, A.W., A Theory of Communicating Sequential Processes, *Journal of the ACM*, 31(3): 560 – 599, 1984.

~ Duan, Z., Bernstein, A. and Lewis, P. A model for abstract process specification, verification and composition, *ICSOC04, 2nd International Conference on Service Oriented Computing*, New York City, pages 232 – 241, 2004

Galton, A., *Qualitative Spatial Change*. Oxford University Press, 2000.

Grenon, P. and Smith, B., SNAP and SPAN: Towards dynamic spatial ontology. *Journal of Spatial Cognition and Computation*, 4(1): 69-104, 2004.

~ McCarthy, J. and Hayes, P., Some Philosophical Problems from the Standpoint of Artificial Intelligence, in *Machine Intelligence 4*, ed. B. Meltzer and D. Michie, Edinburgh, UK: Edinburgh University Press pp. 463-502, 1969.

*Milner, R., *Communicating and mobile systems: the π -calculus*, Cambridge University Press, 1999.

Shanahan, M., *The event calculus explained*, in *Artificial Intelligence Today*, ed. M.J.Wooldridge and M.Veloso, Springer Lecture Notes in Artificial Intelligence no. 1600, Springer, pages 409-430, 1999.

~ Stirling, C., *Modal and temporal properties of processes*, Springer, 2001.

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