

5. Metalithicum-Klausur

Computation as literacy: Self Organizing Maps (May 22nd – 24th, 2014)

Organized by the laboratory for applied virtuality, Chair of Computer Aided Architectural Design (CAAD), Institute for Technology in Architecture (ITA), Swiss Federal Institute of Technology (ETH) Zürich: Prof. Dr. Ludger Hovestadt, Dr. phil. Vera Bühlmann, and PhD candidate Vahid Moosavi, in collaboration with the library Werner Oechslin in Einsiedeln, Switzerland ([http:// www.bibliothek-oechslin.ch](http://www.bibliothek-oechslin.ch)).

Summary of the Conference

Recent advancements in computer science, namely in data-driven modeling techniques, have opened up a new level of design culture. In this conference we would like to consider and discuss how to theorize and apply highly abstract computational modeling procedures in architectural design.

As architects, computer scientists and philosophers we think that the state of the art procedures, as they are implemented today in CAAD tools such as scripting libraries and parametric design environments, are undoubtedly of enormous power. Yet we think that they have potentials and limits which need to be discussed independent of purely pragmatic questions like those related to computation power, the availability of programming skills among architects and engineers, or a sudden plenty of available data to work with. How to deal with computational procedures touches upon many of the issues at stake in the old disputes around architecture as art vs. architecture as science, but we don't find this question adequately addressed by either one camp. So we would like to consider the implications involved with an open mind by relating this question to the philosophical approaches to computability and calculate-ability more abstractly, and with that, to the relation between mathematics and concepts. More precisely, we would like to ask how the genuinely synthetic character of the computational procedures may be theorized not in terms of a formalist and representational paradigm on the one hand, nor in a strictly case- based analytical paradigm on the other, but in terms of what we might preliminarily call 'computation literacy'.

With this aim, we would like to raise one particular procedure into the exemplary status as a point of reference for our discussions: Self Organizing Maps (SOM), a procedure which has been introduced 30 years ago by Teuvo Kohonon. It is a generic and promising procedure, which, as we think, is somewhat restrictively and inadequately viewed as a kind of neural network. Based on our theoretical approach, and on some practical experiments, our hypothesis is that it has particular capacities in relation to data-driven modeling that seem yet to be largely unexplored. If we try to understand SOM's abstractness similar to how we understand that of Markov Chains, SOM promises to be of comparable importance as the latter (in terms of general applicability). Our core interest is to discuss how we could grasp this level of abstractness, and with what benefits and what costs this would be related.

Following this practical and theoretical interests we would like to discuss on three levels:

1. Section one: Self Organizing Map (SOM) as a generic computational modeling tool .
2. Section two: Discussions on the theoretical and philosophical status of abstract/ universal algebra in general, and on the approach of viewing the operational level of computation as literacy in particular.
3. Section three: Possible applications in CAAD and urban design using SOM or similar tools for data-driven computational modeling methods.

Format of the Conference

We would like to work in a generous and sustainable format for discussions around the three above mentioned areas. Therefore we choose a semi-public format for the conference, and plan to invite a small group of speakers and guests. Each speaker will have up to one hour for giving a lecture, and another hour for discussing his/her paper. All speaker's flights and accommodation will be provided for. The lectures as well as excerpts from the conversations will be published as a dedicated volume in the applied virtuality book series (ambra, Vienna).