Summary

Abstract With the Unified Modeling Language (UML) for the first time a standardized object-oriented notation is available, that ends the quarrel about notations taking place in past decades. Various scientific publications have pointed out, however, that the UML cannot be appropriately used for modelling temporal GIS-Applications in an adequate way. A temporal GIS-Application is a Geographical Information System (GIS), that is adapted to subject-specific requirements, and which, beside spatial aspects, also takes temporal ones into consideration. This thesis deals with the definition of a notation, the Spatiotemporal Versionbased Unified Modeling Language (STVersionUML), as a strictly additive extension of UML, which integrates conceptions of space and time, especially from the sphere of Geographical Information Science and adjacent disciplines, and, in doing so, it orients itself by already existing international standards. This notation can be used for the conceptual modelling of the structural view of temporal GIS-Applications. The aim is to present a notation with STVersionUML which on the one hand is easy to apply and on the other hand describes the requirements of a temporal GIS-Application completely, correctly and precisely. According to Kant, space and time are not objects of perception, but can underlie the construction of representations of real, but also ideal objects and their changes in time. For this, man uses dichotomous concepts of space and time. From the sphere of philosophy, e. g. the absolute vs. relative or the discrete vs. continuous view of space and time are known. Interestingly enough, this concepts turn up again in Geographical Information Science, but also in other fields, like artificial intelligence (AI). The data-models of Geographical Information Science are either classed with the object- or field-view. In the object-view objects exists, having properties and maybe even spatial properties, defining space, whereas in the field view space can be used to generate objects. With reference to time, artificial intelligence for a long time has used so called "fluents" to be able to describe continuous changes. Contrary to this, discrete changes are modelled by (way of) events which – in their turn – correspond to an object view. STVersionUML transforms existing concepts of space and time as well, as the combination of these dimensions to so called "stereotypes". Stereotypes are the essential model-elements of the UML specification 2.0 to extend the metamodel of UML. To a stereotype attributes, or tag definitions, can be added, which may be regarded as meta-information and finally has to been seen as invariants for instances of the stereotypes.