
ChronOntology, a gazetteer for temporal terms

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Abstract

In the last years several place gazetteers for the archaeologies and historical sciences have emerged on the web. By using semantic technologies these gazetteers act as linked data hubs connecting multiple datasets of varying thematic focus and of different structural properties through the geo-spatial norm data they provide. In contrast, the role of period gazetteers and temporal norm data for classifying and connecting research objects is much less well understood.

ChronOntology (<https://chronontology.dainst.org/>) is a system for storing, managing, mapping and publishing temporal terms (periods). It is the result of a DFG-funded project and part of the norm data branch of the idai.world (<https://idai.world/>), a system of webservice developed and hosted by the German Archaeological Institute (DAI). ChronOntology's core is a rich semantic modeling of various terminological systems for cultural periods. The data model can describe their semantic relations and is based on CIDOC CRM and Doerr et al. (2006). A central tenet is the separation of a temporal term's definition from any dating information about the term. Only the definition determines whether one is talking about the same thing, and temporal information is meaningful only in connection with the definition. However, since strict period definitions are often not the focus of the research literature, ChronOntology currently represents them by a system of period types such as "political" or "material culture" or subtypes such as "pottery". The view of periods as concepts with separate definitions and dating information complements other approaches to period gazetteers where spatiotemporal information is seen as part of the definition of the terms themselves.

Each defined temporal term is automatically associated with a phenomenological spacetime volume (STV), i.e. the area in space and time where it happened, regardless of what we actually know about its extent. STVs allow for periods such as "Neolithic" to take place at different times in different regions. However, e.g. "Neolithic in the Levant" might seem to denote the same as "Neolithic, limited in a strictly geographic sense to the Levant", but has in fact a different definition. Any concretely given spatial and temporal information is an approximation of the phenomenological spacetime volume. ChronOntology uses widgets for space and time to visualise the concretely given information. ChronOntology itself concentrates on the temporal aspect, while the geographical aspect is handled by DAI's gazetteer for place names idai.gazetteer.

ChronOntology is designed to accommodate large amounts of data with varying degrees of data quality and completeness and all typical information that comes with temporal terms. It attempts to model the semantics of the terms explicitly as far as they can be inferred from the data source. So far the system comprises 13.000+ periods and cultures.

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In this talk we present a number of practical case studies. These case studies demonstrate the advantages of ChronOntology's approach over less structured ways of representing temporal data, and they make full use of the underlying time ontology. In fact, possible new relationships between periods are only added if we have actual data where this particular relationship is needed.

The first case study is the use of temporal terms in the DFG Priority Programme "Entangled Africa: Inner African Relations between the Rainforest and the Mediterranean, Approximately 6000 – 500 Years Ago", where ChronOntology is used to align multiple dating systems and to make explicit the contradictions between these dating systems and different uses of terms such as "Nubia". For this case study we have devised a new way of modelling period definitions with clusters of CIDOC CRM properties.

The second case study is the use of ChronOntology for the temporal aspects of a virtual reconstruction of the Roman theatre in Catania. This is done in collaboration with the Istituto di Scienze del Patrimonio Culturale (ISPC) in Rome and Lecce within the EU project SSHOC (Social Sciences & Humanities Open Cloud). This case study highlights the interplay of temporal information associated with an excavation with the temporal norm data already stored in ChronOntology.

The third case study will explore the use of ChronOntology as a norm data system for the semantic annotation of time-related terms in texts from ancient Greece, for example in the work of the Greek geographer Pausanias (110-180 AD). The last case study examines strategies of inferring information based on the semantic connections between periods. One aspect is that periods that are still ongoing behave differently than periods that have already ended.

The case studies necessitate further extensions of the time ontology. For example, we are working to accommodate events, which can mark the beginnings or ends of periods, and "non-modern" periods, i.e. temporal terms that have been defined before the 19th century. All changes to the underlying ontology also lead to adaptations of the system's frontend, backend and data input workflow, including different visualisations for the events and non-modern periods.

Keywords: temporal gazetteer, cultural periods, CIDOC CRM, archaeology