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(Article begins on next page)

Interactive Digital Narratives for modern historical research

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Abstract. Historians and related disciplinary scientists have been long debating about the historical research as getting close to exact sciences or as a more or less structured narratives. Then, the developments of the WWW and of the interactive media in general have included the digital formats into the debate, mostly with display applications for public history. However, the potential of interactive media for research purposes have remained under-explored, together with their relationship to major historiographic questions.

This paper aims at proposing interactive digital narratives (IDNs) to overcome the limitations of linear narratives for historical research. The Historygraphia system supports the development of an IDN, through the interconnection of narratives through a semantic labeling that overcomes the barriers of the diverse history-related disciplines (history of art, history of architecture, archaeology, medieval history, ...). The system has been experienced and preliminarily evaluated for its effectiveness in addressing the development of historical narratives and the discovery of novel interconnections.

Keywords: historiography · hypertextual narrative · cultural heritage.

1 Introduction

Today, historians intervene in a complex context, in which the public use of history is invasive. The relationship between narratives, including interactive digital narratives (IDNs), and history has produced a vast number of applications, especially to public history and history education. Public history concerns the engagement of history with wide audiences, usually related to dissemination places, such as museums and heritage sites, or media (podcasts, documentaries, drama, ...) in several forms, such as oral history and family history [18]. A large number of games have been released with historical themes, though there are many concerns regarding their historical accuracy [15].

In history education, interactive storytelling lets users experience different story lines, with narrative elements that provide links to everyday contemporary

life, often using informal or humorous tones conveyed by surprising characters. For example, the web-based IDN described in [13], proposes an experience in the ancient market of Athens (the agora), implementing a collaborative learning activity through a branching narrative, with small groups of students engaged in reflection and dialogue at decision points.

In both cases, there has been a great concern for ethical issues, that have also been addressed with possible guidelines [3]. For example, in the IDN example above, users could take into account the interests of characters affected by some decision or what were the consequences of the decisions in both the short and the long term.

Less explored is the field of historical research. Historians, in several disciplinary variants, are engaged in a long-lasting debate about the nature of historical research, with a two-pole distribution: on the one hand, the positivist scientism that positions historiography among the exact sciences, on the other, the deconstructionism, a more or less structured narrative, sometimes floating to a full logocentrism, that reduces the historical text to a pure linguistic construction, avoiding the notion of "truth" and the mapping to reality [7]. Jerzy Topolski, in his monumental text on historiography, has proposed a synthesis of the two extreme positions [14]: first, he analyzes the methods of the historical research, with considerations on the subject matter, the historical fact; then, he reflects on historical writing, with the many represented categories of writing; finally (and here is the synthesis!), he claims that historical knowledge is not purely source-based, but there exists a non-source-based knowledge that determines the selection of relevant information to identify the historical fact, with its hierarchical distribution and thus the formal construction of the narrative.

In addressing historical research with a digital approach, a particular attention has been devoted to develop accounts related to heritage items, that is objects and sites that provide a physical bridge to the immaterial narrative exposition. The digital twins of real objects or original digital artifacts, "quasi-objects" for [6], take on "different meanings in writings by different authors". For example, virtual reality immersive environments for the historical reconstructions merge material items and non-material narratives, to provide multiple perspectives [2].

In this paper, we describe the Historygraphia system that supports historical research, by pursuing an interdisciplinary approach to the representation of the historical facts. Short linear narratives are interconnected by the co-presence of semantic entities, whose categories, namely objects, agents, places, time intervals, events, themes, and states of affairs, have been negotiated between the several disciplines of history, namely history itself, history of art, history of architecture, history of religions, history of the economic thought, ...). A representation of the assumed historical truth is encoded in the formal representation of such semantic entities. Narratives, which are centered upon objects and places, are linked to the actual sources, which provide the evidence for the historical truth of the narrated facts, which are encoded in a knowledge graph of the semantic entities. So, the discipline-based narratives are arranged into an

interdisciplinary hypertext, that returns the complexity of the historical investigation, which would be blurred by the linear narrative format. The system is an authoring platform, with a design based on widely acknowledged tenets of historiography. The implemented prototype has been preliminarily evaluated by a group of user-historians, who have an interest in proposing the platform to scholars in local communities.

2 Related work

Historians have been using computational systems and networked information since their inception. A label that can characterize all applications concerning history is "digital history", considered to be "a branch of the Digital Humanities and an extension of quantitative history, cliometrics, and computing." (Wikipedia entry³ considered by [17] one of the most comprehensive definitions; a history of the term, with its nuances, is reported in [18]). In general, digital history is the effort of digitizing the past and creating a framework through the technology for people to experience, read, and follow an argument about a major historical problem [11].

A popular approach has been to arrange a collection of sources and materials around a historiographical question, with the development of narratives that are organized in a spatial layout. This reflects what in game academia is known as "spatial storytelling" (after [8]), a term that describes a narrative centered around some place. For example, "Victoria's Victoria"⁴ is a digital archive of Victoria's early history, where archival sources are connected through thematic narratives arranged into categories (such as chronological decades, significant places, relevant themes, ...). The Spatial History Project⁵ hosts collaborative open-ended projects of historical research, conceptually focused on space. Spatial and non-spatial data are organized into geospatial databases and use visualization to identify recurrent patterns. For example, "Shaping the West" models and investigates how railroads shaped the American West in the 19th century with a "spatial history" approach.

The development of an IDN system for historical research requires an awareness of the historiographic approaches. Historiography, "the study of the study of history" [14], has been characterized by a positivist approach until the 1960's: there is an ontological premise that supports an interpretation of the past; such a premise is independent of the scientist; the ultimate goal of historical research is the discovery of the historical truth; the truth is reconstructed from the historical sources and transferred to a structured writing. In the 1960's, there has been a growing interest in historical narratives, with a particular attention to the linguistic medium. The generated debate, which was triggered by these lines of thought, has seen opposing arguments. According to Mandelbaum, it is true that when a historian is ready to write his essay, "there are a number of respects

³ https://en.wikipedia.org/wiki/Digital_history, visited on 5 October 2024.

⁴ <http://web.uvic.ca/vv/>, visited on 5 October 2024.

⁵ <http://spatialhistory.stanford.edu>, visited on 5 October 2024.

in which he may be compared to a storyteller" [10]: possessing the knowledge about the historical inquiry, the historian can build the historical account in a narrative form, although the research path could have been different than linear (the exposition is different than the real nature of the relationships in the research).

On the other side, there have been many applications of the general claim of historical research as a narrative or linguistic construction. For example, Danto does not abandon the positivist approach, but argues that historical research differs from exact sciences because it is a "narrative" and not an "explanation" of facts [5].

Finally, Ankersmith provides a detailed conception of narratological methodology for historical research, a subjective construction about the past, though based on individual facts acknowledged to be true [1]. The structure of the narrative is a mental creation of the historian, because it contains, beyond the individual facts, the "narrative substances", that reflect a particular point of view of the historian (and storyteller). In general, the role of narration has become central in historiography, and in all the post-modernist thought, which assigns an active role to the subject in the process of knowledge [16]. According to White, the notion of history itself implies an ambiguity that raises from the fact that the object of study itself can be conceived on the equivocation that there are "historical" facts and "unhistorical" facts.

An operational synthesis of the mentioned positions is that the historian cannot know the complete truth about the past, but can try to get the closest to the truth. Our project stems from the idea that history in the narrative format should not be used as a way to elude the search for the truth, but as a different method to get to it, interconnecting the views of the several disciplines of history. Moving from traditional narrative to IDN, we can address complex issues by empowering narrative with the affordances provided by the digital media [9], that is the procedural, participatory, spatial, and encyclopedic features [12]. So, an encyclopedic IDN can be explored spatially by the participating audience, to which the IDN engine proposes contents through procedural decisions. In the historical research context, the IDN structure is the mean to avoid the rigidity of the arguments of the linear narrative and to provide an interdisciplinary approach to the research question. In particular, in Historygraphia, the formal representation of semantic entities associated with interconnected narratives is a way to address a form of truth about the historical events as revealed by the related and referred sources.

3 Design and implementation of IDN Historygraphia for historical research

Project Historygraphia was born with the idea to enhance the cultural features distributed on a territory, in an attempt to support the dialogue between the historians (that is, the field experts) and the local communities, including the decision makers.

The IDN structure works as a bridge between historical disciplines, which have different methodological approaches. Historians, each one belonging to some disciplinary group, propose their narratives, which are centered upon some object and place of the territory. Each narrative is annotated with semantic entities to realize an interconnected organization of the narratives and, at the same time, an interdisciplinary reading by subjects, that overcome the traditional disciplinary boundaries.

The semantic annotation acknowledges a formal notion of truth of historical facts, by marking a few entities, characterizing the disciplines participating to the project. Categories include Events and States of affairs, Objects, Time spans and Places, Actors, being single Persons or Groups, and finally some abstract concepts, such as Reference models and Themes, mostly related to the history of art and history of architecture (see Figure 1). There exist relations between these semantic categories: an actor that participates in an event, an object collocated at some place, The knowledge graph of individuals (e.g., the Event of commissioning Object painting located in Place church to Actor artist, the State of affairs toll gaining by Actor royal family because of the Event transit along some road, ...), that results from the connection of all entities through the relations is a representation of the logical truth of the historical facts, expressed in a formal logic. Figure 1 shows the categorial conceptual map that has been deployed as a backbone for the annotation of the historical narratives. Most entities and relations have been encoded in the CIDOC-CRM model for the representation of cultural heritage facts [4], with some ad-hoc classes that abstract Reference models and Themes of artistic works. So, together with the IDN, we acknowledge and realize a representation of the historical facts considered to be true, in a way compliant with Ankersmith's position, with a notion of truth applied to individual facts.

Narratives are also connected to the sources, to document the historical facts. Sources are digitized materials stored by the Historygraphia platform or links to external materials and consist of original documents, images, essays on historical facts, digitized collections of objects, The references to sources are also connected to the entities and relations in the knowledge graph, that works as a repository of the identified historical facts. In Figure 2, we show an (anonymized) example of a narrative, with its connections to the related sources and to the entities that correspond to the fact encoding in the knowledge graph. The narrative tells of a commissioning that the breeders' brotherhood has entrusted a painter for a cycle of 12 canvases; the choice of the painter depends on the painter's origins in a land that has an intense commerce with the local community. The knowledge graph represents the main entities that participate to this event. The two sources reported in the figure are a manuscript, that supports the news of the intense commerce of cattle, and the digital collection of ex-voto paintings, that display a relevant presence of herds.

Figure 3 show the overall design of the Historygraphia system: the Narrative, Sources, and Knowledge layers are interconnected. The historical facts are marked by the connections to the entities in the knowledge layer. All the three

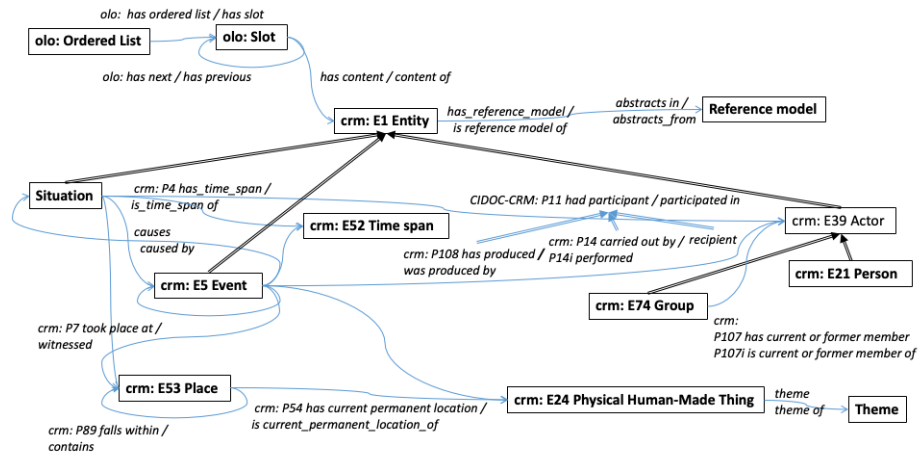


Fig. 1. Ontology used in labeling individual narratives in Historygraphia project.

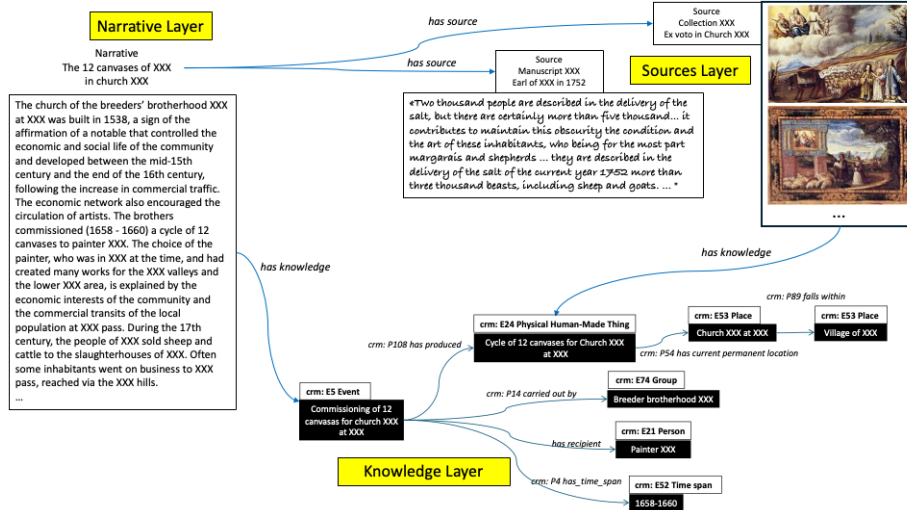


Fig. 2. A snapshot of an example narrative with the connections to sources and knowledge graph.

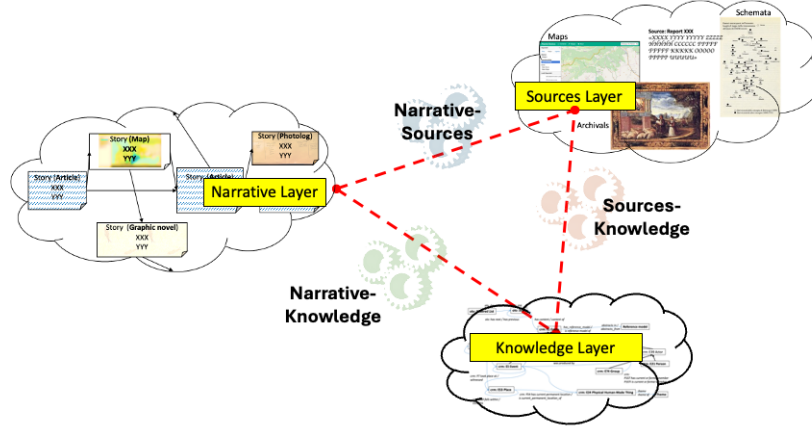


Fig. 3. Historygraphia System layers: Narratives, Knowledge, Sources.

layers are reachable from each other, for a global navigation through the narratives and the access to sources and the knowledge graph.

The Historygraphia system has been implemented as a webapp that is built on a database that stores both narratives and knowledge and indexes sources. CMS Omeka-S provides the interface to the database, by exposing an API that allows the addition and visualization of the data according to a predefined organization.

The user interface visualizes a map that georeferences the narratives according to some pivot place selected by the author.

4 Experiencing the prototype

The whole system has been discussed and designed with a collaboration between multimedia designers, knowledge engineers, and experts of historical disciplines. The latter, numbering 9 participants belonging to 4 different disciplines (medieval history, history of art, history of architecture, archaeology), have become the contributors to the platform. The platform currently contains 30 narratives, mostly of historic, history of art and history of architecture domains, focusing on the Cuneo area, in Piedmont, Italy.

Initially the team addressed the narrative structure and the knowledge encoding, namely the selection of the semantic categories that could label the historical facts, interdisciplinarily. The first meetings were mostly a training carried out on exemplar case studies from all the disciplines involved. The creation of a specific ontology for the structuring of narratives and knowledge raised the awareness about the identification of actors, places, objects, actions, contexts,

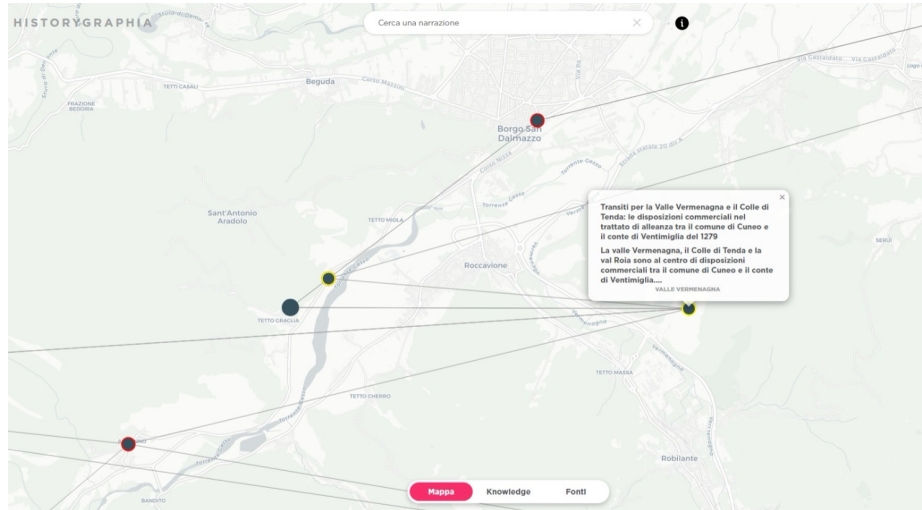


Fig. 4. Historygraphia System frontend map: circles denote a geomapping of narratives; colored circle denote the historical discipline of the narrative; edges between the circles visualize the connections between narratives; the visualized abstract refers to a narrative concerning "the transit routes via Vermenagna valley and the Tenda pass and, in particular, the trade arrangements reported in the treaty of the alliance between the municipality of Cuneo and the Earl of Ventimiglia in 1279".

according to two perspectives: classification and topic selection. The classification issue was carried out with a deep study of acknowledged cataloging systems (thesauri provided by national institutions, the Getty Center, and iconographic classification system Iconclass), with typologies of entities that had to take into account the use across multiple disciplines. At the same time, the laborious process in the definition and annotation of relationships forces the participant to embrace the complexity of the historical processes in a unitary approach. This provides the bases for the logical representation of the assumed historical truth. The selection of the topics (or historical facts) that are addressed by the narratives was influenced by the meetings discussions. Art historians, for example, tended to identify potential historical narratives concerning the artistic bibliography, that proposed clear connections with the specific historical-territorial contexts. Semantic annotation has been claimed by participants to improve the expository clarity of the narratives, by stimulating the narrator to channel the same reasoning approaches within a texture of logical steps.

Afterwards, the Historygraphia project addressed the length and structure of the narratives: after the experience of navigating the platform, participants agreed that a suitable length for the narratives (about 3000 characters) and a stable tripartite structure (a location, an object, and an addendum paragraph). This greatly simplified the authoring process, yielding "concise and topic-focused

texts and preventing excessive digressions, and also avoiding the risk for the reader to lose the thread of the narrative" (it is told in one historian's report).

Participants, at their first experience with the creation of an IDN, were positively impressed by the potential. The planning of an interlinked coherent interdisciplinary IDN that relies on the a priori conception of the conceptual model marks a big difference. For example, cultural heritage catalogues allow to identify all the objects that are registered at the same "place of conservation", but exclude more abstract relations that are relative to the scope of meaning, and then to historical knowledge. The interdisciplinary development of the knowledge base encoding, on the contrary, allows to connect narratives that have in common not only basic entities (places and objects first and foremost), but also more abstract concepts (models, events, situations, themes).

We close with two examples of connected narratives (clearly, connections relating to places or artists form numerous coherent clusters of narratives).

- The alternatives to the Tenda pass between the end of the Middle Ages and the beginning of the modern age: the Saline pass.
- The first testimony of painters Bruno in city Cuneo, Santa Croce area.
- Painter Lorenzo Gastaldi at Entracque.

These are history and history of art narratives that concern different actors and contexts, but which are linked by the common State of affairs "transit area between regions Piemonte and Liguria", a central issue in the development of those regions in triggering historical-artistic and historical events (e.g., the residence of artists and the political-administrative management).

- The works of the painters Bruno in Andonno.
- The 17th-century renovation of the parish church in Valdieri.

These are history of art narratives about different artists that do not have a specific connection. The connection is licensed by the common actor "Family Lovera" as a commissioner in both places.,

As the archive receives further narratives, we believe that non-trivial clusters will be discovered through the navigation of the IDN structure.

5 Conclusions

This paper has presented the Historygraphia system, that contributes to historical research by developing a web-based IDN authoring system for the collection and interconnection of linear narratives through a semantic labeling. The platform works as an interactive digital narrative that addresses core topics of historical research in an interdisciplinary approach, highlighting the complexity of matters at hand and adhering to acknowledged attitudes in modern historiography. We have discussed the main tenets of the system, developed by an interdisciplinary team, in diverse fields of history, and experienced and preliminarily

evaluated for its effectiveness and adequacy to historical research in conjunction with cultural heritage communication.

The novelty in the use of IDN for historical research is the interconnection of several disciplines, through an interdisciplinary approach based on semantics. It is not a mere application of hypertextual structure, since the semantic tagging can represent the assumed historical truth (situations, events, agents, ...) in a logical format and provide a structured connection between narratives with sources. Though ontologies have been out for a long time, we do not know of applications that assign such role to the knowledge graph, that can ensure consistency through reasoning, as a further development.

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