

Constructing and Connecting Storylines to Tell Museum Stories

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Abstract. Over the past decade a number of systems have been developed that tell museum stories by constructing digital presentations from cultural objects and their metadata. Our novel approach, informed by museum practice, is built around a formalization of stages of museum storytelling that involve: (i) the collection of events, museum objects and their associated stories, (ii) the construction of story sections that organise the content in different ways, and (iii) the assembly of story sections into a story structure. Here we focus in particular on this final stage of building the story structure. Our approach to providing intelligent assistance to story construction involves: (i) separating overlapping or conflicting story sections into separate candidate storylines, (ii) evaluating candidate storylines according the criteria of coverage, richness and coherence, (iii) assembling storylines into linear, layered or multi-route structures and (iv) ordering the story sections according to their setting within the storyline.

Keywords: Museum storytelling, storylines, ATMS, clustering.

1 Introduction

Museum professionals, such as curators and educators construct stories that encompass multiple museum objects. These may take the form of e.g. an exhibition, website or museum tour. The aim of our work is to provide intelligent assistance to this storytelling process. A number of systems have been developed that construct presentations with, or facilitate navigation between, multiple museum objects [1, 2, 3, 4]. However, our work is driven by an investigation of how the museum storytelling process is carried out and how it can be supported.

Many previous systems aim at building chains of cultural content, whether they are realized as a web-based presentation or instructions of how to navigate a physical museum space. Work in narrative and hypertext has also considered a wider range of narrative structures that offer branching and choice to the reader [5]. Sharples et al [6] consider four narrative structures and their use in museums: tree branching, braided, an interconnected rhizome structure and a linear diary. Gudmundsdottir [7], in a curriculum design context describes a narrative structure comprising a main horizontal strand and subsidiary vertical strands. In our work we investigate how some of these structures can be employed to assist museum storytelling.

2 The CURATE Ontology and Storyscope

The aim of the web-based environment Storyscope and the CURATE ontology¹ is to provide a way of constructing and modelling museum stories and some of the underlying reasoning that goes into them.

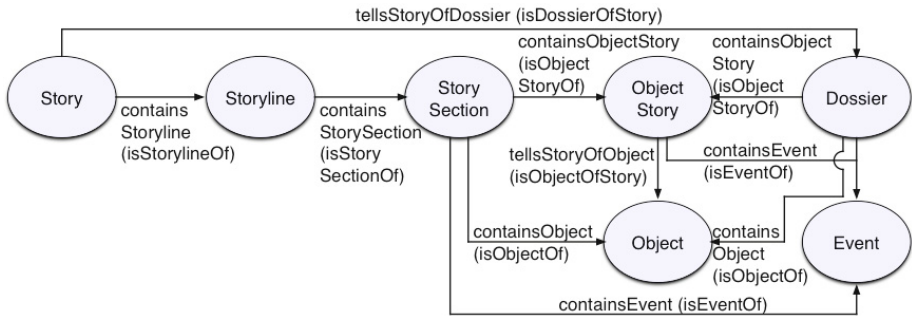


Fig. 1. Overview of main classes and properties in the CURATE ontology

Museum storytelling processes informed the structure of the CURATE ontology, shown in 21. A dossier (shown top right of figure 1) contains object stories, events and references. Events are things that have happened that are of relevance to the story to be told. They provide a particular interpretation or description of a known event in the context of a story. Events inside the story may reinterpret events described using other event schemas such as the one provided by CIDOC CRM [8]. A dossier also contains Object stories. These are stories that can be told about a museum object. This may be a story depicted by the object, a story of its construction, or something that has happened to it since. Both dossiers and object stories can also cite reference materials that support the story (not shown in the figure).

The storyteller starts to build what they wish to say by constructing story sections (center of figure 1). Each story section collects together and edits some number of object stories and events. Story sections form the seed of what could become a chapter in a booklet or page in a hypertext presentation. Finally, the author builds the presentation structure in the form of a story comprising a number of storylines (left of figure 1). Each storyline is a sequence of story sections. The same story section may feature on multiple storylines, potentially allowing branching and reader choice in the final presentation structure.

3 Assisting Story Construction

This formalization of the structure of the museum storytelling process allows us to develop intelligent assistance for the storyteller, recommending additional content or structure. Three types of recommendation have been developed: (i) suggesting

¹ <http://decipher.open.ac.uk/curate>

additional events to add to the dossier based on the current content, (ii) suggesting story sections, and (iii) suggesting a set of storylines that provide a way of navigating the sections of the story. The first two of these, the suggestion of events and story sections, are described in in Wolff et al [9]. The remainder of this paper will focus on the computational construction of story structures.

Storyscope supports the author in assembling story sections from the events and object stories of the dossier. Software for recommending events and story sections essentially introduces events similar to those already in the dossier and brings together similar or related events in story sections. By contrast, our approach to the construction of storylines pushes apart similar story sections into separate storylines. For example, two story sections may cover overlapping content, may cover similar content but on different levels of detail, or may provide alternative perspectives on the same underlying events. Our rationale in adopting this approach is to produce independent subsets of the overall story that can then be selected and combined to produce narratives serving different purposes such as: summarizing; linking an overview to further detail; or identifying alternative routes or perspectives within the story. This is initially by separating story sections that duplicate specified types of item, for example contain the same object, event or alternative interpretations of the same event. An AI program called an Assumption Truth Maintenance System (ATMS) [10] is used to split the story sections into alternative candidate storylines.

The candidate storylines generated by ATMS can be evaluated and ranked in a number of ways. We identify three criteria against which candidate storylines can be ranked: coverage, coherence and richness. *Coverage* measures how much of the story as contained in the dossier is covered by the storyline. This is measured as the sum of unique events found in the story sections contained in the storyline. *Richness* is a measure of how many object stories are associated with the story sections of the candidate storyline. It can be expected that generally richer storylines will be preferred which interconnect a greater number of museum-related stories. *Coherence* is the extent to which the themes of the story sections (the key people, objects, etc. featured in the story section) are consistent (i.e. do not vary) across the storyline. The three criteria used to evaluate storylines are similar to criteria proposed by Shahaf et al [11] for the ranking of what they term Metro Maps, which are reading pathways calculated to span a set of documents.

We identified three types of story structure to be constructed from the set of storylines. Each structure has distinct affordances for storytelling. The three types of structure are linear, layered and multi-route (see figure 2). The linear structure provides a single route through some or all of the story sections of the dossier. The layered structure, motivated by the vertical and horizontal narratives of Gudmundsdottir [7], comprises a horizontal backbone that guides the reader through key story sections. Each story section on the backbone can link to related story sections that provide, for example, additional detail or alternative perspectives. The multi-route structure offers a greater level of choice from a number of interconnected paths.

The simplest implementation of the linear story structure is the selection of the top-ranked storyline. This structure is linear and also can be thought of as providing a précis or summary of the dossier. The layered story structure takes as its backbone the

top-ranked storyline. Other sections are then linked to the backbone section with which they are most similar. The multi-route structure also starts by selecting the top-ranked storyline. Further storylines are then added in rank order that introduce additional story sections to the network. The multi-route structure therefore places alternative or overlapping story sections on alternative routes within the overall structure. An evaluation of this approach to story construction is currently in progress.

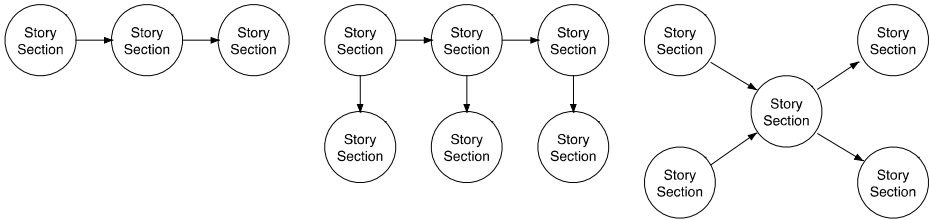


Fig. 2. Linear (left), layered (middle) and multi-route (right) story structures

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