



# Facilitate Knowledge Exploration with Storytelling

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## Abstract

With the fast development of natural language processing and web technologies in recent years, the amount of knowledge/data available for everyone to explore has grown exponentially. This project is aimed at creating an interactive and proactive presentation agent. In particular, narrative and storytelling techniques are used for engaging the audience and helping the audience digest and remember the content. We present examples of using this system for generating presentations, and preliminary evaluation results.

*Keywords:* Storytelling, information exploration

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## 1 Introduction and Motivation

Narrative has always been an important part of human communication. We tell stories not only for entertainment, but also for sharing information and influencing others. Many researchers have argued that narrative is essential for how people understand and organize their experience [9, 11, 4, 1]. For example, Bruner argued, “We organize our experience and our memory of human happenings mainly in the form of narrative” [4]. Similarly, Neumann and Nünning believed “Narratives are not only a literary art form but a fundamental way of organizing human experience and knowledge,” and that narrative can be regarded as a “fundamental way of world making” [10]. Hermann suggested that there are “five ways stories scaffold intelligent behaviors” including chunking experience, imputing causal relations, problem raising/solving, sequencing actions, and distributing intelligence. Abbott even suggested that “narrative is the principal way in which our species organizes its understanding of time.” [1] There is also evidence from empirical studies that when communicating or presenting information in a narrative form, the relationships among the events and objects become clearer and therefore more understandable and memorable to others [14, 13, 6].

In this work, we propose a narrative- based tool for helping people explore information. With the fast development of natural language processing and web technologies in recent years, the amount of knowledge/data available for everyone to explore has grown exponentially. For example, there are more than four million entries currently in the English Wikipedia. Existing means for consuming such large data are often either non-interactive, e.g. summary reports , or passive, e.g. data query or visualization tools where the user needs to specify the queries.

The goal of this project is to create an automated agent for helping people explore large networks of information. The agent acts as a narrator for the knowledge network. Just like a human presenter, the agent picks and presents topics from the knowledge base one by one. The user can interrupt and change the topic. The user can also influence how the agent selects future topics. While deciding what to say, the agent strives to provide the user a structured experience by proactively constructing narratives using information relevant to the user’s interests and balancing a number of objectives, such as topic consistency and novelty, tension management, and various local and global narrative structures. At a more local level, the agent also illustrates and emphasizes the relationships among adjacent topics by constructing transition sentences using analogies and contrasts.

Figure 1 shows the overall pipeline of how the presentation agent works. It takes information as a network of topics which may come from a variety of sources, including social media, crowdsourcing, and querying existing web knowledge base such as DBpedia. The presentation agent performs narrative planning as it is interacting with the user. We anticipate different interactive visualization tools will be needed for different application domains and have taken steps to build two of them.

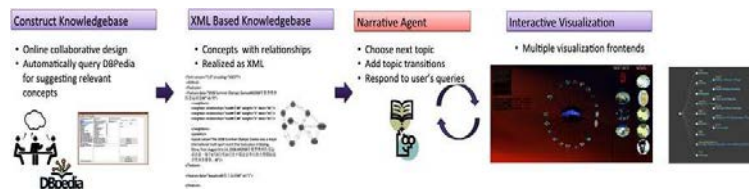


Figure 1: System Pipeline

Many attempts have been made to design virtual characters that can make presentations, such as [5, 7, 12, 2, 3]. Most existing works have strict requirements for how the domain knowledge should be encoded. As a result, the domain knowledge needs to be designed by hand which is severely time-consuming. In this work, we experiment with loosening up such constraints and making minimal assumptions for the type of information the agent gets for enabling the agent to generate presentations for a wider range of domains. The presentation agent also has an objective of encouraging the user to explore the data rather than just making a presentation.

## 2 Example Domain and Knowledge Representation

Throughout this paper, we will illustrate the working of our systems by introducing the 2008 Summer Olympic Games in Beijing, China.

For encoding the agent’s knowledge about a domain, we hope to use a knowledge representation that is both compatible with structured data, such as results from querying DBpedia, and is intuitive enough for non-technical authors to design and edit the knowledge base manually. As an initial step, we created a XML format that encodes knowledge as a directed graph. Each topic the agent can talk about is represented as a node with a unique ID, and nodes are linked to each other by their relationships. For example, the Beijing Olympic Village is located in Olympic Green, which is one of the Olympic parks. In the XML, both “Beijing Olympic Village” and “Olympic parks” are nodes, and “is in” is the relationship between them.

In addition to the relationship between them, both nodes have multiple links to other nodes in the knowledge base. Each node may also contain multiple tags for additional information.

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