A Knowledge Based Approach for Story Generation From Ontology

A. Jaya and G.V. Uma

Department of Computer Science Engineering,

Anna University, Channai, India

Abstract: A story is a message that tells the particulars of an act or occurrence or course of events are presented in the form of writing. The Simple story is expanded into an initial situation, an active event and final situation. Ontology specifies the rich description of terminology, concepts and relation between concepts and rules relevant to a particular domain and defines a formal semantics for information allowing information processing by a computer. This study focuses on the extraction of story from the ontology.

Key words: Ontology, information extraction, story generation

INTRODUCTION

Story is a natural language description of objects, their attributes, relationships, beliefs, behaviors, motivations and interactions. Interesting stories arises from theme, structure and language[1]. A simple story is expanded into an initial situation, an active event and a final situation. The active event is divided in to five-part structure consisting of motivation, plan, qualification, action and resolution. The story generation must draw not only on the general story structure model and the story world model, but also aspects of the audience, the author, the medium of expression and the cultural context[2,3].

This study concentrates about the story model, which generates the story based on the story grammar from the ontology. In the Story generation process, extraction of information from the ontology and Language generation takes a vital role. The information are extracted from the ontology and assigned to language generation. A theory of story structure for the purposes of language generation must be situated within a broader theory of story production, which can be described in terms of the sorts of knowledge, which contribute the creation of story.

Need for ontology in construction of story: Ontologies are content theories about the sorts of objects, properties of objects and relations between objects that are possible in a specified domain of knowledge. They provide potential terms for describing our knowledge about the domain. Ontologies are useful in NLP in two ways. First, domain knowledge often plays a crucial role in disambiguation. Well-designed domain ontology provides the basis for domain knowledge representation. In addition, ontology of a domain helps to identify the semantic categories that are involved in understanding discourse in that domain. For this use, the ontology plays the role of a concept dictionary. In general, for NLU, we need both a general-purpose upper ontology and a domain-specific ontology that focuses on the domain of discourse in addition to domain-specific knowledge[4].

The need for ontology in construction of story is to[5]

- To share common understanding of the structure of information among people or software agents
- To enable reuse of domain knowledge
- To make domain assumptions explicit
- To separate domain knowledge from the operational knowledge
- To analyze domain knowledge

Architecture for extraction of story from the ontology: Ontology is nothing but explicit specification of a shared conceptualization[6,3]

Conceptualization:

Abstract model of some area of interest (domain) by identifying *relevant* concepts of that domain

Consists of:

Relevant concepts of a domain

Relations between concepts

Axioms about these concepts and relations

Corresponding Author: A. Jaya, Department of Computer Science Engineering, Anna University, Channai, India
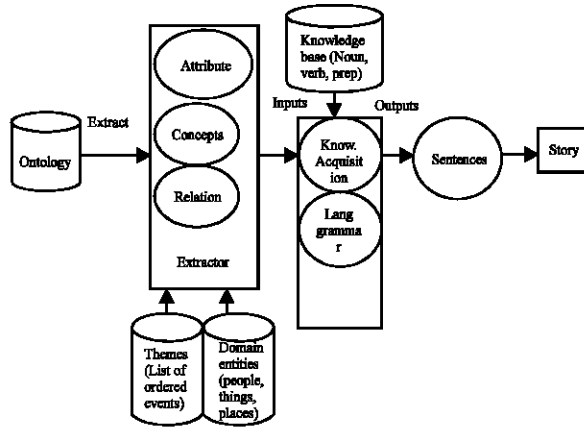
Fig. 1: Shows the extraction of story from the ontology

Explicit:
  Types of concepts used and constraints are explicitly defined
Shared:
  Ontology captures consensual knowledge
  Ontology is not private to some individual

It typically consists of [7]

* Hierarchical description of important concepts in domain
* Descriptions of the properties of each concept
* Degree of formality can be quite variable (NL-logic)
* Increased formality and regularity facilitates machine understanding

Ontology conceptualizes a domain into a machine-readable format.

The above Fig. 1 shows the extraction of story from the ontology. The information from ontology is extracted[8,7] in the form of attribute, concepts and relation, which is given as an input for language generator. Meanwhile the theme is instantiated and the domain entities are identified in extractor. All these are given as input to the language generator. The noun, verb and preposition are identified in knowledge base and the sentences will be generated based on the sentence grammar.

Working of language generator: The language generator is a computational device that distinguishes the grammatical from the ungrammatical sequence of words. The noun, verb, preposition are used to frame the meaningful sentence as per sentence grammar[5].

Sentence = noun verb prep noun/pronoun: All kinds of past, present and future tenses are considered for language generation. Noun, verb and preposition are retrieved from the database and generate according to the sentence grammar. The natural language generation can generate over subset of defined grammatically correct sentence types. These are with generative sentence grammar. The language is described in various levels. group of words should form valid phrases. Words can be phrased based on the sentence grammar and a group of sentences together is called a paragraph and one or more paragraph constitutes a story.
A grammar for a simple sentence is given as

$$S \rightarrow NP\ VP \qquad NP \rightarrow Datum\ Noun$$
$$VP \rightarrow verb\ PP \qquad PP \rightarrow prep\ NP$$

For ex, consider the sentence
The Lion slept in the Den)
Tree structure representing the sentence with its grammar
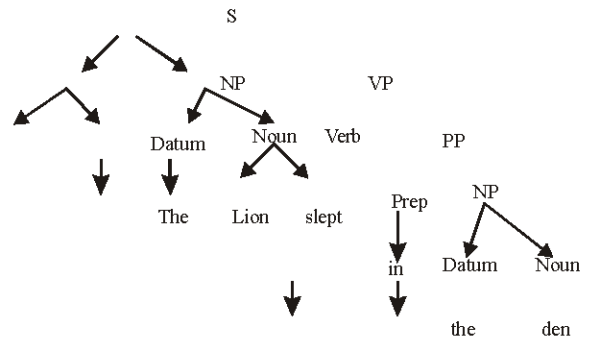
process of story generation: The program has a very limited understanding of the English language. When it converts the events generated by the characters into natural language, it uses sentences of uniform grammatical structure to convey the story[2]. Basically the story is generated based on the simple story grammar, which is given below[9]

  Story → setting + theme + resolution
  Settings → characters+ location + time
  Theme → (Event)* + goal
  Resolution → Event* goal

Construction of sample stories from ontology: The simple lightweight ontology is constructed and is given below[10]
  The sample stories which are generated from the above ontology[11]

Story1:

* Lion is sleeping in the den
* Lion has ears.

Fig. 2: Sample ontology for story generation

- Lion eats rabbits
- Hunter is sitting in the tree
- Crow lays eggs in the nest
- Hunter eats eggs
- Crow flew.
- Hunter walk on the grass
- Lion eats hunter

Story2:

- King is a hunter
- Hunter is walking on the grass
- Hunter got hungry
- Hunter eats rabbits
- Lion is sleeping in the den
- Lion saw the hunter
- Lion eats the hunter

Story3:

- Lion is walking on the grass
- Hunter has ears.
- Rabbit is eating grass
- Lion saw the rabbit
- Lion kills the rabbit
- Hunter kills the Lion

CONCLUSION

The study described here represents extraction of story from ontology. This study can be extended in a number of directions. Firstly, each of the modules must be enriched to enable greater detail, greater variety of incident and more complexity of structure. The inclusion of a more complex mapping between role and actor, to allow for the distribution among several actors of a single role, will be a first step here. Secondly, the story structure rules will be applied to representation of a different story world, possibly that of the fairy tale or the romantic short story, in order to test the independence of the modules. The ontology will be enriched in greater details are required to generate story with different plots and the climax in order to make the story interesting. Similarly the language generator will be enriched further to concentrate on the complex as well as suitable sentences to make story as interesting ones.

REFERENCES

1. Bailey, P., 1999. Searching for Storiness: Story-Generation from a Reader's Perspective. In AAAI Fall Symposium on Narrative Intelligence. http://citeseer.ist.psu.edu/bailey99searching.html

2. Rumelhart, D.E., 1975. Notes on a schema for stories. In Bobrow, D.G. and Collins, A., Editors, representation and understanding, academic press, Orlando, pp: 211-236.

3. Gruninger, M., Lee and Jintae, 2002. Ontology design and applications, communications of the ACM, 4,pp:: 1-2.

4. Chandrasekaran, B. and R. John, 1999. Josephson, Ohio State University V. Richard Benjamins, University of Amsterdam, What Are Ontologies and why do we need them? IEEE Intelligent Systems, pp: 20-26.

5. Douwe Terluin, 2006. Improving Automatically generated stories. Proposal for graduation project, knowledge Engineering Artificial Intelligence University of Groningen.

6. Gruber, T.R., 1993. A translation study to portable ontologies. Knowledge Acquisition, 5,pp: 199-220.

7. Natalia Kozlova, 2005. Automatic ontology extraction for document classification"a thesis for MS degree, Computer Science Department, Saarland University.

8. Harith Alani, Sanghee Kim, David E. Millard, Mark J. Weal, Wendy Hall, Paul H. Lewis and Nigel R. Shadbolt, 2003. Automatic ontology-based knowledge extraction from webdocuments University of Southampton IEEE Intelligent Systems, pp: 1-9.

9. David A. Ferrucci. Brutus an architecture for automatic story generation in logic programming and AI lecture notes.

10. Natalya F. Noy and Deborah L. McGuinness. Ontology Development 101: A guide to creating your first Ontology Stanford University, Stanford, CA.

11. Mark, O., 2005. Riedl institute for Creative Technologies University of Southern California, R. Michael Young, Department of Computer Science, North Carolina State University, from linear story generation to branching story graphs American Association for Artificial Intelligence.