From Tale to Speech: Ontology-based Emotion and Dialogue Annotation of Fairy Tales with a TTS Output

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Abstract. In this demo and poster paper, we describe the concept and implementation of an ontology-based storyteller for fairy tales. Its main functions are (i) annotating the tales by extracting timeline information, characters and dialogues with corresponding emotions expressed in the utterances, (ii) populating an existing ontology for fairy tales with the previously extracted information and (iii) using this ontology to generate a spoken version of the tales.

Common natural language processing technologies and resources, such as part-of-speech tagging, chunking and semantic networks have been successfully used for the implementation of the three tasks mentioned just above, including the integration of an open source text-to-speech system. The code of the system is publicly available.

Keywords: ontology, natural language processing, text-to-speech, semantic-network, fairy tale, storytelling

1 Introduction

The idea of developing an ontology-based storyteller for fairy tales was based on the consideration of two previous works in the field of narrative text processing. The first work is described in (Scheidel & Declerck, 2010), which is about an augmented Proppian[1] fairy tale markup language, called Apftml, which we extended according to the needs of our current work.

Our second starting point is described in (Declerck et al., 2012), which presents an ontology-based system that is able to detect and recognize the characters (participants) playing a role in a folktale. Our system combines and extends the results of

[1] From „Vladimir Yakovlevich Propp", who was "a Soviet folklorist and scholar who analyzed the basic plot components of Russian folk tales to identify their simplest irreducible narrative elements." (http://en.wikipedia.org/wiki/Vladimir_Propp)

those studies, adding the detection of dialogues and emotions in the tales and an ontology-driven Text-To-Speech (TTS) component that "reads" the tales, with individual voices for every character, including also a voice for the narrator, and taking into account the types of emotions detected during the textual processing of the tales.

To summarize: Our system first parses the input tale (in English or German) and extracts as much relevant information as possible on the characters – including their emotions -- and the events they are involved in. This provides us with an annotated version of the tale that is used for populating the ontology. The system finally uses the ontology and a robust and parameterizable TTS system to generate the speech output.

All the data of the system have been made available in a bitbucket repository (https://bitbucket.org/ceisen/apftml2repo), including documentation and related information[2].

2 Architecture of the System

Firstly, we use the Python NLTK[3] and Pattern API[4] to annotate the tale. Then we use the Java OWL-API[5] to populate the ontology. And finally the Mary Text-To-Speech system[6] is used to generate the speech output. Mary is an open-source, multilingual Text-to-Speech Synthesis platform, which is robust, easy to configure and allows us to extend our storyteller to more languages. The general architecture of the system is displayed below in **Fig. 1**.

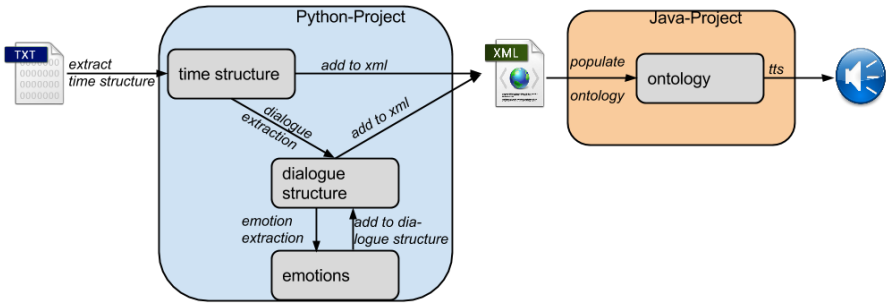

Fig. 1. The general architecture of the ontology-driven 'Tale to Speech" system

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[2] An example of the audio data generated for the tale "The Frog Prince" is available at https://bytebucket.org/ceisen/apftml2repo/raw/763c5eb533f09997e757ec61652310c742238384/example%20output/audio_output.mp3.

[3] Natural Language Toolkit: http://www.nltk.org/. See also (Bird et al., 2009)

[4] See (De Smedt & Daelemans, 2012).

[5] See (Horridge & Bechhofer, 2011).

[6] http://mary.dfki.de/. See also (Schröder Marc &Trouvain, 2003) or (Charfuelan & Steiner, 2013).

3 The Ontology Population

The ontology we use is an extension of the one presented in (Declerck et al., 2012), which describes basically family structures among human beings, but also a small list of extra-natural beings. In the extended version of the ontology we include also temporal information (basically for representing the mostly linear structure of the narrative) as well as dialogue structures, including the participants involved in the dialogues (sender(s) and receivers(s)), whereas we give special attention also to the narrator of the tale, since this "character" is also giving relevant information about the status of the characters in the tales, including their emotional state. Dialogues are synchronized with the linear narrative structure. Detected emotions are also included in the populated ontology, and are attached for the time being to utterances, and will be attached in the future to the characters directly. The Mary TTS system is accessing all this information in order to parameterize the voices that are attached to each detected characters.

4 A Gold Standard

In order to support evaluation of the automated annotation of fairy tales with our integrated set of tools 5 fairy tales have been manually annotated[7]. The tales are "The Frog Prince", "The Town Musicians of Bremen", "Die Bremer Stadt Musikanten" (the German original version), "The Magic Swan Geese" and "Rumpelstiltskin".

The annotation examples show the different steps involved in the system: the text analysis, the temporal segmentation, the recognition of the characters and the dialogues they are involved in, the emotions that are attached to the utterances and delivered during speech the story in near real time.

5 Summary and Outlook

We have designed and implemented in the field of fairy tales an ontology-based emotion- and dialogue annotation system with speech output. The system provides robust results for the tested fairy tales. While the annotation and ontology population processes are working for both English and German texts, the TTS output is for the time being optimized for the English language.

Future work can deal with adding a graphical user interface, extending the parsing process for annotating tales in other languages and populating the ontology with more information, like the Proppian functions.

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[7] The manually annotated tales, together with the annotation schema, are available at https://bitbucket.org/ceisen/apftml2repo/src/763c5eb533f09997e757ec61652310c74223838 4/soproworkspace/SoPro13Java/gold/?at=master

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