Report Ontologies and Knowledge Bases

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1   Objective and Motivation

Folk and Fairy tales are a substantial part of oral history. They play an important role in the cultural heritage of regions, nations or cultural minorities. In European context, fairy tales have been collected and editored by the Grimm brother's in the beginning of the 19th century.[1] In the African context, the oral tradition of folk tales existed way longer. Presumably, African folk tales are therefore different than European fairy tales in terms of structure and motifs. This project aims to construct an ontology of African folk tales following the approach of Russian folklorist Vladimir Propp. We hope to not only collect and structure African folk tales, but also investigate how they follow Propp's formalism and how motifs and agents are verbalised. Hence, the ontology is going to contain:

- The Proppian functions and entities encoded within.

- Specific folk tale motifs according to the Aarne-Thompson-Uther Index (ATU).

- The representation of the functions and motifs in selected African Folktales.

2   Domain

2.1   Motifs Indexes

Folk tales motifs are usually classified by two motif indices. The Aarne-Thompson-Uther index (ATU)[1] is used to classify tales into one category. The categories are relatively wide, describing the main story line of the tale. Therefore, each tale can only have one ATU type. In contrast, the Thompson-Motif-Index (TMI) is more fine grained, describing single motifs, i.e. repeated elements, e.g. characters. The TMI motifs are organized in a hierarchical structure. A tale can be described with more than one TMI motif.[2]

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[1]http://www.mftd.org/
[2]https://sites.ualberta.ca/urban/Projects/English/Motif_Index.htm

2.2 Propp Functions

Russian folklorist Vladimir Propp introduced 31 invariant functions describing the morphology of the Russian magic folk tale. In his ground breaking 1928 work 'Morphology of the Folk tale', he argues that the narrative of folk tales always follows the same pattern. The narrative functions and the *Dramatis Personae* (agents in the story) he introduced are strictly defined and specify recurrent units from which the tales are constructed. Propp set three axioms:

- Not all functions appear in every tale, but they always appear in the same order.

- I

- I forgot as well

The high formality of this structuralism allows something as complex and highly emotional as the folk tale to be pressed in a strict pattern. Thus, they can be further used in automatically processing or when generating new tales. In Computational Linguistics, Propp's functions are used in various ways, such as for automatic markup, classification and annotation (Malec 2010), or as a foundation of an independent XML dialect (Malec 2001, Lendvai et al. 2010). His approach is still widely used not only in folk tale research but also applied to contemporary work such as the Star Wars Trilogy[3]. Proppian functions can appear in the tale as they are, with modifiers or they can be inverted, e.g. *Hero leaves home → Hero does not leave home* (explicitely).

3 Conceptualization

3.1 Existing Work

Declerck et al. 2016/2017 (GWC 2016) have introduced an integrated ontology that combined the ATU and the TMI motifs in a complex way. They suggested extending the ontology by including

- Adding more fairy tales that fall into one of the ATU classes

- Adding more tales from specific collections

- Add Proppian functions

Aim of this project is to fulfil these three aspects. For the time being, we will concentrate on Fairy Tales anthologies from the Southern African context. Our ontology will be independent but can be easily added to the existing work once it's published by Declerck et al.

3.2 Definition of the Ontology

We describe our ontology by the following properties $< C,I,A,R >$

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[3]http://jaced.com/2013/02/06/vladimir-propp-science-of-the-fairy-tale/

- $c_i \in C$ set of Classes: Dramatis Personae according to Propp, elements in Proppian functions, motifs according to ATU, e.g. *the hero*, *the claim*, *Domestic Animals* (ATU 200-219)[4]

- $i_i \in I$ set of Instances: The representation of c_i in the fairy tales from the anthologies (HERE ANTHOLOGIES EINFUEGEN), e.g. *snow white*

- $a_i \in A$ set of Axioms: Proppian functions, e.g. *Acquisition of Magical Agent*

- $r_i \in R$ set of Relations: Relationships between classes that model the functions, sequential relations of functions, e.g. *before(Return,Pursuit)*, *represents* or *isRepresentedBy*, *appearsInTale*, *containsMotif* (s. Declerck 2017)

We are using the ATU index for the classification of our motifs, ignoring the TMI motifs for now, since the classification of tales in TMI motifs requires a vast amount of knowledge in literary studies. Since Declerck et al.'s ontology will cover the TMI motifs, this is not considered a drawback of our work.

3.3 Compentency Questions

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3.4 Classes

Tale, Anthology, Editor, Author, Title, Publisher, Date, Fictional Person, Person, Object, ATU Class, ATU Number, Description, Proppian Function, Verbalisation, Symbol, Family Member, Hero, Villain, Victim, Seeker, Helper, Donor, Dispatcher, Princess, Princess's Father, False Hero, Magical Agent, Desired Object, Task, Reward

3.5 Axioms

We define some axioms for the publication and the classification of the fairy tales.

- Each tale is published in an anthology.
- Each anthology has at least an editor/author, a title, a publisher, and a date of publication.
- Each tale has a title.
- Each tale has a set of Dramatis Personae.
- Each tale falls into one of the ATU classes.
- Each ATU class has an ATU number and a description.
- If a Proppian function applies for a tale, there is some verbalisation in the text.
- Proppian functions follow a specific order (see below).
- Each Proppian function has a symbol.

Furthermore, following Propp's approach, we define our axioms for the description of the narrative as follows:

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[4]ATU motifs are not always single concepts, they can also be a description of content such as *Ogre Frightened by Man* (ATU 1145-1154), nevertheless they will be classes within the scope of this project in contrast to axioms

α The initial situation. A text may only have a single Initial Situation function.

1. A member of a family leaves home (the hero is introduced);

2. An interdiction is addressed to the hero ('don't go there', 'go to this place');

3. The interdiction is violated (villain enters the tale);

4. The villain makes an attempt at reconnaissance (either villain tries to find the children/jewels etc; or intended victim questions the villain);

5. The villain gains information about the victim;

6. The villain attempts to deceive the victim to take possession of victim or victim's belongings (trickery; villain disguised, tries to win confidence of victim);

7. Victim taken in by deception, unwittingly helping the enemy;

8. Villain causes harm/injury to family member (by abduction, theft of magical agent, spoiling crops, plunders in other forms, causes a disappearance, expels someone, casts spell on someone, substitutes child etc, commits murder, imprisons/detains someone, threatens forced marriage, provides nightly torments); Alternatively, a member of family lacks something or desires something (magical potion etc);

9. Misfortune or lack is made known, (hero is dispatched, hears call for help etc/ alternative is that victimized hero is sent away, freed from imprisonment);

10. Seeker agrees to, or decides upon counter-action;

11. Hero leaves home;

12. Hero is tested, interrogated, attacked etc, preparing the way for his/her receiving magical agent or helper (donor);

13. Hero reacts to actions of future donor (withstands/fails the test, frees captive, reconciles disputants, performs service, uses adversary's powers against them);

14. Hero acquires use of a magical agent (directly transferred, located, purchased, prepared, spontaneously appears, eaten/drunk, help offered by other characters);

15. Hero is transferred, delivered or led to whereabouts of an object of the search;

16. Hero and villain join in direct combat;

17. Hero is branded (wounded/marked, receives ring or scarf);

18. Villain is defeated (killed in combat, defeated in contest, killed while asleep, banished);

19. Initial misfortune or lack is resolved (object of search distributed, spell broken, slain person revived, captive freed);

20. Hero returns;

21. Hero is pursued (pursuer tries to kill, eat, undermine the hero);

22. Hero is rescued from pursuit (obstacles delay pursuer, hero hides or is hidden, hero transforms unrecognizably, hero saved from attempt on his/her life);

23. Hero unrecognized, arrives home or in another country;

24. False hero presents unfounded claims;

25. Difficult task proposed to the hero (trial by ordeal, riddles, test of strength/endurance, other tasks);

26. Task is resolved;

27. Hero is recognized (by mark, brand, or thing given to him/her);

28. False hero or villain is exposed;

29. Hero is given a new appearance (is made whole, handsome, new garments etc);

30. Villain is punished;

31. Hero marries and ascends the throne (is rewarded/promoted).

If a function applies for a tale, the axiom holds. Not all of the functions/axioms need to be fulfilled by every tale.

3.6 Relations

We define the relations based on the axioms.

3.6.1 Binary relations

publishedIn(tale, anthology), editedBy(anthology, editor), publishedBy(anthology, publisher), publishedInYear(tale, date), appearsIn(fictional Person, tale), hasClass(tale, ATU), applies(tale, function), isRepresentedAs(function, verbalisation), isFollowedBy(function, function), isPrecededBy(function, function), hasSymbol(function, symbol), isInversed(function), interdicts(fictional person, hero), reconnaissance(villain, object), reconnaissance(villain, victim), gainsInformation(villain, victim), deceives(villain, victim), isDeceivedBy(victim, villain), takesPossessionFrom(villain, victim), helpTheEnemy(victim, villain), related(hero, family member), causesHarm(villain, related(hero, family member)), lacks(hero, object), testedBy(hero, donor), interrogated(hero, donor), attackedBy(hero, donor), reactsTo(hero, donor), acquires(hero, magical agent), acquiresFrom(hero, donor), ledTo(hero, desired object), combat(hero, villain), brandedBy(hero, object), defeats(hero,villain), pursuedBy(hero, fictional person), rescuedBy(hero, fictional person), proposedTo(task, hero), proposedBy(task, fictional person), resolves(hero, task), recognizedBy(hero, object), marries(hero, fictional person), isRewarded(hero, object)

3.6.2 Unary Relations

leavesHome(familymember), leavesHome(hero) , misfortune(hero), decidesCounterAction(seeker), resolvesMisfortune(object), resolvesMisfortune(fictional person), returns(hero), arrives(hero), presentsUnfoundedClaims(falseHero), newAppearance(hero), isPunished(villain)

3.7 UML Diagram
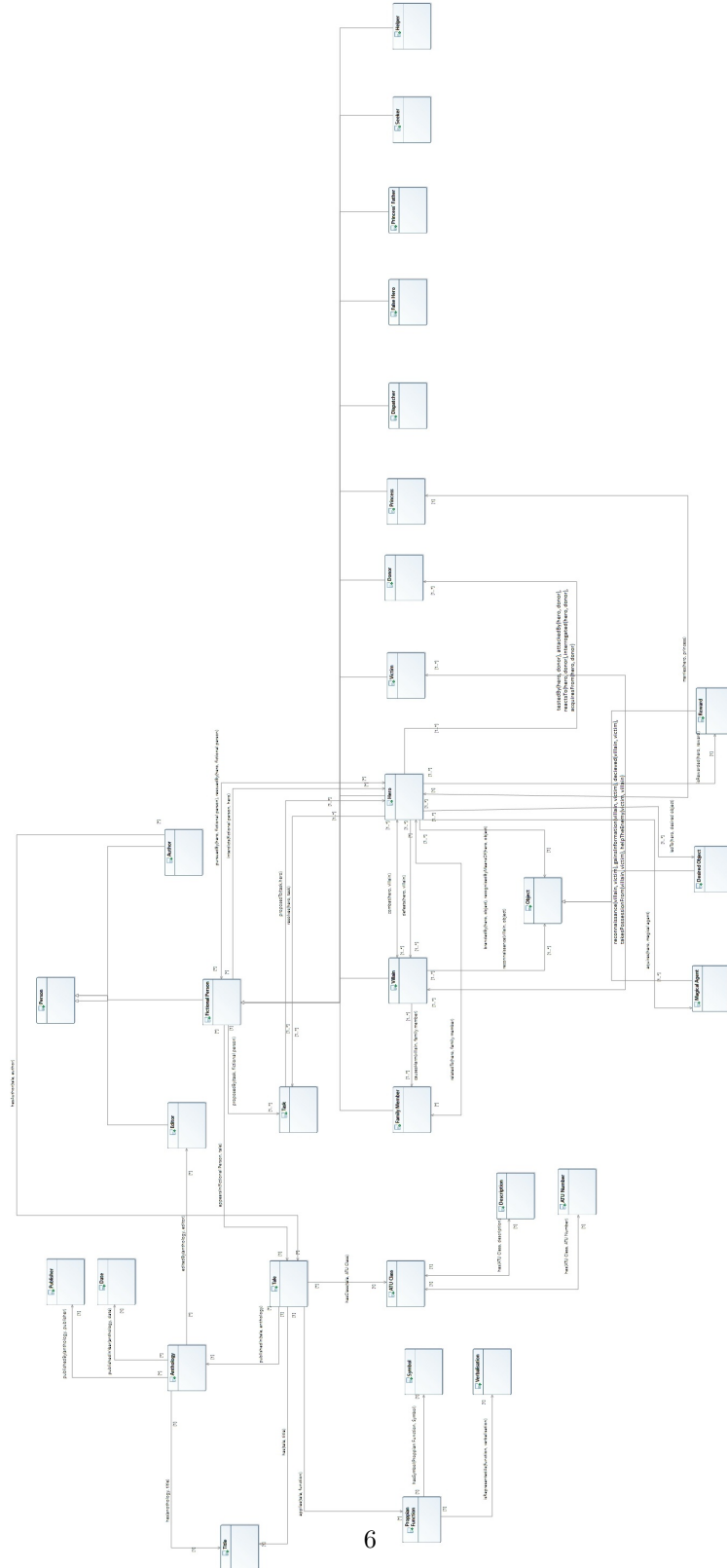
3.8 Description Logic

Axioms of Class Hierarchy	Relationship	
FictionalPerson $\subseteq \exists$ isA.Person		
Hero $\subseteq \exists$ isA.FictionalPerson		
False Hero $\subseteq \exists$ isA.FictionalPerson		
Dispatcher $\subseteq \exists$ isA.FictionalPerson		
Villain $\subseteq \exists$ isA.FictionalPerson		
Donor $\subseteq \exists$ isA.FictionalPerson		
Seeker $\subseteq \exists$ isA.FictionalPerson		
Helper $\subseteq \exists$ isA.FictionalPerson		
Victim $\subseteq \exists$ isA.FictionalPerson		
Family Member $\subseteq \exists$ isA.FictionalPerson		
Princess $\subseteq \exists$ isA.FictionalPerson		
Princess' Father $\subseteq \exists$ isA.FictionalPerson		
Editor $\subseteq \exists$ isA.Person		
Author $\subseteq \exists$ isA.Person		

4 Implementation

5 Outview

6 Bibliography

References

[1] J. Grimm and W. Grimm, eds., *Kinder- und Hausmärchen.* Verlag der Dieterichschen Buchhandlung, 7. ed., 1857.