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A Tool for Interactive Visualization of Narrative Acts

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Abstract. Authoring for Interactive Digital Storytelling (IDS) requires reasoning in formal paradigms which has proven to be a difficult task. One of such paradigms is the narrative act, understood as "actions on actions." We compiled a catalog of narrative acts and made it publicly available as an online interactive visualization tool. A preliminary evaluation deemed this 'living' tool as useful for inspiring authors of IDS systems.

Keywords: Narrative Act, Visualization, Authoring.

1 From New Writing Practices to New Authoring Tools

Research and innovation in the field of IDS tend to show that this emerging media calls for more abstract ways of writing [4]. Writing plain text is replaced by creating structures, parametrizing algorithms, creating logical conditions, handling variables. More particularly, some IDS systems involve writing abstract actions that are "actions on actions." For example, Chris Crawford's Storytron [1] uses verbs such as Promise, Advice in the core mechanics of the narrative engine. Authors need to create such verbs and then implement them into the system. Similarly, the narrative engine IDtension is based on a number of action types, such as Dissuade, Congratulate, Ask for assistance [3]. We call these complex actions types "narrative acts".

Beyond technical difficulties for creating proper data structures, IDS authors may not come easily with an idea of which narrative act to use, let alone which parameters. This situation encouraged us to create a catalog of narrative acts so that authors could either borrow from for story writing or to create novel narrative acts taking inspiration from the indexed ones. The catalog was built from multiple sources including IDS systems, narrative theories, agent languages, speech act theory. At the time of writing it contains 223 narrative acts, enriched with various descriptors.

This catalog is rather large and valuable as such, but narrative acts are not easily retrievable if data is only structured as a table or a spreadsheet. In addition, the catalog wants to be inspirational for authors, not only enabling them access but also engaging them in browsing and discovering narrative acts. Therefore, we propose to design and implement a visualization tool based on appropriate visualization techniques.

2 The Visualization Interface

Information visualization is an active domain in Human-Computer Interaction, studying how to visually represent information so that it is best understood by a user of a computer system. Methods of representation depend on the type of data represented, in our case the main structuring element of the catalog is a hierarchical organization of narrative acts. They are grouped into six main domains, each decomposed into classes containing narrative acts. For example, the narrative act *Promising* belongs to the *Decision* domain, contained in the *Commitment* class.

A number of methods to represent hierarchical information exist, including trees, tree maps, sunburst, circle packing. We chose the sunburst visualization for its readability [2]. Figure 1 represents the home view of the visualization tool: domains are represented by six sectors of different colors, classes and narrative acts represented in the same color range with a lower degree of saturation. The visualization is interactive at several levels. First, when a portion of the disk is rolled-over (a domain, class or narrative act), the corresponding description is detailed on the right panel.

In Figure 1, the mouse is positioned at the specific class, "Authority-based influence" (see Figure 2).

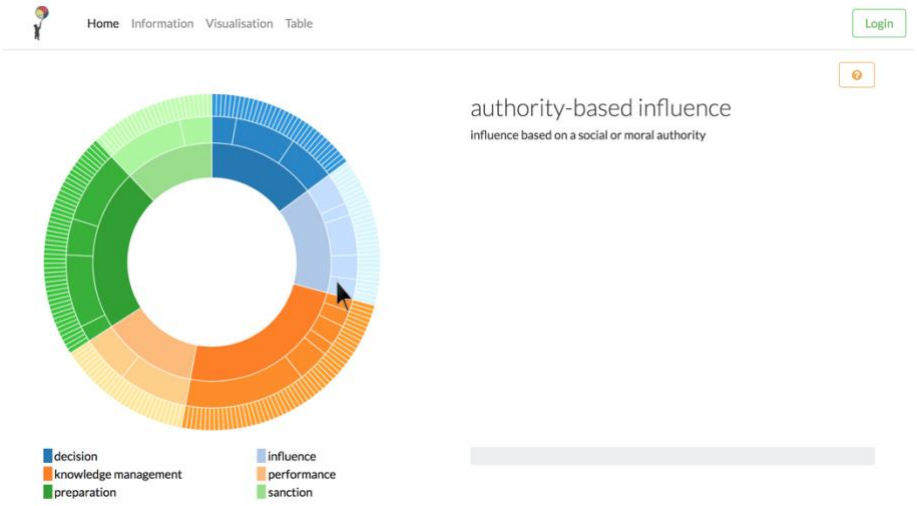

Fig. 1. Main page of the visualization with one class rolled-over.

Second, when an element is clicked, an animation reconfigures the sunburst placing the selected element in the center and the sub-elements around it. In Figure 2 the *Influence* domain was clicked, the visualization now focuses on the narrative acts under this domain. Similarly, all the elements can be rolled-over: the narrative act *Order* is rolled-over in Figure 2 providing all corresponding information. It is then possible to zoom in on a class and then on a specific narrative act.

The visualization is accessible online at http://tecfalabs.unige.ch/narrativeacts_vis/ In addition to the sunburst visualization a presentation of the narrative acts is provided as a searchable table, as well as a general information page.

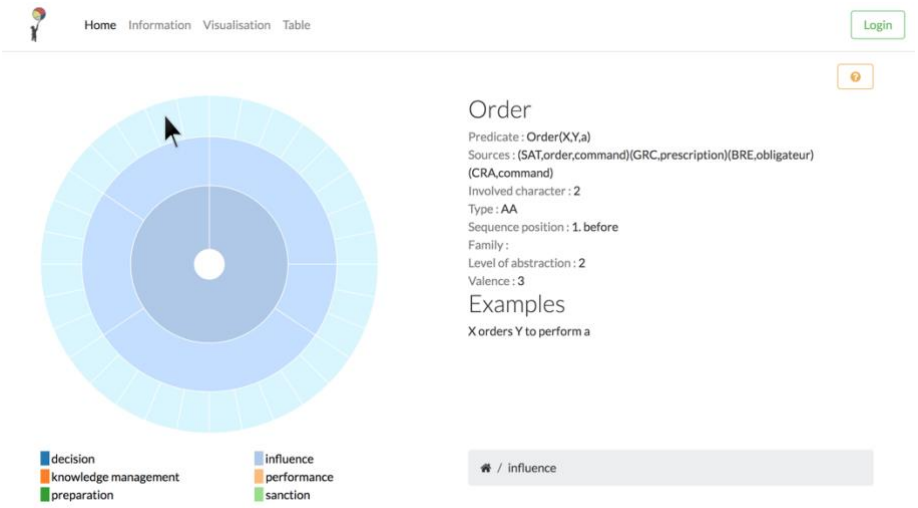

Fig. 2. View on the *Influence* class with the *Order* narrative act rolled-ever.

3 Administration Interface

The list of narrative acts might evolve, in particular as a consequence of the writing process. Additionally, a story may require a relevant specific narrative act that might then worth be adding to the catalog, an administration interface was implemented to add and edit narrative acts.

4 Technical Specifications

The visualization tool has been developed using existing dedicated open libraries. The general web functionalities were programmed using the *Bootstrap* framework. Narrative acts data and their hierarchical organization is stored using a *MySQL* database. Transactions between the website and the database rely on three additional frameworks, namely *Slim*, *Twig*, and *Eloquent*. Data is formatted in *JSON*. Finally, the sunburst visualization was implemented in *D3.js*, a JavaScript library for advanced data visualization.

5 Preliminary Evaluation

A qualitative usability study was carried out with four participants with knowledge in linguistics or IDS authoring. The goal of the evaluation was to assess if 1) the tool is

usable; 2) users could find a certain narrative act they search for (and how); and 3) if the visualization was useful for free exploration of narrative acts.

Participants were given a series of five tasks, such as "could you retrieve the definition of the *Knowledge* domain?" in order to assess the tool usability. Two tasks targeted the utility of the visualization: first, authors were asked to tag an existing story with proper narrative acts, then they were asked to continue the story with the help of the visualization tool. Next, they were invited to add a narrative act in the database via the administration interface. At the end, participants filled out a questionnaire covering their perception of the visualization, difficulties in comprehension, perceived usefulness of the visualization tool, and suggestions for improvement.

The four participants managed to use the tool, despite some reported usability issues when navigating the catalog. They all managed to finish the tasks battery, were enthusiastic regarding the tool, and found it appropriate to complete the tasks they were asked to perform. The table view was perceived as more appropriate than the visualization when it comes to searching for a specific narrative act. Conversely, the visualization appeared more relevant when searching a narrative act according to its domain and class. The usability issues were considered to design the current version of the visualization tool.

6 Conclusion

Based on a catalog of 223 narrative acts, an interactive visualization tool was implemented and made available online to any IDS author involved in handling narrative acts. An interesting extension of this work could consist in connecting the catalog to an IDS engine so that actions related to a given narrative act could be executed (as text, animated images, 3D behaviors, etc.) in order for the author to get a better grasp of a certain narrative act.

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