Tolstoy: Playfulness through Visual Shared Storytelling

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Abstract

Stories play a central role in our lives. They shape how we interpret the world and enrich our imagination and creativity through their playful, visual qualities. Following a review of how computers have played a role in storytelling, we present *TolsToy*, an interactive installation for visual shared storytelling. Tolstoy shows that it is possible to create a situation where the computer acts as an imaginative, playful and mindset-shaping partner in the creation of stories. Tolstoy does not place users in a predefined context, limiting their creativity. It can thus be seen as the first step towards the future of storytelling, where technological developments can benefit the creativity of both humans and computers.

Author Keywords

Storytelling; playfulness; collaboration.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

Introduction

Long, long ago, mankind recognized the potential of telling stories. Ever since, stories play a central role in our life. They are found everywhere around us: during conversations, while consuming media or while sensing

and reflecting on our surroundings. As Delgado argues, through the ubiquity of stories, they shape how we interpret the world by the (de)construction of our current mindset and the forming of an internal ideology [7]. Telling stories can thus create a common consensus or institutional memory [3]. This shared knowledge is created in all kinds of societal communities, both in dominant groups and outgroups [7] and equally holding in organizations [15].

Stories also enrich our imagination and creativity through their playful, visual qualities. They contain powerful linguistic elements such as narratives, storylines, metaphors and conceptualizations. Therefore, storytelling and reading can be a powerful educational mean for language complexity and story comprehension [12] and a psychotherapeutic tool for those with special needs [10].

Thus, while stories might seem childish and trivial, it is precisely these imaginative, playful and mindset-shaping qualities that make them interesting and useful and raise the questions about what computer technology has been designed to enhance the storytelling experience, and how we can use the qualities of stories to do this in a better way.

In this paper we review the literature on these themes, focusing on the different roles that computers take in the enhancing of our storytelling experience. For simplicity we only consider visual storytelling. From this review, it becomes clear that storytelling is subject to technological improvements. This creates opportunities that seem weakly addressed by current research. As a solution we present Tolstoy, an interactive installation for visual shared storytelling where the computer acts as an imaginative, playful and mindset-shaping partner in the creation of stories. We give an overview of Tolstoy and our observational results based on a public exhibition, and critically reflect if the result is in line with our envisioned solution.

The computer as a visual output for stories
Ever since early cave paintings, where stories were represented in paintings, mankind has been in search for new ways and media to communicate stories. Technology enables us to show stories like never before, using its computational power to render animated films to the screen, or through electronic story books. In this role, the computer is merely used as a mean to visualize a static, one-directional story after it has been shaped by a human. The story "receivers" do not have influence on the story itself.

The computer as a story teller
The quest to generate automated stories dates back to 1977 when Meehan described the concept of a meta-novel. His system, Tale-Spin, generates stories in the domain of Aesop's Fables [14], an old collection of fables credited by the Greek storyteller Aesop.

Since then, there have been many developments in the area of digital storytelling, allowing external influence on the computerized story. Entirely new genres such as computer games arose with this premise. *The Stanley Parable* [19] is an intriguing recent example where the player has the choice to (dis)obey the story narrator. Another example is *Façade* [13], an experiment in building a fully realized interactive drama allowing the use of natural language through the keyboard for the first time. The player is placed in a virtual environment and is free to interact with the virtual characters.

Human interaction with the computer-generated stories is limited by the narrow range of possible storylines. The impressive recent development in systems with *Artificial Intelligence* (AI) can possibly remove this limitation and create a more sophisticated experience. For example, *Interactive Storyteller* [1] creates AI-based interactive stories through its multi-user interface. The stories emerge from the interaction of human players with intelligent characters in a simulated story world.

The computer as a story authoring tool

A recently growing body of research is in the area of story authoring tools. In story authoring tools, computers serve as a "construction medium for creative authoring that allows … to build interactive stories where the 'reader' is an active participant in the story" [6]. Thus, computers can be an instrument that enable users to create their own visual (interactive) stories. For example, *StoryScape* [8] is a platform allowing users to create stories in order to encourage participatory learning. It was built initially to stimulate social engagement in children with Autism Spectrum Disorders. The *StoryTec* tool [9] allows graphical manipulation of story elements. Finally, several recent games like *Little Big Planet* [18] provide extensive editing and creation tools that allow players to author an endless amount of new stories.

An interesting approach is to make the story authoring experience more collaborative for a better social experience. *KidPad* and *Klump* [2] are storytelling technologies that encourage shoulder-to-shoulder collaboration. KidPad is a shared 2D drawing tool that allows children to jointly visualize their stories. Klump adopts an improvisational approach where players take turns to deform 3D blobs that represent characters.

Motivation

In all the current approaches it is clear that computers attempt to enhance the storytelling experience. Recent technological improvements allow storytelling applications to use computational power and artificial intelligence. This creates numerous opportunities to allow users to author their own stories.

However, current applications seem to contribute more towards improving the creativity and imagination of computers, making humans more complacent. We find that present authoring tools are still placing the users in a predefined context, telling users specifically what they can do and what they cannot. This undermines the imaginative, playful and mindset-shaping qualities that stories can have.

This is why we envision a solution for shared visual storytelling where the computer acts as an imaginative, playful and mindset-shaping partner in the creation of stories. This role implies that the computer is on the same level as the user, using AI, but not limiting the user in any way other than the used language. The computer becomes unpredictable. This can lead to a positive form of uncertainty, allowing users to be more creative and spontaneous and feel less restricted.

System Design

Tolstoy is an interactive installation where up to three users can shape a story together with the computer by speaking to it. Whenever a line is added to the story, the computer visualizes a relevant silhouette,

Figure 1: Exterior view of the installation: a crude, playful blanket fort.
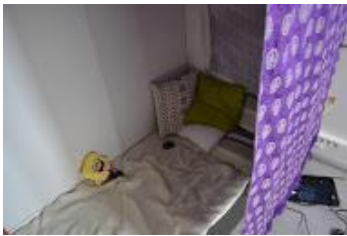

Figure 2: Interior view of the installation. The users are provided a cozy, playful environment.

Figure 3: The starry visualization on the ceiling.

encouraging users to reflect on the story line and, if wanted, steer the story in a whole new direction.

Experience
The installation (Figure 1) is inspired by the setting of blanket forts. These crude looking tents are associated with childhood and can recall the playfulness that we look for. To stimulate this behavior further, we add mattresses, a blanket, cushions, soft toys, and candles. The users can always lie down comfortably and stay inside for a longer time (Figure 2).

Inspired by imaginative and mind-shaping storytelling activities like bedtime stories and star gazing, the ceiling of the blanket fort serves as the canvas for projecting a night sky with the starry visualizations of Tolstoy (Figure 3). These visualizations are shown as one-colored silhouettes on purpose in order to leave the users' own imagination intact as much as possible. Users are handed a mouse which they click-and-hold to add a line to the story. A hidden microphone picked up the users' speech.

Lastly, the closed blanket fort creates a suspenseful spectator experience [16] where visual effects of the interactions cannot be seen by the spectators. This can make the spectators curious about what happens inside and wanting to join the current user(s). It can result in an interesting collaborative storytelling experience.

Technology
The system divided into three distinct parts:

i.   Voice to text
ii.   Text to meaning (natural language)
iii. Visualization

The processing from voice to text is done using Google's *Web Speech API*. This tool captures the users' voices relatively accurately, supporting all major languages and accents. Voices are recorded on mouse clicks, and sent to the server on mouse releases. The text is received as the response.

The linguistic meaning of the response can be extracted by the *Natural Language Tool Kit* (NLTK) [4]. NLTK's Part of Speech tagging mechanism puts words in a sentence into their corresponding lexical categories such as nouns, verbs, adjectives etc. Now only nouns are selected, or verbs when there are no nouns. These provide the most meaningful information of a storyline.

The visualization engine of TolsToy scrapes Google's *Image Search* results scraping to obtain a corresponding silhouette image. In fact, we use the AI engine of Google here. There are other open-source silhouette or shape websites such as *all-silhouettes.com* [17], but Google ensures that we can retrieve the plain colored .png image that is needed. Moreover, the retrieved images have a diverse array of shapes and styles. *ImageMagick* [11] and *three.js* [5] are then used to process the image in order to generate the outline of the silhouette. Finally, we project these outlines and animate them as forming and deforming starry particles on the night sky.

The outcome can be very surprising and unpredictable. An example is when the user tells: "Once there was a mountain". In the final visualization (Figure 4) the computer can show the outline of a snow capped mountain, encouraging the next user to drastically change the course of the story. There are many more interesting visual outcomes (Figure 5 – 7).

Figure 4: Visualization for "There was a big mountain".

Figure 5: Visualization for "There lived a princess".

Figure 6: Visualization for "Then Santa Claus arrived".

Figure 7: Visualization for "And he met Jackson".

Results

Based on informal observations after showing the installation in a 2-hour exhibition, it was clear that most users liked Tolstoy and came out excited and smiling. When we experimented with setting the language of Tolstoy to the users' native language, we found out that users enjoyed it even better.

The experience of the used tent fortress and starry sky metaphor was very positive. Users liked the playful elements and commented positively on the look of the fort's blankets and soft toys. They had no problem to lie down for a longer time on the bed. One user told us: "I can lie down here and play with this forever." An interesting observation is that users instinctively tended to talk into the given mouse assuming that the microphone was in it. This inspires a more subtle future design that matches the mental model of the user.

Spectators went in together and the suspenseful design made them peek through the tent opening to see what happened inside. When there were more people inside, they collaborated and were more likely to tell actual stories. They discussed what appeared and tried to progress their stories together: "What is this? I said axe!" followed by: "It's Wolverine from X-Men!". The relationship with the computer was very interesting. Users were pleasantly surprised, not understanding how the computer was able capture the essence of their storyline so accurately: "How does it know this?" and "How is this possible!".

Discussion

In the beginning, it seemed like the users had a magical sensation of being fully understood by the computer. This is exactly how we envisioned the role of the computer in Tolstoy. However, this later led to the behavior of testing the computer with random nouns that were not part of a bigger story. This leads us to Tolstoy's limitations. Right now, only nouns are recognized, or verbs when there are no nouns. But a more sophisticated approach Tolstoy would extract more information such as adjectives (sizes, colors, etc.) and verbs applied to nouns (objects transforming, corresponding animations). Also, it would remember what objects are mentioned and how they are called, so that all the relevant parts of the storyline are shown at the right time. One can even argue that this limitation makes users rethink or retell their last storyline, instead of shifting the story forward. Lastly, further work is required to ensure that there are no copyright infringements in the use of images.

Conclusion

With Tolstoy, we envisioned a solution for shared visual storytelling where the computer acts as partner for the creation of stories: imaginative, playful and mindset-shaping. The pleasant, surprised feeling that the users experienced of being fully understood by the computer during storytelling shows that Tolstoy is aligned with this vision.

All in all, Tolstoy needs a slightly more sophisticated approach. While this might ask for a better AI, it does not place users in a context that is too predefined, making them complacent. With Tolstoy we showed that it is possible to create the situation where computers are a creative storytelling partner. It can be seen as the first step towards the future of storytelling, where technological developments can indeed benefit the creativity of both humans and computers, so that they live together happily ever after.

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