1 Abstract

In this project, we harness the power of visualization to introduce an alternative, more efficient way to read texts. We build a software application capable of representing texts in three-dimensional structures using highly interactive graphics, where the structures are determined by the lexicographical and statistical properties of the texts. Users know at a glance what the texts are all about, and can skim through lengthy texts by having the program moving through the text space.

2 Background

2.1 The Problem

Throughout history, writing has been the way we communicate thoughts and transfer knowledge. Articles, news, blogs, and writings of all kinds are currently being generated at an ever-increasing rate, creating a perpetual flood of information that we need to wade through in our daily life. Besides the writings that are natively digital, digitized knowledge has also been increasing drastically in size. We see online document hosting websites such as scribd.com, along side with Google and Microsoft’s efforts to digitally scan millions of books to make them accessible to users worldwide through their services. However, such massive amounts of natively digital and digitized knowledge are useless if we cannot access, filter, and digest them efficiently. The fact that texts are intrinsically linear also poses the limit on our capability to deal with them.

2.2 Text Visualization

One promising solution that this project aims to investigate is to use visualization techniques to represent texts in such a way that:

- Allows readers to assimilate information, as fast as possible
- Deepens the understanding and sparks insights, by visually illustrating texts in an interesting yet meaningful way
- Allows otherwise invisible patterns within a large bodies of texts to emerge
• Impresses and inspires asthetically.

There have been attempts in dealing with texts visually, yet most of them often either oversimply or produce visual clutters. Some projects, such as DocuBurst\(^1\), strike a nice balance and produce conceptually robust and lexicographically meaningful results, while lacking in interactive features. On the other end, projects like Ben Fry’s famous Valence\(^2\) are rich in terms of dynamics and interactions, but the usefulness and meaningfulness of results are questioned.

3 Project Overview

The project aims to introduces a new way of reading through texts. We build a visualization system prototype that inputs texts and presents them in an insightful and intuitively appealing way in an interactive three-dimensional environment. Users will be allowed to move across visualization techniques. Depending on the visualizations, words are represented in space by nodes, whose attributes are determined by the words’ lexical and statistical properties. The connections between parts of the texts are visualized and can be explored further by users.

Built on top of the visualization system, an interactive reader goes through the texts visually across the text space, at various speeds. This allows users to skim visually, which results in higher comprehension within less time.

3.1 Platforms and Tools

The application is web-based. Primarily, the project will utilize Jeff Heer’s Flare\(^3\) ActionScript library, and Ben Fry and Casey Rea’s Processing 4.

- **Flare** is the descendant ActionScript version of the widely used Profuse library. I plan to base the project’s main two-dimensional visualization layouts on Flare’s modules. The code development will be done in Adobe Flex Builder and Eclipse.

- **Processing** is a Java-based programming language, specially tailored to electronic arts and visual design communities. I plan to use it for three-dimensional handling and physics between nodes, using Traer Physics engine\(^5\).

For the lexical databases, we will use Princeton’s WordNet \(^6\).

\(^1\)http://www.cs.utoronto.ca/~ccollins/research/docuburst/index.html
\(^2\)http://benfry.com/valence/
\(^3\)http://flare.prefuse.org/
\(^4\)http://www.processing.org/
\(^5\)http://www.cs.princeton.edu/~traer/physics/
\(^6\)http://www.cogsci.princeton.edu/~wn/index.shtml
4 Timeline

My plan for the project over the course of the semester is divided into four main phases:

- **Preparation** (Until 2/13/09)
  Meet with professors to ask for advice and help develop the project ideas further. Conduct further literature review, with main focus on text visualization techniques that have been developed.

- **Research** (Until 2/13/09)
  Learn ActionScript, Flare, and Processing. All these tools are totally new to me, so I will need to spend time working through the tutorials. I plan to practice mainly through code examples from the internet. Then, I will explore WordNet documentation.

- **Design** (2/9/09 - 2/20/09)
  Determine specifically the scope and functionalities of the application, as well as visualizations to be developed and implemented. Design code organization. Put a web page on my Pantheon server, containing all relevant updates.

- **Implementation and testing** (2/21/09 - 4/24/09)
  Complete the implementation.

- **Presentation** (the remaining time until the presentation)
  Prepare a presentation explaining and summarizing the project to Prof. Rushmeier and any other interested faculty members.

5 Deliverables

My final deliverables will consist of the following:

- Complete source code
- Web page describing the project
- Paper discussing the project