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Are matrix-based or node-linked graphs more readable when representing causal relationships for social and health data?

Kristina Lazarova

School of Computing Science
Sir Alwyn Williams Building
University of Glasgow
G12 8QQ

Abstract

We show how to produce a level 4 project report using latex and pdflatex using the style file l4proj.cls

Education Use Consent

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Literature Review

This is the first chapter where I will introduce data visualisation and and explain how I came up with the idea of this research

Chapter 2

Introduction

Introduction to the specific area of my reseaerch

Chapter 3

Implementation details

3.1 Software tools and technologies

A web application framework

3.2 Challenges

```
Spring idea failed
changed to Node.js
Angular compatibility with Node.js
```

Spring is among the most widely used frameworks in industry [**?**].

3.3 Software reliability testing

Chapter 4

Evaluation

4.1   Design

4.2   Participants

4.3   Procedure

4.4   Results

4.5   Discussion

Chapter 5

5.1 First Section in Chapter

The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog [?]. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog.

5.1.1 A subsection

The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog.

The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox [?] jumped over the lazy dog. The quick brown fox jumped over the lazy dog.

Chapter 6

The Fox and Dog

The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog.

6.1 The Fox Jumps Over

The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over Uroborus (Figure 6.1). The quick brown fox jumped over the lazy dog.

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The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick

Figure 6.1: An alternative hierarchy of the algorithms.

brown fox jumped over the lazy dog. The quick brown fox jumped over [**?**] the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog.
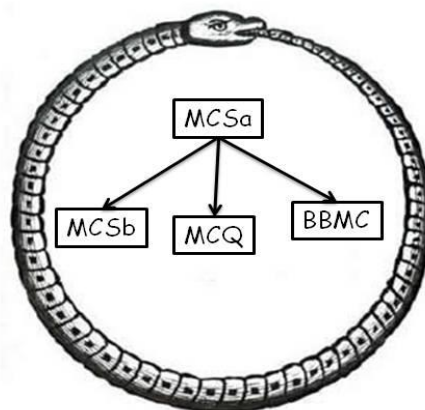
6.2   The Lazy Dog

The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog.

The quick brown fox jumped over the lazy dog. The quick brown fox [**?**] jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog.

Appendices

Appendix A

Running the Programs

An example of running from the command line is as follows:

```
> java MaxClique BBMC1 brock200_1.clq 14400
```

This will apply $BBMC$ with $style = 1$ to the first brock200 DIMACS instance allowing 14400 seconds of cpu time.

Appendix B

Generating Random Graphs

We generate Erdós-Rënyi random graphs $G(n, p)$ where n is the number of vertices and each edge is included in the graph with probability p independent from every other edge. It produces a random graph in DIMACS format with vertices numbered 1 to n inclusive. It can be run from the command line as follows to produce a clq file

```
> java RandomGraph 100 0.9 > 100-90-00.clq
```

Bibliography

[1] DIMACS clique benchmark instances. ftp://dimacs.rutgers.edu/pub/challenge/graph/benchmarks/clique.

[2] Peter Cheeseman, Bob Kanefsky, and William M. Taylor. Where the really hard problems are. In *Proceedings IJCAI'91*, pages 331–337, 1991.

[3] Torsten Fahle. Simple and Fast: Improving a Branch-and-Bound Algorithm for Maximum Clique. In *Proceedings ESA 2002, LNCS 2461*, pages 485–498, 2002.

[4] Brian Hayes. Can't get no satisfaction. *American Scientist*, 85:108–112, 1997.

[5] Kuikui Liuös Xiujin Shiás and Yue Liës. Integrated Architecture for Web Application Development Based on Spring Framework and Activiti Engine. *The International Conference on E-Technologies and Business on the Web (EBW2013)*, pages 52–56, 2013.