A FANCY UNIVERSITY

AN EVEN FANCIER LAB

Christian Stentoft Michelsen

tufte-style-thesis, a Tufte-styled LaTeX class for theses

Actually more of a mix
between Edward Tufte and Robert Bringhurst

Doctoral thesis

November 9, 2022

Supervisor	their name	their job
Cosupervisor	also their name	also their job
Jury members	jury 1	jobs
	jury 2	…

For my homies

Contents

Preface

This Ph.D. thesis summarizes my scientific research in collaboration with the Niels Bohr Institute (NBI) and the Globe Institute, University of Copenhagen, and was funded by the Lundbeck Foundation. The research was supervised by Associate Professor Troels C. Petersen (NBI) and Assistant Professor Thorfinn S. Korneliussen (Globe Institute).

Being a multi-disciplinary project, the research presented in this thesis is multi-faceted and covers a wide range of topics with the main scope being the development and integration of a novel statistical methods and machine learning models for the analysis of large-scale biological data. The thesis is organized as follows. First I present a brief introduction to the statistical methods and machine learning models used in the thesis. Then I present the research in the form of four papers, each of which reflects a different aspect of the research.

The first paper presents a novel method I developed for detecting and classifying ancient DNA damage in metagenomic samples taking the full taxanomic information into account. While the first paper focuses on the development of the statistical model in the field of ancient genomics, the second paper focuses on the use of modern machine learning models in medicine and how advanced boosted decision trees can not only improve the accuracy of identifying patients at risk of being readmitted after knee or hip surgery, but doing so in a way that is interpretable as well. In the beginning of 2020 we all experienced how COVID-19 suddenly changed our lives and impacted our societies in dramatic ways. During this time, I ended up working for Statens Serum Institut (SSI), the Danish CDC, on a project to develop an agent based model capable of simulating the spread of COVID-19 in Denmark. This model is presented in the third paper and was used to inform the Danish government on how to best handle the pandemic in the early stages and the effect of lockdowns and other measures. Finally, in the fourth paper we show how advanced Bayesian methods can be utilized to better estimate the diffusion coefficients of molecules in the cell nucleus in XXX experiments.

Acknowledgements

Gabriel the king. All the TEX.SE team for answering my stupid questions.

Abstract

Basically a thesis (book?) class for Tufte lovers like myself. I am aware that `tufte-latex` already exists but I just wanted to create my own thing.

Dansk Abstract

Her et dansk abstract.

Publications

Here a list of publications.

1   *Notes on the design*

This class is my personal mix of different book design influences: mainly the works of Edward R. Tufte,[1–4] known for the big margin and the plentiness of sidenotes and sidecaptions. The margins are however not as prominent as in Tufte's works, the main text takes a bit more space, more like in Robert Bringhurt's typographer's bible.[5] So it is a bit of a mix of Tufte and Bringhurst, with some of my own choices for other design features, as we will see through this chapter.

1.1   *Document layout*

While `tufte-style-thesis` is a class for typesetting theses, the general layout is pretty much the same as in a regular book. A book is traditionally divided into three major sections: the front matter, the main matter and the back matter.

[1] Tufte, E. R. *The Visual Display of Quantitative Information* ISBN: 0-9613921-4-2 (Graphics Press, Cheshire, Connecticut, 2001).

[2] Tufte, E. R. *Beautiful Evidence* ISBN: 0-9613921-7-7 (Graphics Press, Cheshire, Connecticut, 2006).

[3] Tufte, E. R. *Envisioning Information* ISBN: 0-9613921-1-8 (Graphics Press, Cheshire, Connecticut, 1990).

[4] Tufte, E. R. *Visual Explanations* ISBN: 0-9613921-2-6 (Graphics Press, Cheshire, Connecticut, 1997).

[5] Bringhurst, R. *The Elements of Typographic Style* ISBN: 978-0881791327 (Hartley & Marks Publishers, 2002).

Bibliography

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APPENDIX

Some additional stuff (see how the title protrudes in the margin)

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