Handling Unreliable Information

A thesis submitted in partial fulfilment of the requirement
for the degree of Doctor of Philosophy

Joseph Singleton

XXX 2022

Abstract

This is a short summary of the thesis. What a great thesis it's going to be.

Contents

Contents i

Ackowledgements iii

List of Publications iv

I Introduction and Motivation 1

1 Introduction 2

2 Thesis Outline 3

II Social Choice Perspectives 4

3 Introduction 5

4 Truth Discovery 6
4.1 Summary 6

5 Bipartite Tournaments 7
5.1 Summary 7

III Logic-based Perspectives 8

6 Introduction 9

7 Expertise and Knowledge 10
7.1 Summary 10

8 Belief Change with Non-Expert Sources 11
8.1 Summary 11

9 Truth-Tracking **12**
9.1 Summary 12

IV Conclusions **13**

10 Conclusion **14**
10.1 Summary 14
10.2 Future Work 14

Bibliography **15**

Ackowledgements

I would like to thank Bear for being a dog. Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

List of Publications

The content of this thesis is derived from the following publications.

- Joseph Singleton and Richard Booth. *Who's the Expert? On Multi-source Belief Change*. 2022. DOI: 10.48550/ARXIV.2205.00077. URL: https://arxiv.org/abs/2205.00077

  This work appears in some chapter later on.

- And another

Part I

Introduction and Motivation

1 Introduction

- Overall theme: how should we deal with unreliable information?
- We want to:
  - Aggregate conflicting reports (crowdsourcing, news)
  - Assess the trustworthiness of information sources
  - Understand what reliability, trustworthiness and expertise *mean*
  - Find the truth with imperfect information
- This thesis offers two main perspectives on these general themes
  - **Social choice theory.**
    - By posing the aggregation problem as one of social choice, we can apply the axiomatic method to investigate desirable properties of aggregation methods. We can then analyse and evaluate such methods in a formal and principled way.
    - Related ranking problems can be addressed through the lens of social choice.
  - **Logic and knowledge representation.**
    - We develop a logical system to formalise notions of expertise, and explore connections with knowledge and information.
    - We use these formal notions to express the aggregation problem in logical terms, taking an alternative look at the problems of the first part of the thesis. We use what is essentially still an axiomatic approach, but now in the tradition of knowledge representation and rational belief change.
    - This logical model is well-suited to investigate *truth-tracking*: the question of when we can find the truth given that not all sources are experts.
- Note that while there are many links between the two major parts, they are not tightly connected and may be read independently.

2 Thesis Outline

Part II

Social Choice Perspectives

3 Introduction

- Describe what we mean by social choice?
- Overview of how our stuff will relate to the COMSOC literature?

4 Truth Discovery

This section is all about truth discovery. Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

4.1 Summary

5 Bipartite Tournaments

5.1 Summary

Part III

Logic-based Perspectives

6 Introduction

7 Expertise and Knowledge

7.1 Summary

8 Belief Change with Non-Expert Sources

8.1 Summary

9 Truth-Tracking

9.1 Summary

Part IV

Conclusions

10 Conclusion

10.1 Summary

10.2 Future Work

Bibliography

[1] Joseph Singleton and Richard Booth. *Who's the Expert? On Multi-source Belief Change*. 2022. DOI: 10.48550/ARXIV.2205.00077. URL: https://arxiv.org/abs/2205.00077.