



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Simple Bayesian Algorithm for Top-m Arm Identification

Master Thesis

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Abstract

This example thesis briefly shows the main features of our thesis style, and how to use it for your purposes.

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Chapter 1

Introduction

What is the relationship between the optimal allocation and the algorithm? How does this statement translate to real world applications? What is particular about the algorithm being Bayesian? What are constraints on prior and posterior distributions? Are we in a frequentist or Bayesian setting?

Chapter 2

Background

2.1 Chernoff's 2-player game

Tbd whether relevant.

2.2 Bandits

What is the scenario? What are typical problems in this scenario? Why is the scenario and its problems relevant?

2.3 Thompson Sampling

How does it work? Why is it useful? What is it used for?

2.4 Best Arm Identification: Top-1

2.4.1 Problem formulation

What is the problem? Why is it relevant? How is performance evaluated?

2.4.2 Optimal allocation

What is the overall goal? How is this achieved? (Talk about optimization over hyper-parameters)

2.4.3 A Constrained Optimal Allocation

What are properties of the constrained optimal allocation? How can they be interpreted?

2.4.4 TTTS algorithm

What is the algorithm? Refer to empirical section for details on distribution updates.

2.4.5 Alternative approaches

What are alternative approaches to Russo's? How do they compare against Russo's?

2.5 Top-m Arm Identification

What is the problem? Why is it relevant compared to Top-1?

2.5.1 Current approaches: LUCB

How are those methods evaluated? What are possible qualitative shortcomings of those methods? What are possible quantitative shortcomings of those methods?

Confidence estimation 1

Confidence estimation 2

Confidence estimation 3

Characterizing the Optimal Allocation

3.1 Problem formulation

What does it mean to be optimal?

3.2 A Constrained Optimal Allocation

3.2.1 Statements

How can C be interpreted? How does this tie in with Chernoff's statements? How does this compare to the top-1 case? What's an example of an optimal allocation? How would those statements look like without the constraint?

3.2.2 Proofs

Chapter 4

Algorithm

4.1 Analysis/Properties

4.2 Empirical behaviour

What true distributions are assumed? What prior and posterior distributions are assumed? How is C computed? How is α computed, as it is defined via a huge integral? How is ψ computed, as there is no closed form?

4.3 Proofs

Chapter 5

Conclusion

Appendix A

Dummy Appendix

You can defer lengthy calculations that would otherwise only interrupt the flow of your thesis to an appendix.

Bibliography



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