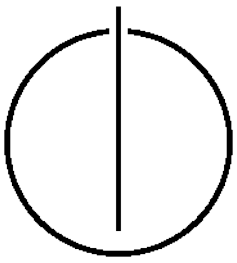
TECHNISCHE UNIVERSITÄT MÜNCHEN

DEPARTMENT OF INFORMATICS

Master's Thesis in Informatics

Finding Stable Outcomes in Fishery Exchanges with Budget Constraints

Deepesh Pandey



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Finding Stable Outcomes in Fishery Exchanges with Budget Constraints

Stabile Ergebnisse in Fischereiborsen mit Budgetbeschrankungen finden

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I confirm that this master's thesis in informatics is my own work and I have documented all sources and material used.

Munich, 15.10.2018 Deepesh Pandey

Acknowledgments

Abbreviations and Acronyms

FEx	FisheryExchange

Abstract

Contents

1 Introduction

1.1 Fishery Exchange

Problem of overfishing? Measures taken by the government to fix this problem and their effects? Model of share classes and catch shares? Problems with this model and the introduction of fishery exchanges.

1.2 Combinatorial Exchange Model

What is combinatorial exchange? How Fishery exchange can be viewed as a combinatorial exchange?

1.3 Budget constraints

What are budget constraints? Why do we care about them? Some examples? Past results with these constraints?

2 Combinatorial Exchange

2.1 Design Desiderata

1. Efficiency
2. Individual Rationality
3. Budget Balance
4. Incentive Compatibility
5. Stability

2.2 Core in Combinatorial Exchanges

What is Core? Why do we need them? How they play role in Combinatorial exchanges? With the concept of core the equations can be modelled as a bilevel program?

2.3 Bilevel Programming Model

What are bilevel programs and what kind of problems they encode? Mathematical formulation of the model?

2.3.1 Fishery Exchange Bilevel Formulation

Write down the equations and explain each of them

2.4 Solving Bilevel Programs

Discuss about the structure of the problem and what are the intricacies with it?

2.4.1 Zeng's Algorithm

Discuss in detail every step of the Zeng's algorithm

2.4.2 Solving FEx using Zeng's Algorithm

Discuss the mapping of the Zeng's algorithm on the FEx problem. Write down all the generated KKT conditions.

3 Implementation and Results

3.1 System Requirements

1. Solver choice
2. Programming Language and Java API'S
3. Naming Conventions
4. System RAM requrements based on the instance sizes

3.2 Input and Output Format

Disucss about the current json model and its advantges.

3.3 Instance specific settings

Choice of M(complimentary constraint one and the objective one), share classes and other things

3.4 Generalized Object-Oriented Framework

How did we modularized the complete thing so that it could be used everywhere? Discuss about the object oriented architecture and classes

3.5 Execution

Execute the implemented algorithm on a smaller instance and explain in detail what's happening? Results from the master level, lower level and everything that the algorithm performs on this instance. Now execute the bigger example and

4 Improvements on Algorithm

4.1 Delayed Coalition Generation

Compare results and show improvements.

4.2 KKT Pruning

Compare results and show improvements.

4.3 FEx specific Improvements

Compare results and show improvements.

4.4 Instance specific Improvements

Compare results and show improvements.

5 Conclusions

5.1 Summary

5.2 Future Work

List of Figures

List of Tables