

The Definite Extension Procedure for Large-Scale Marginal Satisfiability

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Todo (TC Fraser): Write an abstract

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I. INTRODUCTION

- Todo (TC Fraser): Marginal problem
- Todo (TC Fraser): Use cases for the marginal problem
- Todo (TC Fraser): Motivate issue of computational complexity
- Todo (TC Fraser): Will be presenting technique capable of fully solving marginal problem
- Todo (TC Fraser): Early termination offers partial solution

II. MARGINAL PROBLEM

- Todo (TC Fraser): Set up notation and definitions

III. EXISTING METHODS

- Todo (TC Fraser): Geometric interpretation of marginal Polytope
- Todo (TC Fraser): Fourier Motzkin, Convex Hull
- Todo (TC Fraser): ESP, Symmetric, etc...
- Todo (TC Fraser): Existing methods do not exploit features of interest
- Todo (TC Fraser): Logical Contextuality & Hardy Transversals

IV. DEFINITE EXTENSION PROCEDURE

- Todo (TC Fraser): Prove features of complete solution
- Todo (TC Fraser): Homogeneous, linear, integral
- Todo (TC Fraser): Multi-set representation of inequality (certificates)

A. Hypergraph Transversals

- Todo (TC Fraser): Generalizing Logical Contextuality inequalities to more exotic antecedents
- Todo (TC Fraser): Algorithms

B. Irreducibility & Facets

- Todo (TC Fraser): Define facets and their properties
- Todo (TC Fraser): Algorithms
- Todo (TC Fraser): Visualization

C. Accelerations & Symmetries

Todo (TC Fraser): **Need to prove/disprove complete symmetry group**

- Todo (TC Fraser): Complete Characterization of Marginal Symmetries
- Todo (TC Fraser): Outcome Symmetries
- Todo (TC Fraser): Variable Symmetries
- Todo (TC Fraser): Search space and Output massively reduced

D. Hierarchy vs. Relaxation

Todo (TC Fraser): **Need to determine upper limit**

- Todo (TC Fraser): Implementation as Hierarchy or Relaxation

E. Convex Hull Problem

- Todo (TC Fraser): Possible to use this on generic convex hull

F. Targeted Definite Extension Procedure

- Todo (TC Fraser): With known incompatible distributions can target output
- Todo (TC Fraser): Seeds inequalities

V. DEMONSTRATIONS

A. Generic Problem

B. Quantum Non-locality

C. Something Else

VI. CONCLUSIONS

- Todo (TC Fraser): In situations where Fourier Motzkin is intractable/will never finish, other methods need to be used
- Todo (TC Fraser): If number of facets is massive, partial solution with flexibility is desired
- Todo (TC Fraser): Symmetries drastically reduce the output space and search space
- Todo (TC Fraser): DEP offers a canonical presentation of output space

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