

Concept - Presentation

High Quality Hypergraph Partitioning via Max-Flow-Min-Cut Computations

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1 Introduction

- ✓ Problem/Task Description (high-level) and Main Contributions
 - ✓ e.g. *Integration of a framework based on Max-Flow-Min-Cut computations to improve a balanced k -way partition into the n -level hypergraph partitioner KaHyPar*
- ✓ Introduce *hypergraphs*
- ✓ Define the ϵ -balanced k -way hypergraph partitioning Problem
- ✓ Applications
- ✓ Introduce *multilevel paradigm*
- Motivation: Disadvantages of *FM* algorithm and why *flow*-based approaches solve these problems
 - ✓ *Move*-based and only incorporates *local* informations
 - ✓ *Zero-Gain* Moves
 - Flow-based approaches are not move-based and finding the global minimum cut separating two vertices s and t

2 Preliminaries

- Introduce most important notations
- ✓ Define Flow Problems + Terminology

3 Framework

- ✓ High-level overview of framework (Mixed with related work)
 - ✓ *Active Block Scheduling*
 - ✓ Build region around cut + *Adaptive Flow Iterations*
 - ✓ Solve flow problem on a hypergraph flow network
 - ✓ *Most Balanced Minimum Cut*
- ✓ Flow Networks
 - ✓ Vertex Separator Analogy
 - ✓ Lawler Network
 - ✓ Wong Network
 - ✓ Heuer Network
 - ✓ Hybrid Network
- Flow Problem Configuration
 - ✓ Modeling of Sanders and Schulz

- ☐ Optimized modeling approach
- ☐ Flow Algorithms
 - ☐ EDMONDKARP
 - ☐ GOLDBERG TARJAN
 - ☐ BOYKOV KOLMOGOROV
 - ☐ IBFS
- ☐ MBMC on hypergraphs
- ☐ Integration into *KaHyPar*
 - ☐ Flow Execution Policy
 - ☐ Gain-Cache
 - ☐ Speed-Up Heuristics

4 Experiments

5 Conclusion