

Offer Networks Simulation and Dynamics

Master's Dissertation Contract

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1 Thesis Statement

I will run experiments simulating automated transaction suggestions in a moneyless market. The set-up is a network where users upload pairs of tasks they will offer in exchange for requested tasks, which has been called an offer network. I will use either graph or SAT based optimization to find potential transactions, which can be cycles among more than two users. Then I will analyze the network dynamics and performance. If time permits, more features will be experimented with.

2 Additional Information

An offer network instance can be represented as a graph where tasks are nodes and directed links represent (offer, request) pairs, in which case potential transactions are cycles. Thus finding optimal transaction is a **maximum vertex cycle problem**. The problem can also be framed in terms of **weighted boolean optimization**.

3 TODO

Core goals:

- Review and summarize related work
- Read up on the state-of-the-art graph / SAT optimizers
- Read up on market performance metrics
- Survey real-world sites to determine realistic initial instances:
 - How many users and (offer, request) pairs per user?
 - How often will users add new (o, r) pairs?
- Formalize time-complexity of problem
- Formally represent problem instance as graph
- Develop or find and use a problem-instance generator
- Adapt pre-existing optimizer (graph or WBO-based) to problem format
- Finish up simulator via feedback: modify instance by effecting found solution
- Run initial trials and measure:
 - % of requests satisfied
 - average time (iterations?) to being fulfilled
 - distribution of cycle (match) sizes
 - ...
- Vary instance parameters (or optimization parameters) and repeat trials

Extra if time permits:

- Explore other optimization methods not used above
- Experiment with adding features to the offer network instances, such as gifts (o,) or requests without offers (o,r), or reputation systems

Questions:

- How to view offer network instances and solutions.
- Online vs batch matching – depends on algorithm

4 Timeline

From 06.02.2017 to about 25.06.2017

