Game Theoretical Analysis of Resource Allocation in the InterPlanetary File System

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TBD

Background

IPFS (InterPlanetery File System)

- P2P hypermedia distribution protocol
- Content-addressed, versioned filesystem
- Git repo in a torrent
- Many use-cases
  - **Goal:** Replace HTTP, decentralize Internet

IPFS Stack

System Model

Process

- Multiple iterations
  - *Complexity* vs. *accuracy*
- Attempted tools
  - Evolutionary game theory
  - Statistical mechanics
  - **Repeated games**

IPFS Network as Graph

- *Nodes*: Users
- *Edges*: Peerings; unweighted, undirected

Game

- *Infinitely repeated*
  - Discrete rounds, denoted by t
- *Static*

Plan

Analytical Work

1. **Repeated game analysis**
   - Balances model accuracy with complexity
2. **Evolutionary game theory** (if time allows)
   - Good model, but high complexity

Simulations

1. **Strategy simulator**
   - Complements repeated game analysis
2. **Bitswap tests**
   - Test actual IPFS nodes

Preliminary Results

TODO: graphic for this?

Strategy Simulator

- 3 node network
- Parameters
  - Resource distribution
  - Initial peer-wise reputations
- Tests whether given strategy function is NE

Strategy Simulator

TODO: figures illustrating full exchange example

Strategy Simulator

Conclusions

- Homogeneous resource distributions

Timeline

TODO

TODO: need this?