

On the sustainability of BitTorrent-based credit systems

A decorative graphic consisting of a solid teal horizontal bar, followed by a white horizontal bar, and then three thin, parallel white horizontal lines.

BitTorrent - reminder

- tracker: keeps a record of every transaction, peer and swarm
- private communities: own incentive policies
 - sharing ratio enforcement, credit amount checking
- credit ~ money

Simulator

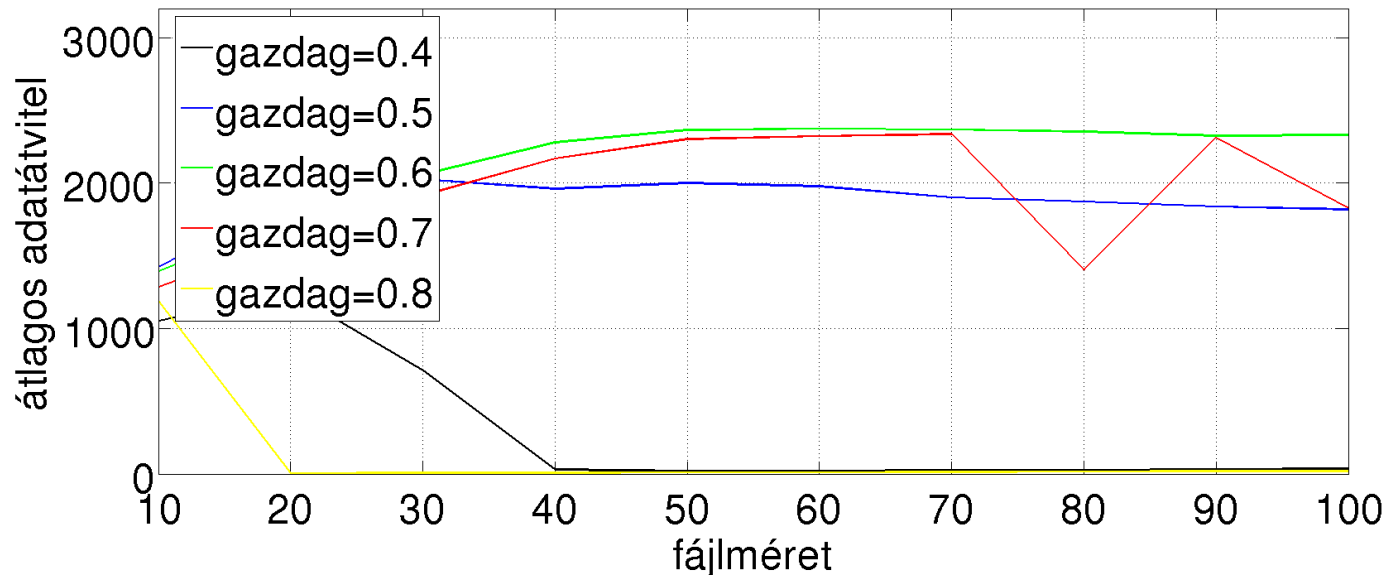
- simplified model
 - one peer participates in one swarm at a time
 - completely closed community
- 1000 peers, 100 files, 1 credit = 1 piece
- upload: 4 pieces/generation
- varying file size and credit amount
- varying download speed

1. Connection between file size and sustainability

- reproducing results of an article
- crash/crunch doesn't only depend on the initial ratio of rich/poor peers
- average file size has a huge impact as well
- simulations: 10 -> 100 size, 40% -> 80% rich

Homogeneous peers, default case

- earlier: initial 40% rich is safe
- 80%: unbalanced system

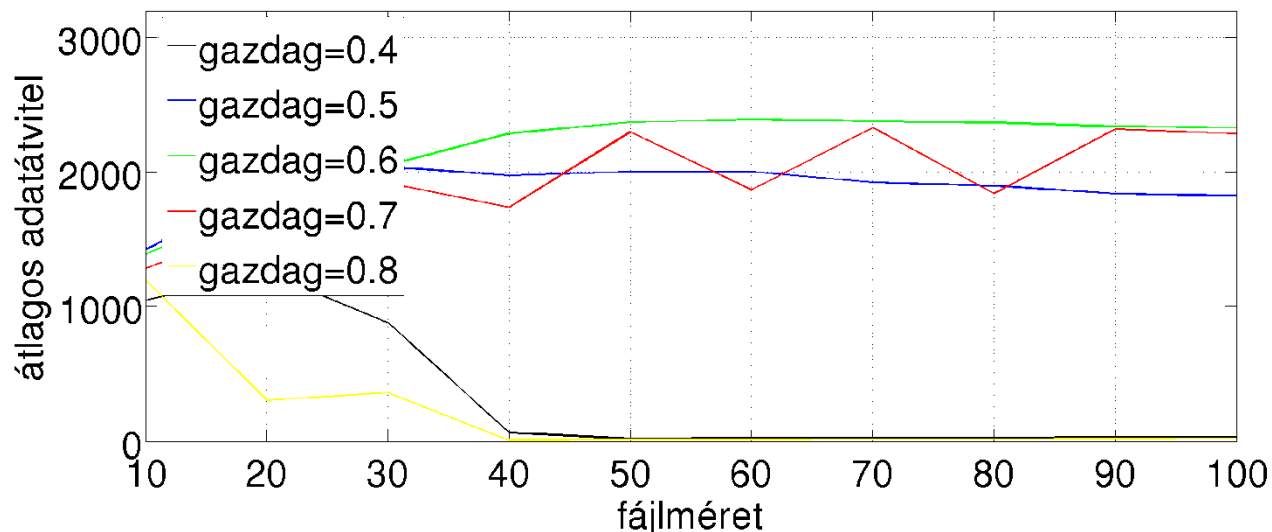


Homogeneous peers, constrained leecher upload

- Why does a system go down?
- crash/crunch -> bad credit distribution
- observation: too rich leechers
- constraining credit earning while leeching?
- nothing changes with homogeneous peers and fix credit amount ☹️

Heterogeneous peers, default case

- one step closer to reality: different download speeds
- good news: easier to sustain at 40% and 80%

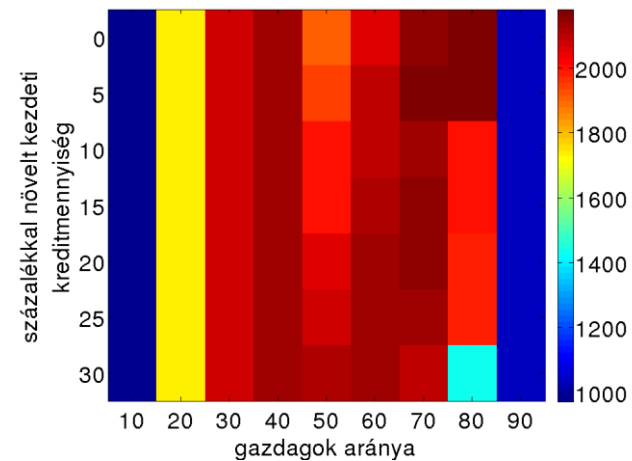
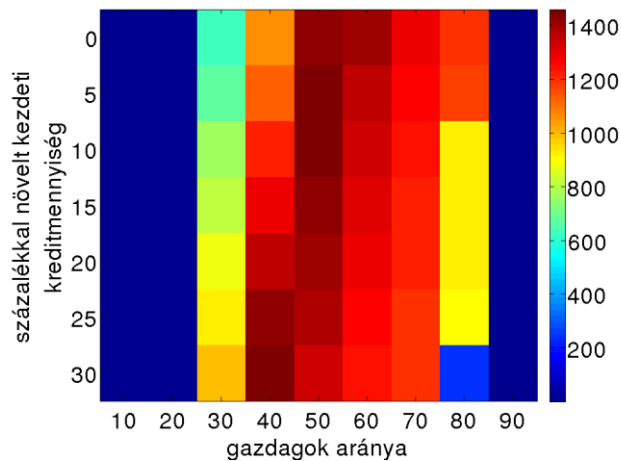


2. Changing the initial credit amount

- motivation: crash/crunch + adaptive credit
- earlier configuration: $(\# \text{rich peers}) * \text{fileSize}$
- now: step 5%, up to +30%
- distribution of extra credits: randomly among the peers
- similar to real systems (snapshot)

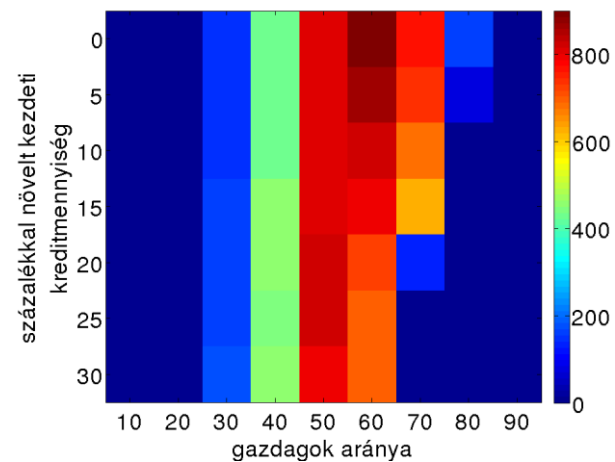
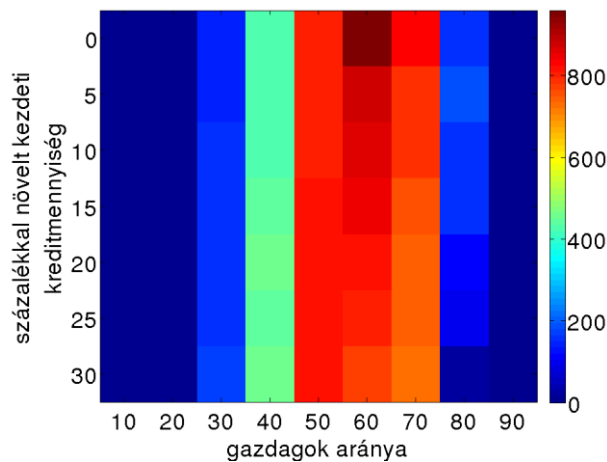
Homogeneous peers, default case

- average: correlation between ratio and credit amount
- max throughput could be increased
- no effect on min throughput



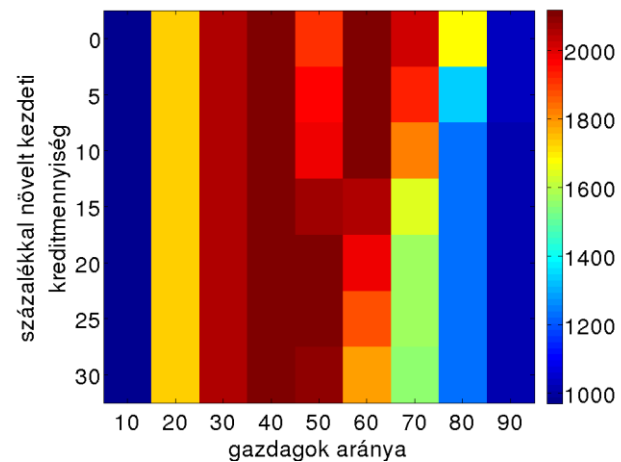
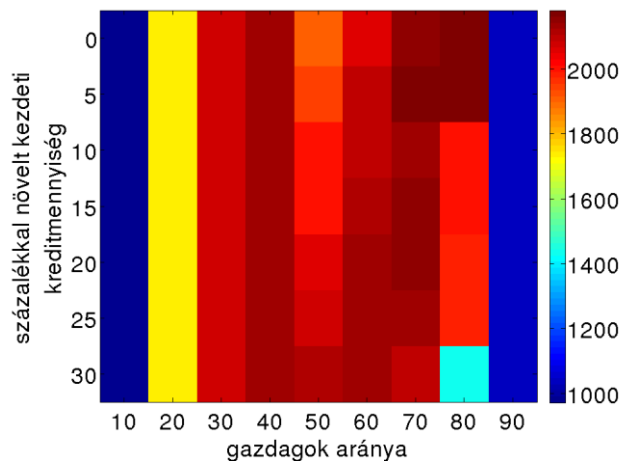
Homogeneous peers, constrained leecher upload

- even collapses at the earlier stable 70% ratio
- 50% & 60%: minimal throughputs are better

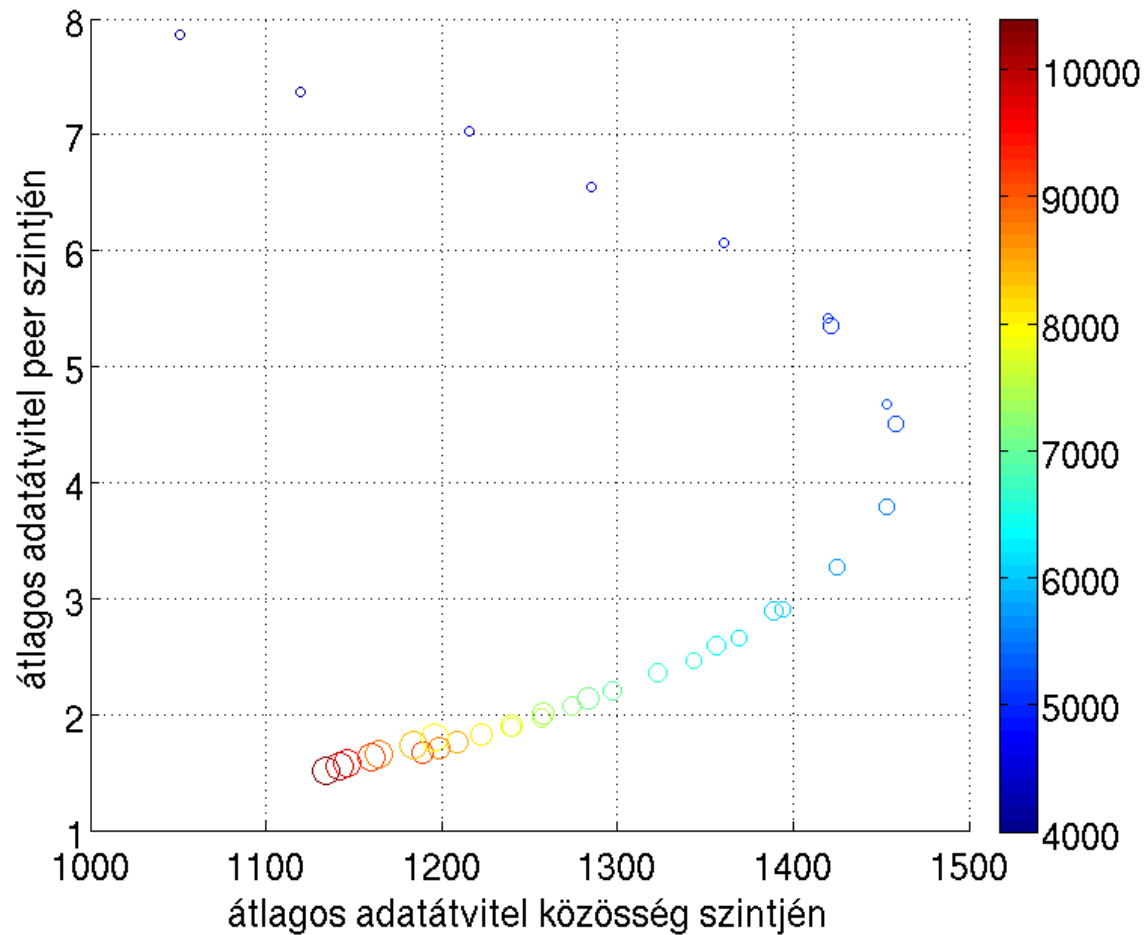


Heterogeneous peers

- default case: more stable at 80%
- constrained upload: average throughput decreases
 - BUT: min & max throughput could be increased



Heterogeneous peers





Thank you!