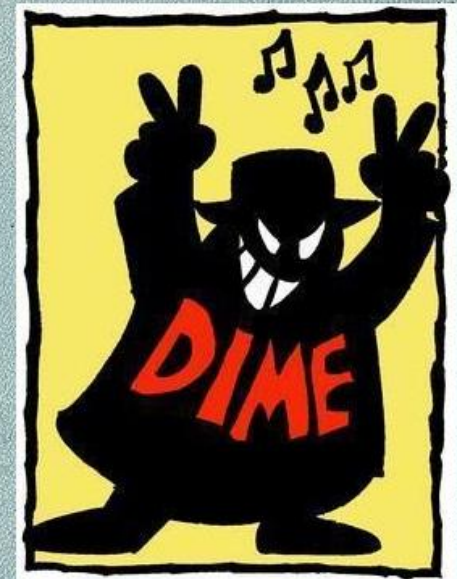


ECONOMICS OF BITTORRENT COMMUNITIES

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1. QUICK BRIEFING

- In this paper authors advance the study of private file sharing communities built on BitTorrent Protocol as Economic Systems.
- They have conducted this research on DIME community for about half of a year (April 28, 2010 to September 27, 2010)
- DIME(www.dimeadozen.org) is a private BitTorrent community for sharing live concert recordings (Bootlegs in lossless audio formats)
- DIME allows open registrarion, restricts maximum number of accounts 110,000(to reduce server laod and work for moderators)

Tech Terms Used

- BitTorrent: BitTorrent is a protocol intended to share files via direct connections between different hosts(Peer to Peer)
- Tracker: Is a coordinating server between peers and establishes direct connections between them to download and upload pieces of files.
- Seeder: Peers who have a full copy of the file and thus only upload to others.
- Leechers: Peers who only have a partial copy of a file and engage in upload and download.
- Bootlegs: Is audio/video recording of a performance that was not officially released.

2. THE PROBLEM

- BitTorrent is a Huge Success - no doubt but there is no incentives for the peers to continue uploading a file after it is downloaded. Hence upload of a file is completely depends on the generosity or selflessness of the peer.
(Although chances are that most of the data that one peer got was from seeds, and it is good to give back to the community !)

The Solution

- The solution to this problem is 'Private BitTorrent communities' build on BitTorrent Protocol.
- Private communities, by developing their own policies and mechanisms for motivating members to share content and contribute resources.
- Currently there are over 800 active Private BitTorrent Communities.
- Private communities track how much each user downloads and uploads. This allow them to require members to upload a certain fraction of the amount they download.
- This regulation is known as 'Share Ratio Enforcement'. Users earn credits by uploading files they download and spend credit by downloading new files.

3. HOW DIME WORKS ? (THE MATHEMATICS AND ECONOMICS OF DIME)

- **DIME** enforces a share ratio of **0.25**, which requires members to upload atleast a quarter of the amount they download (in bytes)
- **Formula:** The amount of credit or wealth each user has on DIME is defined as
CREDIT = 4 * UPLOAD - DOWNLOAD
- As DIME requires a share ratio of 0.25, every transfer of data adds credit to the system. If a byte is sent from peer A to B, then B loses a unit of Credit, but A gains 4 units of Credit.
- **PRICE OF A FILE:** Is the amount of credit deducted from the account of the downloader when the file is acquired (Simply the size of the file in bytes)
- **RESALE VALUE:** After a file is downloaded, users can seed the file to earn credits, resulting every downloaded file a 'Resale Value'
- Even if two files have the same price, their resale values can be significantly different due to a difference in the expected returns for the seeding (possibly some inconvenience cost due to effort associated with seeding for some period)
- Occasionally **DIME** offers a **FREE LEECH PERIOD** during which users do not spend any credits while downloading files (Prices of all the files are fixed to 0) and users still receive credits for uploading files. So files retain their resale value.

4. METHODOLOGY USED IN THIS RESEARCH

Researchers with permissions from **DIME MODERATORS** and with the approval from **HARVARD's** Institutional Review Board have obtained the following information by performing periodic crawls of the website.

- **1. ACCOUNT PROFILE SNAPSHOTS**

It included static information such as the user's date of joining and dynamically updated information such as the user's ratio, and upload / download amounts and rates.

- **2. TORRENT TRACES**

It includes traces of torrent detail pages from the time a torrent was posted for a number of torrents. It also included information about the seeders and leechers on the torrent and their current upload and download amounts for the torrent.

- **3. TORRENT SNAPSHOTS**

It included information about all the active torrents in the system.

5. FINDINGS AND SUGGESTION

- FINDINGS

- 1. Old files are more harder to upload to others . (Due to the difference in resale value between new and old files)
- 2. This effect skews the everyday consumption of the newer, more popular files which is reflected in the desire to download old files when the price is dropped during 'FREE LEECH DAY'. It is found the active download during the LEECH PERIOD is 50 to 70% higher than the other normal days.

On DIME, users are allowed to have a negative amount of credit (limited to 5GB). This helps new users, who begin with 0 credits, to download their first files.

- 4. It is found that the newly joined users have an increased tendency to download old files. (Users may be less aware of the fact that downloading old files can quickly result in them having negative credit)
- 5. Some users join the site to download a particular file and do not get interested in staying for the long time. These 'Free Riders' know in advance that they will not need to regain their lost credits so they do not upload the file.
- SUGGESTION: Restricting access of new users to old files may be imposed.