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PeekaTorrent

Leveraging P2P Hash Values for Digital Forensics

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Problem Description

We are drowning in data:

- processes and best-practices do not scale well
- 12TB hard drives recently presented
- sector hashing, unziping and unpacking, ...

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Problem Description

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We'd like to ignore:

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Problem Description

Hashing is prevalent:

- DHTs, P2P file-sharing (SHA-1)
- Dropbox (4MB, SHA-256)
- file whitelisting (NSRL):
  - full file (SHA256, SHA1 & MD5)
  - fuzzy files (ssdeep, sdhash)
  - blocks (MD5b4096, MD5b8192)

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Problem Description

Couldn’t we add to this:

- exclude commonly found files
- mostly totally irrelevant for investigation
- even before looking at files manually

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General idea:

- leverage publicly shared hash values
- more granular than files, but less than sectors

- it's all in the *.torrent*
- copyright-free!

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BitTorrent uses chunking:

- all files are concatenated
- then split in chunks (=*pieces*)
- most often 256kb, (observed 16kb-16mb)
- depending on implementation and user preference

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Instead of hashing sectors, or files:

- variable hash windows (2^n)
- iterate over each sector
- build on *bulk_extractor*

Then pipe it all into *hashdb*, see what drops out

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Benefits:

- also deleted & partially overwritten files
- fast!
- less false-positives
- hashdb files can be easily shared

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Use cases:

- file whitelisting (torrents)
- file blacklisting
- custom hashsets: source code, email attachements, sharepoint, ...

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Simplistic use:

- create torrent with files of interest
- don’t publish/announce it
- pipe into hashdb, done

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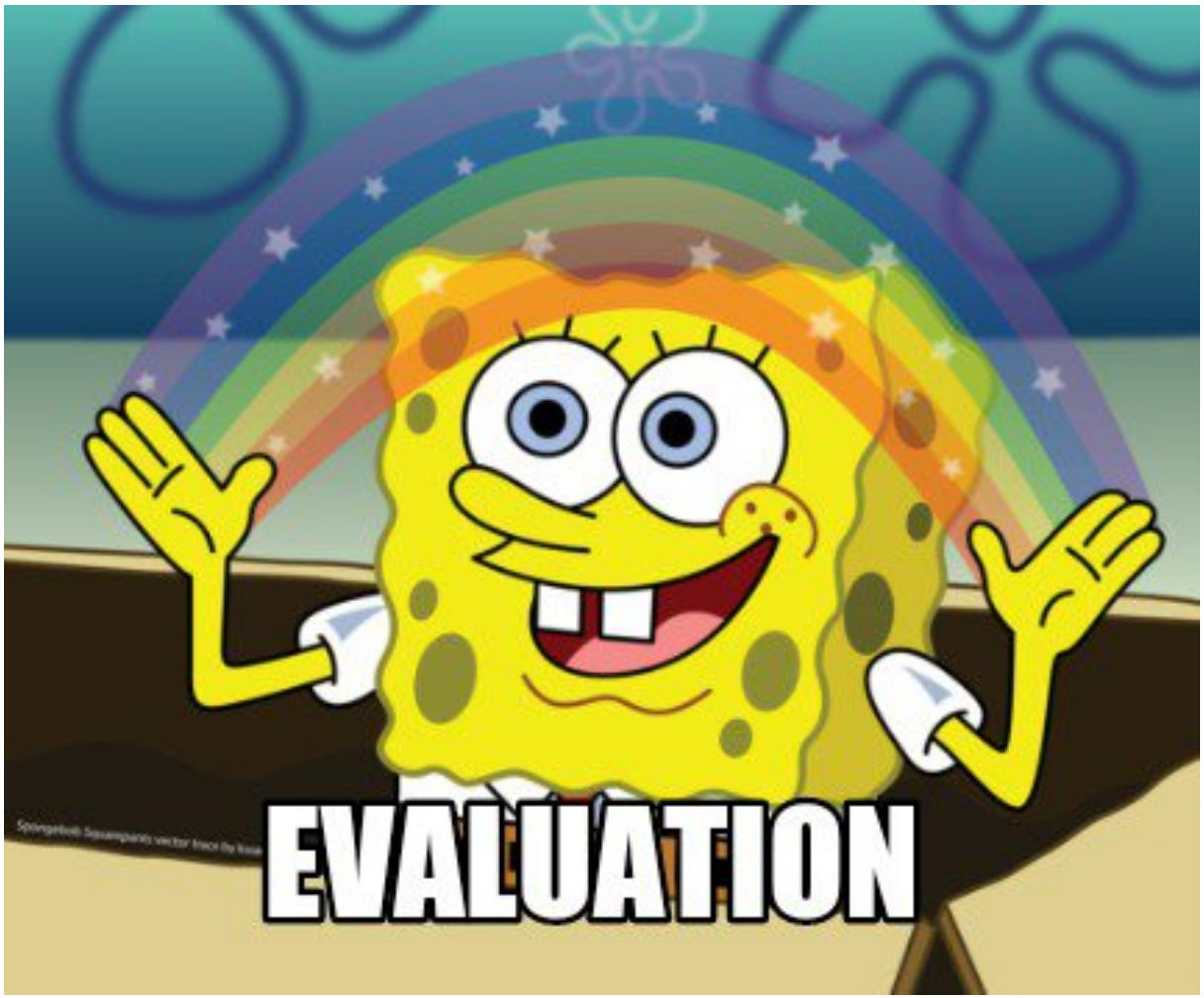
Evaluation



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Evaluation

Collected data:

- in total: 2.65 million torrent files
- crawling Piratebay & KAT
- multiple data dumps

- 3.3 billion unique chunk hashes
- up to 2.6 PB of data

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Evaluation

Some numbers:

- 1 GB filesystem, Ubuntu Desktop = 1158 chunks
- running bulk_extractor: 220s (Notebook), 23s (Server)
- running hashdb: few seconds

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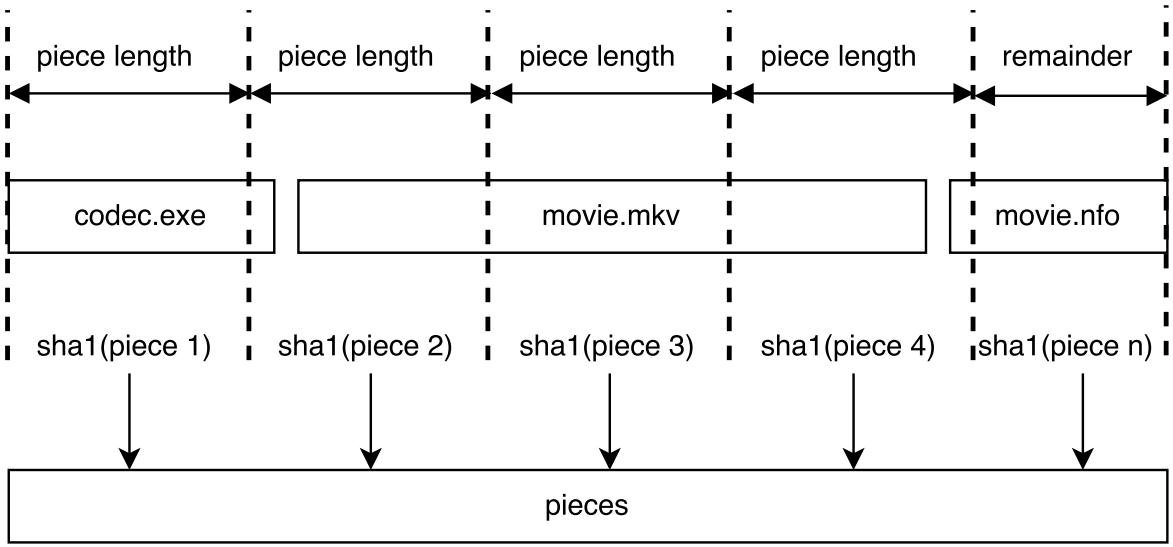
Limitations

Non-usable data:

- chunks consisting of two files
- fragementation on disk



Future Work

What's needed:

- more .torrents!
- more data
- investigate data set more closely (duplicates)
- get feedback

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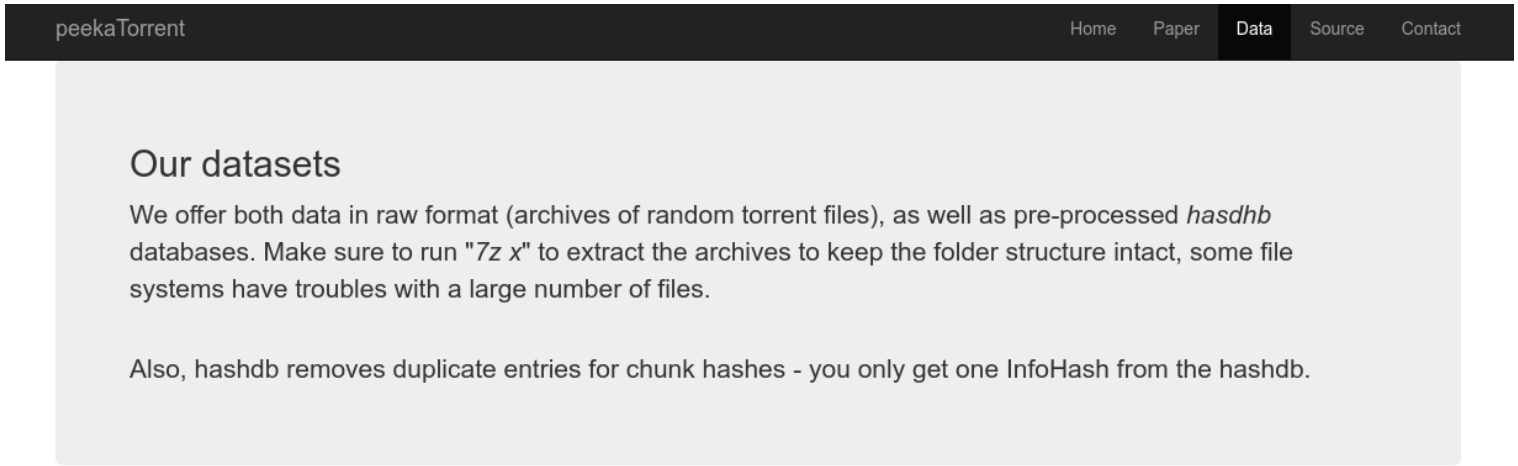
Sharing is Caring



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Home Paper Data Source Contact

Our datasets

We offer both data in raw format (archives of random torrent files), as well as pre-processed *hasdhb* databases. Make sure to run "*7z x*" to extract the archives to keep the folder structure intact, some file systems have troubles with a large number of files.

Also, hashdb removes duplicate entries for chunk hashes - you only get one InfoHash from the hashdb.

Torrent Archives

2.65 million torrent files 66 GB compressed, 84 GB raw

85,000 torrent files piece_length 16k, 1 GB compressed, 3 GB raw
100,000 torrent files piece_length 32k, 2.2 GB compressed, 3.7 GB raw
345,000 torrent files piece_length 64k, 3.9 GB compressed, 5.4 GB raw
213,000 torrent files piece_length 128k, 4.4 GB compressed, 5.4 GB raw
730,000 torrent files piece_length 256k, 25 GB compressed, 31 GB raw
318,000 torrent files piece_length 512k, 8.2 GB compressed, 9.5 GB raw
332,000 torrent files piece_length 1024k, 7.3 GB compressed, 8.8 GB raw
189,000 torrent files piece_length 2048k, 4.3 GB compressed, 5.3 GB raw
171,000 torrent files piece_length 4096k, 4.7 GB compressed, 6.1 GB raw

hashdb Datasets with InfoHash

50 mio hashes, piece_length 16k, 2.2 GB compressed, 5 GB raw
111 mio hashes, piece_length 32k, 4.7 GB compressed, 10 GB raw
192 mio hashes, piece_length 64k, 8.1 GB compressed, 15 GB raw
220 mio hashes, piece_length 128k, 9.1 GB compressed, 17 GB raw
1.2 bil hashes, piece_length 256k, 49 GB compressed, 81 GB raw
405 mio hashes, piece_length 512k, 17 GB compressed, 30 GB raw
350 mio hashes, piece_length 1024k, 15 GB compressed, 26 GB raw
205 mio hashes, piece_length 2048k, 8.6 GB compressed, 16 GB raw
226 mio hashes, piece_length 4096k, 9.4 GB compressed, 18 GB raw

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Questions?

Thank you for your attention

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