Video Scoring

Definitions:

For any video v, cache c and endpoint e:

1. $\mathbb{E}[c]$ - the set of all endpoints connected to the cache c.

2. $R_e[v]$ - the number of requests to the video v from endpoint e.

3. $\ell(e,c)$ - the latency (in ms) of serving a video from the cache c to endpoint e.

4. $\ell(e,v)$ - the latency (in ms) of serving a video v to endpoint e from the closest place that currently holds the video v. e.g. if the data-center latency of e is 1000ms, video v is in caches c_1, c_2 and $\ell(e,c_1) = 150$ and $\ell(e,c_2) = 300$. then $\ell(e,v) = min\{150, 300, 1000\}$.

5. $size(v)$ - the size of the video v in megabytes.

Video score:

The score a cache c gives to a video v is:

$$Score(c,v) = \frac{\sum\limits_{e \in \mathbb{E}[c]} R_e[v] \cdot (\ell(e,v) - \ell(e,c))}{size(v)^2}$$

Inserting videos to cache

We go through all caches in the network. At each step we compute all scores this cache gives to the videos in the network. Then we start inserting videos to this cache as long as there is space for them. We insert videos in descending order of their scores (i.e. videos with higher score are tried to get in first).