Competition over popularity in social networks

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Recent work

- Create videos and uploading them to youtube
- As creators we have access to much data
- This allows us to model the propagation of content in the network
- Study competition over popularity in social network
What do we learn from youtube data

- What brought the views: another social How many views according to the profile (age, sex, location)
- network? Another WEB site? The recommendation of Youtube? A search in Youtube etc.? Is it a mobile source?
- Audience Retention
Traffic Source

- 2103 views during 70 days
- 850 from recommendations of youtube

<table>
<thead>
<tr>
<th>Traffic source</th>
<th>Views</th>
<th>% of total views</th>
</tr>
</thead>
<tbody>
<tr>
<td>YouTube suggested video</td>
<td>850</td>
<td>40.4%</td>
</tr>
<tr>
<td>Mobile apps and direct traffic (unknown sources)</td>
<td>438</td>
<td>20.8%</td>
</tr>
<tr>
<td>YouTube channel page</td>
<td>282</td>
<td>13.4%</td>
</tr>
<tr>
<td>Embedded player (unknown sources)</td>
<td>199</td>
<td>9.5%</td>
</tr>
<tr>
<td>External website</td>
<td>172</td>
<td>8.2%</td>
</tr>
<tr>
<td>YouTube search</td>
<td>89</td>
<td>4.2%</td>
</tr>
<tr>
<td>YouTube – other features</td>
<td>63</td>
<td>3.0%</td>
</tr>
<tr>
<td>Google search</td>
<td>8</td>
<td>0.4%</td>
</tr>
<tr>
<td>Homepage feeds and subscriptions</td>
<td>2</td>
<td>0.1%</td>
</tr>
</tbody>
</table>
Traffic Source

• Social Networks:
  - Linkedin (71)
  - Facebook (38)

(From INRIA: 5)
Profile:
- France: 820
- USA: 540
- Unknown: 200
- Next come locations where I gave talks:
  - India: 87
  - Germany: 37
  - Israel: 27
  - Italy: 24
Profile: gender and age

- 9.8% Fem views
- 4.4% Fem views in France
- 7.2% Fem views in US
audience retension (allows dimensionning)
Data we get from Facebook:

- Data on each Content in a page
Competing over popularity of content:

- **Individuals** who wish to disseminate content through a social network. **Goal: visibility, popularity**

- **Social network provider** (SNP) interested in maximizing the amount of downloads

- Has **tools** to accelerate the dissemination of popular content. Example: **Recommendation graph**
Example: YOUTUBE
Example: YOUTUBE
Example: YOUTUBE

AD 1

AD 2

AD 3

Recom

graph
A list containing other ad events:
Sharing and embedding
- **Semi Dynamic model: ads in the beginning**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>02/22/12</td>
<td>First view from a mobile device</td>
<td>107,108</td>
</tr>
<tr>
<td>02/22/12</td>
<td>First embedded on – facebook.com</td>
<td>75,452</td>
</tr>
<tr>
<td>02/22/12</td>
<td>First referral from YouTube search – obama singing</td>
<td>31,008</td>
</tr>
<tr>
<td>02/22/12</td>
<td>First embedded on – whitehouse.gov</td>
<td>23,221</td>
</tr>
<tr>
<td>02/22/12</td>
<td>First referral from – facebook.com</td>
<td>19,180</td>
</tr>
<tr>
<td>02/22/12</td>
<td>First embedded on – plus.google.com</td>
<td>11,465</td>
</tr>
<tr>
<td>02/22/12</td>
<td>First referral from YouTube search – barack obama singing</td>
<td>7,892</td>
</tr>
<tr>
<td>02/22/12</td>
<td>First referral from YouTube search – obama sings</td>
<td>6,601</td>
</tr>
<tr>
<td>02/22/12</td>
<td>First embedded on – failblog.org</td>
<td>5,824</td>
</tr>
</tbody>
</table>
Snowball epidemic effects
Dynamic ads policy

Other acceleration
Factors:
- Other publishers
- Embed content
- Comments and Responses increase Visibility
Model

- $N$ content creators (seeds) – players
- $M$ potential destination
- A destination $m$ is interested in the first content that it will be aware of.
- Information on content $n$ arrives at a destination after a time exponentially distributed with parameter $\lambda(n)$.
- The goal of a seed: maximize the number of destinations $X_i(T)$ at time $T$ ($T$ large) that have its content (dissemination utility).
For linear dissemination utility, we can reduce the state space to the number of destinations that have some content. 1-dimensional!

Solution: formulate explicit M matrix games, the equilibrium at matrix m is the equilibrium of the original game at state m.
We take as state the vector whose $i$-th component is the expected number of destinations with a packet from source $i$.

We obtain a differential game with a compact state space.

The case of no information

Let $\bar{x}_i(t) := E[X_i(t)]$ and $\bar{x}(t) := \sum_{i=1}^{N} \bar{x}_i(t)$. Then

$$\dot{\bar{x}}_i(t) = \lambda_i w^i_t (M - \bar{x}(t))$$

We take as state the vector whose $i$-th component is the expected number of destinations with a packet from source $i$. .
Results

Again state space collapse to dimension 1

- Equilibrium at state $m$ obtained as equilibrium of $m$-th matrix game. Now $m$ is a real number.

- For linear acceleration cost – same threshold policies as in the case of full information.
Motivation: video competition
More info: 1 goto my homepage
2. Click on “Dodescaden project”

October 2012: The LONGAS (COmplex Networks and GAmes theory) European STREP EU Project (of which I am the scientific coordinator) has its first meetings. See 2 for notes from the second meeting.

October 16th, 2012, the French Academy of Sciences attributes the Grand Prix France Telecom jointly to Joel CIBERT and to Eitan ALTMAN, see video (to the left) and photos.

The DODESCADEN project (Data and cOntent DElivery in SoCiAL networks: an epiDEmic aNalysis) is in search for a sponsor!

The book "Through the Eyes of a 12-Year-old Girl" by my Mother, Yanina Hesheles Altman, has been translated to Ukrainian and Russian thanks to the great work of devoted persons from Hesed Arie association in Lviv. In addition, they made an excellent movie and theater show based on the book. My deepest thanks to Adel Dianova, Ola Lidovskaja, Oldovsky Slavik, Alexandra Somish, Tatjana Sukorkina, Aharon Weiss and maney others. A short film is available, documenting the movie the theater show, and the return of Yanina to Lvov in that occasion. You may directly download from here the file in the format of AVI,...

Helena Ganor, writes about my mother in her book "Four letters to the witnesses of my childhood": "After the war, she [Janina Hezzeles] published a book about these times... Papa bought it for me after the war... This book, as I see it now, was a Polish equivalent to The Diary of Anne Frank. How sad it is, my dear Mama, that this book is unknown to the world..." The most recent book by my mother is on the Weisse Rose (German resistance movement of students and professors in Munich University). The first part of the book entitled "Naturwissenschaftler vor und nach Hitlers Aufstieg zur Macht" has now appeared in German.

Past and Present Projects that I coordinated:

POPEYE

DAWN

GANESH

IFANY

PAINTINGS:
Visit my Gallery, view and print my book of selected paintings or visit my facebook galleries: 1 2 3 4 5 6 7 8 more.
Dodescaden involves technology, art, and society. The word "Dodescaden" stands for the sound that the train does, as we learn in Akira Kurosawa’s masterpiece which carries this name. The train, although existing only in the imagination of its unemployed driver, allows that driver to pursue a regular life and also helps him in creating interactions with those virtual passengers that he meets everyday.

The passengers in our project are even more virtual - they consist of data and content: symbols, letters, words and sentences, that move through data highways over which social networks are built.

In the Dodescaden project we create content: paintings, music, dance video and films. We then tweet them over social networks and help them compete for visibility and recognition, using game theoretic models. So far, my Dodescaden project has been as virtual as the train in Kurosawa’s film, and yet as present as that train is for the driver.

Publications:


