What Makes Conversations Interesting?

Themes, Participants and Consequences of Conversations in Online Social Media

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Why do people *repeatedly* come back to the same You Tube video?
They are returning to do *more than* watch the same video
We think it is the conversations around the video they find interesting.
What is a Conversation?

- A conversation associated with an online social media object is a temporally ordered sequence of comments posted by individuals.
Themes and participants make conversations interesting
An example of an interesting conversation...

[Image of a conversation thread]

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Conversational interestingness is not necessarily the popularity of a media object or preference of a topic
Who can benefit from this research?

A news reporter  A political analyst  A company  You...
Our Contributions

- **Goal:**
  - What causes a conversation to be interesting, that prompts a user to participate in the discussion on a posted video?

- **Approach:**
  - Detect conversational themes.
  - Determine interestingness of participants and interestingness of conversations based on a random walk model.
  - Measure the consequence of a conversations.
  - Excellent results on a dataset from YouTube.
Related Work

Analysis of Media Properties
- Visualization of evolution of tags [Dubinko et al. 2006]
- YouTube traffic characterization [Gill et al. 2007]
- Analysis of user-generated media [Cha et al. 2007]
- Tagging conventions and strategies (YouTube) [Geisler et al. 2007]
- Social dynamics in media sharing [Halvey et al. 2007]
- Representative views of landmarks [Kennedy et al. 2008]

Theme Extraction in Social Media
- Mining multi-faceted overviews of topics [Ling et al. 2008]
- Video topic discovery [Liu et al. 2008]

Analysis of Communication In Social Media
- Predictivity of online chatter [Gruhl et al. 2005]
- Analysis of weblog comments [Mishne 2006]
- Correlation of communication & stocks [Choudhury et al. 2007]
- Predicting sales using blog communication [Liu et al. 2007]
- Discussion threads in Slashdot [Kaltenbruner et al. 2007, Gomez 2008]
- Video interactions in YouTube [Benevenuto et al. 2008]
- Tendency of topic discussions [Zhou et al. 2008]
How do we determine interestingness?
Conversational themes are sets of salient topics associated with conversations at different points in time.

\[ p(\theta_j | \lambda_{i,t}, t) = ? \]
Temporal Regularization

- A word $w$ in the chunk can be attributed either to the textual context $\lambda_{i,t}$ or the time slice $t$
- Smoothness of theme models over time

$$L(C) = \sum_{\lambda_{i,t} \in C} \sum_{w \in \lambda_{i,t}} n(w, \lambda_{i,t}) \cdot \log \sum_{j=1}^{K} \left( p(w, \theta_j | \lambda_{i,t}, t) + \exp(-d_T(j)) \right)$$
Co-participation based Regularization

- If several participants comment on a pair of chunks, their theme distributions are likely to be close to each other.

\[
R(C) = \sum_{c_i, c_m \in C} \sum_{j=1}^{K} \left( \omega_{i,m} - \left( 1 - \left( f(\theta_j | c_i) - f(\theta_j | c_m) \right)^2 \right) \right)^2.
\]

\[
O(C) = -(1 - \zeta) \cdot L(C) + \zeta \cdot R(C)
\]
Interestingness of Conversations

Impact due to participants

Impact due to themes

Relationship between participants and conversations

Interestingness of participants

Conversational Theme Distribution

Theme Strength

Interestingness of conversations

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Interestingness of Participants

- ‘Leadership’ of participants
- ‘Followership’ of participants
- Interestingness of participants
- Interestingness of conversations
- Participants and conversations
- Participants and themes
- Theme Strength

Past communication Preference

1−β

α1

α2

α3

1−β

β

Interestingness of participants

(t−1) → t
Interestingness of participants and conversations mutually reinforce each other
A joint optimization framework, which maximizes the two interestingness measures for optimal $X=(\alpha_1, \alpha_2, \alpha_3, \psi)$ and also incorporates temporal smoothness:

$$g_1(X) = \rho \cdot \|I_p(X)\|^2 + (1-\rho) \cdot \|I_c(X)\|^2 + \exp(-d_p) + \exp(-d_c)$$

Interestingness of participants
Interestingness of conversations
Regularization of participants’ interestingness
Regularization of conversations’ interestingness
What happens *after* a conversation becomes interesting?
Three consequence metrics of interestingness

Participant activity

Participant Cohesiveness

Thematic interestingness
Experimental Results
YouTube Dataset

- ‘News & Politics’ category on YouTube – rich communication on highly dynamic events.
  - 132,348 videos
  - ~9M unique participants
  - ~89M comments
  - 15 weeks from June 20, 2008 to September 26, 2008
Analysis of Interestingness of Participants

Interestingness of participants is less affected by number of comments during significant external events.

- Jun 20, 2008
- Jul 4, 2008
- Jul 18, 2008
  - Obama makes trip to Europe and the Middle East (Jul 23, 2008)
- Aug 1, 2008
- Aug 15, 2008
  - Palin is selected for the Republican VP candidate (Aug 29, 2008)
  - 2008 Republican National Convention in Minneapolis (Sep 1, 2008)
- Sep 12, 2008
  - Lehman Brothers goes bankrupt, Merrill Lynch is dissolved (Sep 15, 2008)
  - Bush addresses the nation on the Financial Crisis (Sep 24, 2008)
- Sep 26, 2008

- Number of comments
- Interestingness
- Correlation between number of comments and interestingness

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Mean interestingness of conversations increases during periods of several external events; however, certain highly interesting conversations always occur at different weeks irrespective of events.
Interestingness is computed using five techniques –
• our method with temporal smoothing ($I_1$),
• our method without temporal smoothing ($I_2$) and
• the three baseline methods,
  • $B_1$ (comment frequency),
  • $B_2$ (novelty of participation),
  • $B_3$ (co-participation based PageRank).
Conclusions

Summary
• Why do people repeatedly come back to the same YouTube video?
• Our method can explain future consequences

Future Work
• User subjectivity
• Personalized recommendations

Participant Cohesiveness
Questions?
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Thanks!