"I Want to Talk About, Again, My Record on Energy ...": Modeling Topic Control in Conversations using Speaker-centric Nonparametric Topic Models

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MASC-SLL 2012
Outline

1. Influence and Topic Control in real world
2. Our Approach: SITS
3. Experiments and Results
   - Topic Segmentation Task
   - Speakers’ Topic Shift Tendency
4. Conclusions and Future Work
1. Influence and Topic Control in real world

2. Our Approach: SITS

3. Experiments and Results
   - Topic Segmentation Task
   - Speakers’ Topic Shift Tendency

4. Conclusions and Future Work
2008 U.S. Presidential Election

VP Candidate Debate

Palin

Biden

Dave Granlund © www.davegranlund.com
2008 U.S. Presidential Election

Gwen Ifill

Senator Biden, you voted for this bankruptcy bill. Senator Obama voted against it. Some people have said that mortgage-holders really paid the price.
Gwen Ifill

Senator Biden, you voted for this bankruptcy bill. Senator Obama voted against it. Some people have said that mortgage-holders really paid the price.

Joe Biden

Well, mortgage-holders didn’t pay the price. Only 10 percent of the people who are – have been affected by this whole switch from Chapter 7 to Chapter 13 – it gets complicated. But the point of this – Barack Obama saw the glass as half-empty. I saw it as half-full. We disagreed on that, and 85 senators voted one way, and 15 voted the other way. But here’s the deal. Barack Obama pointed out two years ago that there was a subprime mortgage . . . And there – ways that we’re offering are not being supported by – by the Bush administration nor do I believe by John McCain and Governor Palin.
Gwen Ifill

Senator Biden, you voted for this bankruptcy bill. Senator Obama voted against it. Some people have said that mortgage-holders really paid the price.

Joe Biden

Well, mortgage-holders didn't pay the price. [...] 

Sarah Palin

That is not so, but because that's just a quick answer, I want to talk about, again, my record on energy . . . When we talk about energy, we have to consider the need to do all that we can to allow this nation to become energy independent . . . East Coast politicians who don’t allow energy-producing states like Alaska to produce these, to tap into them, and instead we’re relying on foreign countries to produce for us.
Gwen Ifill

So, Governor, as vice president, there’s nothing that you have promised as a candidate that you would – that you wouldn’t take off the table because of this financial crisis we’re in?
Gwen Ifill

So, Governor, [...] that you wouldn’t take off the table because of this financial crisis we’re in?

Sarah Palin

There is not. And how long have I been at this, like five weeks? So there hasn’t been a whole lot that I’ve promised, except to do what is right for the American people, put government back on the side of the American people, stop the greed and corruption on Wall Street. And the rescue plan has got to include that massive oversight that Americans are expecting and deserving. And I don’t believe that John McCain has made any promise that he would not be able to keep, either.
So, Governor, [...] that you wouldn’t take off the table because of this financial crisis we’re in?

[...] put government back on the side of the American people, stop the greed and corruption on Wall Street. [...]

Again, let me – let’s talk about those tax breaks. Barack Obama – Obama voted for an energy bill because, for the first time, it had real support for alternative energy. When there were separate votes on eliminating the tax breaks for the oil companies, Barack Obama voted to eliminate them. John did not. [...]

Gwen Ifill

Sarah Palin

Joe Biden
Influence and Dominance in Conversations

Focus of much research in communication, sociology and psychology for decades

Topic control and management is one of the most effective ways "the ability to change topical focus, especially given strong cultural and social pressure to be relevant, means having enough interpersonal power to take charge of the agenda" [Palmer 1989]

Topic segmentation is a natural way to understand the hidden structure of conversations

Traditional approach did not emphasize on speaker identity

Questions
Can we incorporate speaker identity into an unsupervised model?
Does it help?
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Basic Ideas

A: What's the guy's name on first base?

B: No. What is on second base!

C: I'm not asking you who's on second

A: Who's on first?
Problem Approach Experiments Conclusions

Basic Ideas

Viewing each turn as a distribution over topics

“Norm Mineta tells me, and Homeland Security Adviser Tom Ridge tells me, and they are against it. And I think the reason they are against it is you don’t want the guy who’s flying one of these big busters up there also with a gun in his hand trying to protect his plane […]”
Basic Ideas

- Viewing each turn as a distribution over topics
- Endowing each turn with a binary latent variable to indicate whether the topic is shifted
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- Associating each speaker with a biased coin to decide whether to shift the topic of the conversation
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Generative Process

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That is not so, but because that’s just a quick answer, I want to talk about, again, my record on energy . . .
Generative Process
SITS: Speaker Identity for Topic Segmentation

1. For speaker $m = 1 \ldots M$, draw speaker shift probability $\pi_m \sim \text{Beta}(\gamma)$
2. Draw global probability measure $G_0 \sim \text{DP}(\alpha, H)$
3. For each conversation $c \in [1, C]$ and each turn $t \in [1, T_c]$ with speaker $a_c, t$
   1. If $t = 1$, set the topic shift $l_{c,t} = 1$. Otherwise, draw $l_{c,t} \sim \text{Bernoulli}(\pi_{a_c,t})$
   2. If $l_{c,t} = 1$, draw $G_{c,t} \sim \text{DP}(\alpha_{c}, G_c)$. Otherwise, set $G_{c,t} \equiv G_{c,t-1}$
   3. For each word index $n \in [1, N_{c,t}]$
      - Draw $\psi_{c,t,n} \sim G_{c,t}$
      - Draw $w_{c,t,n} \sim \text{Mult}(\psi_{c,t,n})$

See (Nguyen et al., ACL 2012)
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Topic Segmentation

- Task: divide a conversation into smaller, topically coherent segments
Topic Segmentation

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- Datasets:
  - **ICSI**: 75 transcripts of Berkeley meetings
    - 75 meetings, 25 segmented
    - 60 participants
  - **Debates**: 2008 presidential debates
    - 4 debates, all segmented
    - 9 participants
## Segmentation Performance

### Debates Dataset

<table>
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<th>WindowDiff</th>
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- EMD, \(P_k\), and **WindowDiff** measure the difference between the hypothesis segmentation and the reference segmentation. \((k\) is the window size).
- For all measurements, lower is better.

---

1^[Purver et al. 2006]  
2^[Fox et al. 2008]
## Segmentation Performance

### ICSI Dataset

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<td>NP-SITS</td>
<td>2.126</td>
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<td>.253</td>
</tr>
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</table>

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\[^3\text{Purver et al. 2006}]^{3}\]
\[^4\text{Fox et al. 2008}]^{4}\]

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Modeling Topic Control in Conversations
What about the speakers?
2008 Presidential Debates

In presidential debates, moderators have much higher scores than candidates do. In the VP debate, IFILL’s score is only slightly higher than those of PALIN and BIDEN.
What about the speakers?

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2008 Presidential Debates

- In presidential debates, moderators have much higher scores than candidates do.
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... Ifill's questioning and moderating was, as The Atlantic's James Fallows remarked, "terrible." She asked open-ended, utterly predictable questions which presented very little challenge to the candidates. But even more important to the McCain campaign's strategy, Palin was able to simply ignore the questions and recite her talking points.
What about the speakers?  
2008 Presidential Debates

- **Ifill**, moderator: *Terrible*. Yes, she was constrained by the agreed debate rules. But she gave not the slightest sign of chafing against them or looking for ways to follow up the many unanswered questions or self-contradictory answers. This was the big news of the evening. Katie Couric, and for that matter Jim Lehrer, have never looked so good.

- **Palin**: "*Beat expectations.*" In every single answer, she was obviously trying to fit the talking points she had learned to the air time she had to fill, knowing she could do so with impunity from the moderator. But she did it with spunk and without any of the poleaxed moments she had displayed in previous questions. The worst holes in her answers - above all, about the Vice President's role, also either mishearing or ignoring the question about her "Achilles heel" - were concealed in ways they haven't been before.
LEHRER: All right.
ROMNEY: My experience is the private sector typically is able to provide a better product at a lower cost.
LEHRER: Can we - can the two of you agree that the voters have a choice, a clear choice between the two of you -
ROMNEY: Absolutely.
LEHRER: - on Medicare?
ROMNEY: Absolutely.
LEHRER: All right. So, to finish quickly, briefly, on the economy, what is your view about the level of federal regulation of the economy right now? Is there too much, and in your case, Mr. President, is there - should there be more? Beginning with you - this is not a new two-minute segment - to start, and we'll go for a few
OBAMA: And so -

ROMNEY: That's - that's a big topic. Could we - could we stay on Medicare?

OBAMA: Is that a - is that a separate topic? I'm sorry.

LEHRER: Yeah, we're going to - yeah. I want to get to it, but all I want to do is very quickly -

ROMNEY: Let's get back to Medicare.

LEHRER: - before we leave the economy -

ROMNEY: Let's get back to Medicare.

LEHRER: No, no, no, no -

ROMNEY: The president said that the government can provide the service at lower -

LEHRER: No.

ROMNEY: - cost and without a profit.

LEHRER: All right.

OBAMA: Is that a - is that a separate topic? I'm sorry.

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Conclusions & Future work

- Computational model for studying topic control and influence in conversations
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- Jointly modeling topics and speakers’ tendency to change topics helps
  - improve performances in topic segmentation task
  - propose intriguing hypotheses for social scientists
Conclusions & Future work

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- Current/future work: understanding and detecting framing and framing propagation
  - How people talk differently about the same thing
Computational model for studying topic control and influence in conversations

Jointly modeling topics and speakers’ tendency to change topics helps
  - improve performances in topic segmentation task
  - propose intriguing hypotheses for social scientists

Current/future work: understanding and detecting framing and framing propagation
  - How people talk differently about the same thing

Thanks!


Number two, with regard to bankruptcy now, Gwen, what we should be doing now -- and Barack Obama and I support it -- we should be allowing bankruptcy courts to be able to re-adjust not just the interest rate you're paying on your mortgage to be able to stay in your home, but be able to adjust the principal that you owe, the principal that you owe. That would keep people in their homes, actually help banks by keeping it from going under. But John McCain, as I understand it -- I'm not sure of this, but I believe John McCain and the governor don't support that. There are ways to help people now. And there -- ways that we're offering are not being supported by -- by the Bush administration nor do I believe by John McCain and Governor Palin.

PALIN: That is not so, but because that's just a quick answer, I want to talk about, again, my record on energy versus your ticket's energy ticket, also. I think that this is important to come back to, with that energy policy plan again that was voted for in '05. When we talk about energy, we have to consider the need to do all that we can to allow this nation to become energy independent. It's a nonsensical position that we are in when we have domestic supplies of energy all over this great land. And East Coast politicians who don't allow energy-producing states like Alaska to produce these, to tap into them, and instead we're relying on foreign countries to produce for us. We're circulating about $700 billion a year into foreign countries, some who do not like America -- they certainly don't have our best interests at heart -- instead of those dollars circulating here, creating tens of thousands of jobs and allowing domestic supplies of energy to be tapped into and start flowing into these very, very hungry markets. Energy independence is the key to this nation's future, to our economic future, and to our national security. So when we talk about energy plans, it's not just about who got a tax break and who didn't. And we're not giving oil companies tax breaks, but it's about a heck of a lot more than that. Energy independence is the key to America's future.

IFILL: Governor, I'm happy to talk to you in this next section about energy issues. Let's talk about climate change. What is true and what is false about what we have heard, read, discussed, debated about the causes of climate change?
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Task: identify the influencers in conversations
Influencer Detection

- Task: identify the influencers in conversations
- We annotated two datasets

**Crossfire**: CNN’s debate TV shows
- 1134 conversations
- 2567 speakers

**Wikipedia**: Wikipedia discussions
- 1991 discussions
- 604 users
Influencer Detection

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<th>Rankers</th>
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What about the speakers?

Crossfire

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Top speakers by topic shift tendencies. We mark hosts (†) and “speakers” who often (but not always) appeared in clips (‡). Apart from those groups, speakers with the highest tendency were political moderates.
What about the speakers?

Crossfire

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What about the speakers?

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<td>Your question to him was whether he supported <em>gay marriage</em> and my answer is the same as his and it is that I do not.</td>
<td>IFILL: Wonderful. You agree. On that note, let’s move to <em>foreign policy</em>. You both have sons who are in Iraq or on their way to Iraq. You, Governor Palin, have said that you would like to see a real clear plan for an exit strategy. […]</td>
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<td>MCCAIN</td>
<td>I think that Joe Biden is qualified in many respects. […]</td>
<td>SCHIEFFER: […] Let’s talk about <em>energy</em> and <em>climate control</em>. Every president since Nixon has said what both of you […]</td>
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<td>IFILL</td>
<td>So, Governor, as vice president, there’s nothing that you have promised […] that you wouldn’t take off the table because of this <em>financial crisis</em> we’re in?</td>
<td>BIDEN: Again, let me – let’s talk about those tax breaks. [Obama] voted for an energy bill because, for the first time, it had real support for alternative energy. […] on eliminating the tax breaks for the oil companies, Barack Obama voted to eliminate them. […]</td>
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Example of turns designated as a topic shift by SITS. Turns were chosen with speakers to give examples of those with high topic shift tendency $\pi$. 
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<td>PRESS: But what do you say, governor, to Governor Bush and [...] your party who would let politicians and not medical scientists decide what drugs are distributed [...]</td>
<td>WHITMAN: Well I disagree with them on this particular issues [...] that’s important to me that George Bush stands for education of our children [...] I care about tax policy, I care about the environment. I care about all the issues where he has a proven record in Texas [...]</td>
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<td>WEXLER: [...] They need a Medicare prescription drug plan [...] Talk about schools, [...] Al Gore has got a real plan. George Bush offers us vouchers. Talk about the environment. [...] Al Gore is right on in terms of the majority of Americans, but George Bush [...]</td>
<td>KASICH: [...] I want to talk about choice. [...] George Bush believes that, if schools fail, parents ought to have a right to get their kids out of those schools and give them a chance and an opportunity for success. Gore says “no way” [...] Social Security. George Bush says [...] direct it the way federal employees do [...] Al Gore says “No way” [...] That’s real choice. That’s real bottom-up, not a bureaucratic approach, the way we run this country.</td>
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<td>PRESS: Senator, Senator Breaux mentioned that it’s President Bush’s aim to start on education [...] [McCain] [...] said he was going to do introduce the legislation the first day of the first week of the new administration. [...]</td>
<td>MCCAIN: After one of closest elections in our nation’s history, there is one thing the American people are unanimous about They want their government back. We can do that by ridding politics of large, unregulated contributions that give special interests a seat at the table while average Americans are stuck in the back of the room.</td>
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