On Politics and Argumentation
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ON POLITICS AND ARGUMENTATION

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Argument Mining

• **Aim**: identify argument structures that can be found within the discourse
  ○ Argumentative schemes
  ○ Relationships between pairs of arguments

• **Introducing automation ~ 2000**

• **Applications**:
  ○ Stock market
  ○ Computerized essay grading
  ○ Computer-supported peer review
Projects

Argument mining

- **Argument mining** provides algorithms for automatically extracting argument structures from monological text and from transcripts of dialogue.

- The Centre for Argument Technology has won £700k from EPSRC for a project on **Argument Mining**.

- The group ran and hosted the **Scottish Workshop on Argument Mining** 2014.

- Members of the group have founded a series of workshops dedicated to Argument Mining, with editions at ACL in 2014, NAACL in 2015, and chaired by us in 2016 at ACL.

- Members of the group also co-delivered tutorials on Argument Mining at **IJCAI 2016** and **ACL 2016**.

Argument visualisation and analysis

- **AnalysisWall** — A very large touch screen supporting collaborative analysis in real time.

- **OVA: Online Visualisation of Argument** — A browser-based tool that supports analysis of online textual arguments and saves to the Argument Web. There are also two other tools in the suite: **OVAview**, which renders AIF argument resources diagrammatically and **OVAgent** for manipulating abstract frameworks. **OVA+** supports analyses of dialogical arguments.

- **Araucaria** — A software tool for analysing arguments (also in a Polish version, **Araucaria-PL**) now largely replaced by OVA.

Argument in dialogue

- The Dialogue Game Description Language, DGDL+, a language for describing the rules of dialogue games.

- The Dialogue Game Execution Platform providing generalised execution services for arbitrary dialogue games.
How to automatically mine intertextual correspondences between **U.S. candidates** argumentation during primaries debates and Reddit users’ comments on those?
Some theory

Some politics

A spoonful of reality

Politics, people and argumentation

What now?
SOME THEORY
Example (A simple dialogue)

Alice: Q.
Bob: Why Q?
Alice: P.

Modelisation (A simple dialogue)

\[
\frac{P}{Q} \quad (P \Rightarrow Q)
\]
Inference Anchoring Theory

- Aim: link dialogical and argumentative structures
- Combination of logic and argumentation theories
- Reference: Budzynska and Reed, 2011
- Contribution to the Argument Web
  - Mediation project
  - Ethos mining
Example (Reddit comments)

Redditor1: Every American should be a capitalist.
Redditor2: Why?
Redditor1: Our country was built on capitalism.
Every American should be a capitalist

Asserting

Redditor 1: Every American should be a capitalist
IAT DIAGRAM (LOADING...)

- Every American should be a capitalist
- Asserting
- Redditor 1: Every American should be a capitalist
- Redditor 2: Why?
IAT Diagram (Loading...)

Redditor 1: Every American should be a capitalist

Every American should be a capitalist

Asserting

Redditor 2: Why?

America was built on capitalism

Asserting

Redditor 1: Our country was built on capitalism
Every American should be a capitalist

Asserting

Challenging

Redditor 1: Every American should be a capitalist

Default Transition

Redditor 2: Why?

America was built on capitalism

Asserting

Redditor 1: Our country was built on capitalism
Every American should be a capitalist

Asserting

Challenging

Default Transition

Redditor 2: Why?

Default Transition

Redditor 1: Our country was built on capitalism

America was built on capitalism

Default Inference
Every American should be a capitalist

Asserting

Challenging

Default Transition

Redditor 2: Why?

Default Transition

Arguing

Redditor 1: Our country was built on capitalism

Default Inference

America was built on capitalism

Redditor 1: Everything American should be a capitalist
SOME POLITICS
U.S. presidential debates

- The American Presidency Project
- Web archive: American presidency related documents
- Transcripts of all presidential debates from 1960 to 2016
- 2016 elections:
  - 9 Democratic debates
  - 12 Republican debates
  - 3 General debates
ABOUT THE CORPORA

Reddit

- Social media and news aggregation, web content rating and discussion English-speaking website
- **subreddits**: news, science, politics, gaming, movies, ...
- In /r/politics, October 13 DNC Primary Debate - During-debate Discussion Discussion Megathread
1. For each debate, select the corresponding thread.
2. Sort the comments by time-stamp (oldest on top).
3. Remove all comments having no children.
4. Remove all comments trees beginning with irony or wordplay (rhetoric structures are not handled by IAT).
5. Keep comments trees classified by excerpts (time-stamp identification), discard all others.
A SPOONFUL OF REALITY
MODEL

Moderator

Participant₁

Participant₂

Participant₃
everybody is on the question of electability. Governor Chafee, you’ve been everything but a
spoiler. When you were senator from Rhode Island, you were a Republican. When you were
elected governor, you were an independent. You’ve only been a Democrat for little more than
two years. Why should Democratic voters trust you won’t change again?

CHAFEET: I mean, you’re looking as a block of granite when it comes to the issues. Whether
it’s the crooks...

COOPER: It seems, like pretty soft granite, I mean, you’ve been a Republican, you’ve been
politically independent...

CHAFEET: Did you hear what I said? On the issues, I have not changed on the issues. I was
a liberal Republican. Then I was an independent. And now I am a proud Democrat. But I have not
changed on the issues. And open my record to scrutiny. Whether it’s on the environment, a
woman’s right to choose, gay marriage, fiscal responsibility, aversion to foreign
entanglements, using the tools of government to help the less fortunate. Time and time again,
I have never changed. You’re looking at a block of granite when it comes to the issues. So I
have not changed.

COOPER: Then why change labels?

CHAFEET: The party left me. There’s no doubt about that. There was no room for a liberal
moderate in that party. I even had a primary for my reelection in 2006. I won it with
the money poured in to defeat me in Rhode Island as a Republican. That’s what we were up
against.
Example

CHAFEE: Anderson, you’re looking at a block of granite when it comes to the issues. Whether it’s...[crosstalk]

COOPER: It seems like pretty soft granite. I mean, you’ve been a Republican, you’ve been an independent.
HDA MOMENTS EXTRACTION

Debate n°1, excerpt n°1

Debate n°1, excerpt n°2

Presidential debate n°1, transcription (part)

k = 3
US2016

Argument Map 10436

THANK YOU Chafee was the only Republican in the Senate to vote against the Iraq war it is good enough it's the worst decision in American history That's very significant if you're going to make those poor judgment calls a critical time in our history we just finished with the Vietnam era getting...

Download: SVG | PNG | DOT | JSON | UKIF | RTNL | RDF | PL  Edit: OVA | OVA+

Argument Map 10437

Clinton should have seen that attack coming let's remember what was going on we had a murderous dictator Gadhafi, who had American blood on his hands Gadhafi was threatening to massacre large numbers of the Libyan people we had our closest allies in Europe burning up the phone lines begging us to...

Download: SVG | PNG | DOT | JSON | UKIF | RTNL | RDF | PL  Edit: OVA | OVA+

Argument Map 10438

WEBB put the African American soldier on the Mall WEBB made that recommendation WEBB fought for it if you want someone who can stand up in front of you right now and say I have done the hard job, I have taken the risks. WEBB is your person wages and incomes are flat the gap between rich and poor is...

Download: SVG | PNG | DOT | JSON | UKIF | RTNL | RDF | PL  Edit: OVA | OVA+

Argument Map 10439

I Secretary Clinton, you have to be able to respond Sanders brought you up CLINTON respects the unique no one else CLINTON represented Wall Street, an engine from New York, CLINTON went to
CORRESPONDENCE MINING

Presidential debates

... [crosstalk] ...

... disagree ...

Debate n°1

Reddit comments

Reddit megathread n°1

... arg ...

Full IAT analysis, segment extraction

Presidential debates excerpts corpus

Debate n°2

Participant 1: ...
Participant 2: ...

... [crosstalk] ...

... agree...

Debate n°21

Reddit megathread n°2

... arg ...

... arg ...

... arg ...

Reddit megathread n°21

Full IAT analysis, segment extraction

INTERTEXTUAL CORRESPONDENCE MINING

Presidential debates segments

Reddit comments segments
STATING THE INTERTEXTUAL CORRESPONDENCE TASK

Input
R = \{r_1, \ldots, r_i, \ldots, r_n\} set of Reddit comments segments.
D = \{d_1, \ldots, d_j, \ldots, d_m\} set of presidential debates segments.

Output
C = (c_{i,j}), matrix of the correspondence coefficients between r_i and d_j.
SKETCHING THE ALGORITHM

Natural Language Processing tools:

- Speakers similarity
- Frequent wordsets similarity
- Semantic similarity

\[ c_{i,j} = w_1 \cdot \text{Sp}(r_i, d_j) + \frac{w_2}{\text{length}(r_i)} \cdot \sum_{u \in r_i} \text{tf-idf}(u, d_j, D) \]

\[ + \frac{w_3}{\text{length}(r_i) \cdot \text{length}(d_j)} \cdot \sum_{u \in r_i, v \in d_j} \text{Semsim}(u, v) \]
SKETCHING THE ALGORITHM

Natural Language Processing tools:

- Speakers similarity
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\[ c_{i,j} = w_1 \cdot Sp(r_i, d_j) + \frac{w_2}{\text{length}(r_i)} \cdot \sum_{u \in r_i} \text{tf-idf}(u, d_j, D) + \frac{w_3}{\text{length}(r_i) \cdot \text{length}(d_j)} \cdot \sum_{u \in r_i, v \in d_j} \text{Semsim}(u, v) \]
Example

\[ r_i = \text{“Hillary Clinton knows Bernie Sanders’ gun control record isn’t his strong suit”} \]
\[ d_j = \text{“CLINTON thinks what Senator SANDERS is saying certainly makes sense in the terms of the inequality that we have”} \]
\[ S(t) = \{\text{CLINTON, SANDERS}\} \]
SKETCHING THE ALGORITHM

Natural Language Processing tools:

- Speakers similarity
- Frequent wordsets similarity
- Semantic similarity

\[
c_{i,j} = w_1 \cdot \text{Sp}(r_i, d_j) + \frac{w_2}{\text{length}(r_i)} \cdot \sum_{u \in r_i} \text{tf-idf}(u, d_j, D)
+ \frac{w_3}{\text{length}(r_i) \cdot \text{length}(d_j)} \cdot \sum_{u \in r_i, v \in d_j} \text{Semsim}(u, v)
\]
Definition (Term frequency)

Let \( w \) be a word of a (non-empty) segment \( t \) in a corpus \( C \). Term frequency of \( w \) in \( t \) is defined as

\[
Tf(w, t) = \frac{|\{v \in t, v = w\}|}{|\{v \in t\}|}.
\]

Definition (Inverse document frequency)

Inverse document frequency of \( w \) in \( C \) is defined as

\[
Idf(w, C) = \begin{cases} 
0 & \text{if } w \notin t, \\
\log \frac{|s, s \in C|}{|s \in C, w \in s|} & \text{otherwise}.
\end{cases}
\]
Definition (Term frequency–inverse document frequency)

Let $w$ be a word of a segment $t$ in a corpus $C$. tf-idf of $w$ in $t$ in $C$ is defined as

$$\text{tf-idf}(w, t, C) = \text{Tf}(w, t) \cdot \text{Idf}(w, C).$$
SKETCHING THE ALGORITHM

Natural Language Processing tools:

- Speakers similarity
- Frequent wordsets similarity
- Semantic similarity

\[ c_{i,j} = w_1 \cdot Sp(r_i, d_j) + \frac{w_2}{\text{length}(r_i)} \cdot \sum_{u \in r_i} \text{tf-idf}(u, d_j, D) \]
\[ + \frac{w_3}{\text{length}(r_i) \cdot \text{length}(d_j)} \cdot \sum_{u \in r_i, v \in d_j} \text{Semsim}(u, v) \]
Definition

Semantic similarity of $w_1$ and $w_2$ is defined as

$$\text{Semsim}(w_1, w_2) = 1 - \frac{\min_{i,j} \{\text{length}(\text{path}(w_1\#i, w_2\#j))\}}{\max_{v,k} \{\text{length}(\text{path}(\text{entity}, v\#k))\}}.$$
SKETCHING THE ALGORITHM

Natural Language Processing tools:

- Speakers similarity
- Frequent wordsets similarity
- Semantic similarity

\[ c_{i,j} = w_1 \cdot Sp(r_i, d_j) + \frac{w_2}{\text{length}(r_i)} \cdot \sum_{u \in r_i} \text{tf-idf}(u, d_j, D) \]

\[ + \frac{w_3}{\text{length}(r_i) \cdot \text{length}(d_j)} \cdot \sum_{u \in r_i, v \in d_j} \text{Semsim}(u, v) \]
WHAT NOW?
CONCLUSION AND PERSPECTIVES

- Stating the **intertextual correspondence task**
- Developing the **corpora**
- Sketching the **intertextual correspondence algorithm**

- Future work
  - Other corpora?
  - Other methods?
Thank you for your attention