Metaphor, Metaphor, Metaphor!

Metaphor Processing of Social Media Text

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Outlines

- Memory Refreshment
- Data Analysis
- Research Directions
- Current Work
- Latest News
What is Metaphor?

- **Metaphora**: to *transfer* the sense of one word to a different word.
- Represent *abstract concepts* in terms of the *properties* of another.
  - *Argument* is *war*
    - ... *shot down* all of my *arguments*.
    - ... *attacked* every *point*...
  - *Crime* is a *disease*
    - ... way to *diagnose* corruption is...
Metaphor Processing Levels

- Learn metaphorical associations from corpora
  - Time is MONEY
  - Political System is a MECHANISM

- Identify metaphorical language in text
  - leaked report
  - mend the policy

- Interpret the metaphorical language
  - leaked report = disclosed report
  - mend the policy = improve the policy
Types of Metaphors

Conceptual Metaphor

Time is MONEY

Linguistic Metaphor

...cost you hours...

Lexical

At the level of a single word sense

...mend marriage...

...stir excitement...

Multi-word

As a subtype of MWE

...left me in the dark...

...shed more light on...

Extended

Spans over longer discourse fragments

The Berkeley Master Metaphor List (Lakoff et al., 1991).
Are all Metaphors equally important for Modelling?

"From an NLP viewpoint, not all metaphorical expressions are equally important. A metaphorical expression is integral for computational modelling if its sense is significantly distinct from its literal sense and cannot be disambiguated directly (e.g. by existing disambiguation techniques within the sense inventory)." (Shutova)

**Example:**
- *Impress:* stems from printing
- Its metaphorical sense has long been dominant in language and its original literal sense may no longer be used
- *Same for:* overwhelm
Dream

- **Adaptive** Metaphor Processing System
  - Metaphor Identification
  - Metaphor Interpretation
Applications
Why Metaphor?

I think that metaphor really is a key to explaining thought and language. [...] Our powers of analogy allow us to apply ancient neural structures to newfound subject matter, to discover hidden laws and systems in nature, and not least, to amplify the expressive power of language itself. (Pinker, 2007)

Metaphors play an important role in the construction of social, cultural, and political reality.

A compact and memorable way of expressing ideas and emotions that would be difficult to convey with literal language.
Metaphor, Psychology & Decision-making

Punishment- or Restraint-oriented measures VS Preventive measures

[Image of a Metropolitan Police sign: @ Metropolitan Police]

[Image of a crime scene: A crime scene with text: Meth lab bust in fourteen area]
Why Social Media?

- Social media enables users all over the world to share real-time information that can be used to track the continuous change in the human language.
- Metaphor processing is a challenging task, to which, the informal nature of user-generated content adds new dimensions.
Tweet a Metaphor

@azzalovesanime · Nov 12
didn’t get much done with my essay today... hit a dead end after 3 lines

@TrueTheVote · Nov 12
ICYMI: Leaked Documents Reveal Expansive Soros Funding to Manipulate Federal Elections ow.ly/suaY3067Ujr #ElectionIntegrity #VoterID

@Okigbo · Dec 7 2015
if we do not resolve the issue openly.. we will continue to witness a subtle & silent poisoning of historically cultivated and nurtured” AA

@Joshuatreer · Nov 7
Very proud of the Trump supporters in my timeline that, even this late, they have kept me in the dark about their existence.

@JAYANTH40830762 · Oct 19
We cannot fight an economy 6 times our size just thru clever diplomacy. Let's shut up, sink our differences and build economic muscle. #China

@KurtDAadam · 38m
LCTI students "checking out" Dr. Hansel's Tesla. Student gaining an understanding of the new wave in the Auto industry.

@PaperJhon · Oct 4
Urban development in India... will be the biggest sunrise industry that any country has see #KushalPalSingh #quotes
Data Analysis – Motivation

- Studies revealed that Metaphor occurs on average in every third sentence!
Data Analysis – Experiment 1

- Analysis of the frequency of uses of the verb “swept” as a metaphor in 100 tweets retrieved using Twitter Search API.
Data Analysis – Experiment 1

- Fourteen people have been injured after being swept across rocks at Crescent Head.
- Bitcoin has been swept up in yet another speculative frenzy, pushing its price toward its 2013 peak.
- She swept up the pieces of her shattered hopes and dreams—discovering she was made of pure strength and determination.

- We all want to be swept off our feet, but remember, one-sided relationships always fail.
- Too many of these cases get swept under the carpet.

- Went to chemist, grocery store, made bed, done polishing, swept floor, baked some cookies, washed up, getting better :)
Data Analysis – Experiment 1

- Observations
  - The metaphorical sense of an expression is sometimes more frequent than its literal counterpart.
  - This proves that using metaphors is ubiquitous in social communication as well and not limited to the literary language where sometimes writers intend to enrich their style using figures of speech.
Data Analysis – Motivation

- Observe the patterns of expressing metaphors social media text opposed to literature text and the resulting challenges that will affect a system design.
Data Analysis – Experiment 2

- A set of metaphors has been selected for the analysis in which the verb is used metaphorically.
- **BNC**: a general-domain, well-structured corpus.
- **Twitter**: 400 unique tweets.
Comparative analysis of a set of metaphoric expressions in the Twitter dataset and BNC. The verb could be used metaphorically, literally or as part of an idiom.
# Data Analysis – Experiment 2

<table>
<thead>
<tr>
<th>Example Type &amp; Number</th>
<th>Example</th>
<th>Dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>not single expression</strong></td>
<td>1... <em>stir up</em> emotions, tell stories, and convey <em>feelings</em>!</td>
<td>Twitter</td>
</tr>
<tr>
<td></td>
<td>2... <em>and Anger</em> Gives Bitterness A Voice. <em>Swallow</em> <em>My Pride</em>, ...</td>
<td>Twitter</td>
</tr>
<tr>
<td></td>
<td>3... <em>Galaxy S8 Cases</em> <em>Leaked</em>: This <em>report</em> is prepared ...</td>
<td>Twitter</td>
</tr>
<tr>
<td></td>
<td>4...after all the <em>stir</em> and <em>excitement</em> ...</td>
<td>BNC</td>
</tr>
<tr>
<td><strong>window size</strong></td>
<td>5... enough to <em>stir excitement</em>.</td>
<td>Twitter</td>
</tr>
<tr>
<td></td>
<td>6... <em>You swallow</em> a lot of things but none of them are <em>anger</em> ...</td>
<td>Twitter</td>
</tr>
<tr>
<td></td>
<td>7<em>A secret</em> <em>report</em> to the Cabinet in October of that year*, prepared by the Energy Secretary, David Howell, and eventually <em>leaked</em>, gave ...</td>
<td>BNC</td>
</tr>
<tr>
<td><strong>word order</strong></td>
<td>8... <em>My pride</em> is in the sky but have to <em>swallow it</em> ...</td>
<td>Twitter</td>
</tr>
<tr>
<td></td>
<td>9<em>The report</em>, <em>leaked</em> to Friends of the Earth*...</td>
<td>BNC</td>
</tr>
<tr>
<td><strong>metaphor-metaphor collocation</strong></td>
<td>10... <em>the pain</em> <em>killed my anger</em> and it made <em>me swallow my pride</em>...</td>
<td>Twitter</td>
</tr>
<tr>
<td><strong>multiple predicates</strong></td>
<td>11... <em>had to swallow</em> anger &amp; pride after* ...</td>
<td>Twitter</td>
</tr>
<tr>
<td></td>
<td>12... <em>anything to stir up</em> those feelings and emotions.</td>
<td>Twitter</td>
</tr>
<tr>
<td></td>
<td>13<em>Swallow</em> <em>your pride</em> and your anger*, old man!</td>
<td>BNC</td>
</tr>
</tbody>
</table>

Examples from the Twitter dataset and BNC that show various ways of expressing metaphors.
Goal

- **Build a Metaphor Processing system**
  - *Avoid the limitations* of previous approaches
    - Rely on task-specific hand-coded knowledge
    - Operate on a limited domain
    - Single word metaphor
    - Cover limited syntactic constructions
  - Be easily **adaptable** to new domains, text types & languages.
Research Directions – System

- Two Directions:
  1. **Supervised**: build upon the minimally supervised system introduced by Shutova (2013).
  2. **Unsupervised**: Neural Networks using word embeddings
Research Directions – Dataset

- Create a necessary corpus from Twitter
- Benchmark Evaluation Dataset
  - lack of a benchmark evaluation dataset which, led to a variety of evaluation strategies and no fair performance comparison
Research Directions – Evaluation

- Two Settings:
  1. to judge the recall of the system in identifying metaphors in given text
  2. to evaluate the precision of literal metaphor interpretation against human judgment.
What I am doing Now?

- Comparative Study
  - Undirected sample from Twitter and BNC

- System Implementation

- Social Media Dataset
  - Create a **benchmark** corpus of figurative tweets annotated according to **metaphoricity**.
Latest News

- Submitted a research proposal to ACL SRW 2017
Thank you!

QUESTIONS?