FACT VS. OPINION:
THE ROLE OF ARGUMENTATION FEATURES IN NEWS CLASSIFICATION

Tariq Alhindi, Smaranda Muresan and Daniel Preoțiuc-Pietro

Columbia University
In the City of New York

Bloomberg Engineering
PROBLEM & MOTIVATION

- Only 41% of publishers label their type of articles
  - Types include: editorial, review, analysis
  - Lack of consistency and clarity (Harris, 2017).

- Two Types of News Articles:
  1) Opinion articles: persuade the readers with respect to a particular point of view e.g. editorial, op-ed, letters to the editor
  2) News stories: report factual news or events.

- A clear marking is essential for graining public trust (The Media Insight Project, 2018)
  - Especially between the above categories

Hypothesis
A key difference between the two types is the discourse structure and, in particular, the argumentative and persuasive aspects
Title: Massachusetts Law Requires Insurance for Infertility Care

Massachusetts will become the first state to require insurance companies to pay for all medical treatment of infertility.

A new law, signed Thursday by Gov. Michael S. Dukakis, is expected to help hundreds of couples who have been unable to afford infertility treatment, including the expensive procedure of fertilizing human embryos outside the womb. The law takes effect Jan. 6.

"Insurance companies have tended to regard infertility as a cosmetic problem, like a nose job," said Karen Sweet, a lobbyist for Resolve of the Bay State, a group that offers support and counseling to infertile people. "In practice, most people were getting most things paid for," she said. "But the coverage was inconsistent and inequitable in many cases. Usually, if a doctor used a medical term to describe it, it got covered."

Many couples in Massachusetts have found that initial treatments for infertility were covered by insurance, but subsequent ones were not, Ms. Sweet said. The bill passed easily despite opposition from Blue Cross and Blue Shield of Massachusetts and the Roman Catholic Church.

Antibiotics in the Poultry Industry

It was a pleasant surprise to learn this week that three large poultry companies had greatly reduced their use of antibiotics in healthy chickens, a move that could help slow the emergence of antibiotic resistance in bacteria that cause diseases in humans. Other companies ought to follow the lead of these pioneers, and Congress ought to ban the use of medically important antibiotics in animal husbandry except to cure sick animals.

Strong action is needed because many germs that infect humans are growing resistant to treatment with antibiotics. Such resistance occurs inevitably over time as an antibiotic kills off susceptible strains of a germ and leaves only the more resistant strains to proliferate. But in recent decades the growth of resistance has been increased by overuse of antibiotics in agriculture, where companies routinely use the drugs to promote growth on less feed and to prevent disease in healthy animals. As a result, some germs that infect both animals and humans have become resistant to antibiotics, and even germs that do not infect humans are capable of transferring their antibiotic-resistance genes to germs that do.

That is why the report in Sunday's Times by Marian Burros was so encouraging. She found that three poultry companies that produce a third of the chickens consumed by Americans each year -- Foster Farms, Perdue Farms and Tyson Foods -- had greatly reduced the use of antibiotics in healthy chickens and were using them primarily to treat sick chickens.

There is no reason that other poultry producers could not do the same, and probably the pork and beef industries as well. It is unacceptable that any industry should use medically important antibiotics for the economic purpose of fostering growth. Congress and the Food and Drug Administration need to curtail the use of animal antibiotics that are related to human medicines.

(a) News Story

(b) Opinion Article

Fact vs. Opinion: the Role of Argumentation Features in News Classification.
Tariq Alhindi, Smaranda Muresan, and Daniel Preoțiuc-Pietro. COLING 2020
Fact vs. Opinion: the Role of Argumentation Features in News Classification.

Tariq Alhindi, Smaranda Muresan, and Daniel Preoțiuc-Pietro. COLING 2020

EXAMPLE

Title: Massachusetts Law Requires Insurance for Infertility Care

Massachusetts will become the first state to require insurance companies to pay for all medical treatment of infertility.

A new law, signed Thursday by Gov. Michael S. Dukakis, is expected to help hundreds of couples who have been unable to afford infertility treatment, including the expensive procedure of fertilizing human embryos outside the womb. The law takes effect Jan. 6.

"Insurance companies have tended to regard infertility as a cosmetic problem, like a nose job," said Karen Sweet, a lobbyist for Resolve of the Bay State, a group that offers support and counseling to infertile people. "In practice, most people were getting most things paid for," she said. "But the coverage was inconsistent and inequitable in many cases. Usually, if a doctor used a medical term to describe it, it got covered."

Many couples in Massachusetts have found that initial treatments for infertility were covered by insurance, but subsequent ones were not, Ms. Sweet said. The bill passed easily despite opposition from Blue Cross and Blue Shield of Massachusetts and the Roman Catholic Church.

Claim

Antibiotics in the Poultry Industry

It was a pleasant surprise to learn this week that three large poultry companies had greatly reduced their use of antibiotics in healthy chickens, a move that could help slow the emergence of antibiotic resistance in bacteria that cause diseases in humans. Other companies ought to follow the lead of these pioneers, and Congress ought to ban the use of medically important antibiotics in animal husbandry except to cure sick animals.

Strong action is needed because many germs that infect humans are growing resistant to treatment with antibiotics. Such resistance occurs inevitably over time as an antibiotic kills off susceptible strains of a germ and leaves only the more resistant strains to proliferate. But in recent decades the growth of resistance has been increased by overuse of antibiotics in agriculture, where companies routinely use the drugs to promote growth on less feed and to prevent disease in healthy animals. As a result, some germs that infect both animals and humans have become resistant to antibiotics, and even germs that do not infect humans are capable of transferring their antibiotic-resistance genes to germs that do.

That is why the report in Sunday's Times by Marian Burros was so encouraging. She found that three poultry companies that produce a third of the chickens consumed by Americans each year -- Foster Farms, Perdue Farms and Tyson Foods -- had greatly reduced the use of antibiotics in healthy chickens and were using them primarily to treat sick chickens.

There is no reason that other poultry producers could not do the same, and probably the pork and beef industries as well. It is unacceptable that any industry should use medically important antibiotics for the economic purpose of fostering growth. Congress and the Food and Drug Administration need to curtail the use of animal antibiotics that are related to human medicines.

(b) Opinion Article

(a) News Story
Can sentence-level argumentation features derived from predictive models help in the downstream task of document-level news vs. opinion classification?

Do argumentation features transfer well to articles from unseen publishers or domains, when trained on a single- or multiple-publishers?
OUTLINE

- Related Work
- Data
- Features
- Models and Results
- Conclusion
RELATED WORK

- Linguistic Features for News vs. Opinion Articles
  (Kruger et al., 2017)

- Argumentation Features have been used for other tasks
  e.g. Sentiment Analysis (Wachsmuth et al., 2014)
OUTLINE

- Related Work
- Data
- Features
- Models and Results
- Conclusion
DATA

- **Single-Publisher Training** (Kruger et al., 2017)
  - **Train and test:** WSJ
    - BLIIP Wall Street Journal (Charniak et al., 2000)
  - **Test:** NYT (Topics: Defense; Medicine)

- **Multi-Publisher Training** 2018 - 2019
  - **Test (Unseen Publisher):** The Metro - Winnipeg

---

<table>
<thead>
<tr>
<th>Data Collection</th>
<th>Type</th>
<th>Publisher</th>
<th>News</th>
<th>Opinion</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSJ-NYT</td>
<td>train</td>
<td>WSJ</td>
<td>1751</td>
<td>1751</td>
<td>3502</td>
</tr>
<tr>
<td></td>
<td>test</td>
<td>WSJ</td>
<td>500</td>
<td>500</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>test</td>
<td>NYT-Defense</td>
<td>1000</td>
<td>1000</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>test</td>
<td>NYT-Medicine</td>
<td>1000</td>
<td>1000</td>
<td>2000</td>
</tr>
<tr>
<td>Multi-Publisher</td>
<td>train</td>
<td>10 publishers</td>
<td>3193</td>
<td>3193</td>
<td>6386</td>
</tr>
<tr>
<td></td>
<td>test</td>
<td>10 publishers</td>
<td>353</td>
<td>353</td>
<td>706</td>
</tr>
<tr>
<td></td>
<td>test</td>
<td>The Metro - Winnipeg</td>
<td>418</td>
<td>418</td>
<td>836</td>
</tr>
</tbody>
</table>

---

Fact vs. Opinion: the Role of Argumentation Features in News Classification. Tariq Alhindi, Smaranda Muresan, and Daniel Preoțiuc-Pietro. COLING 2020
OUTLINE

- Related Work
- Data
- Features
- Models and Results
- Conclusion
FEATURES

- **Linguistic Features**
  Structural, Quotes, Modal Verbs, Sentiment (Kruger et al., 2017)

- **Embeddings**
  Fine-tuned BERT (Devlin et al., 2019): `bert-base-cased`
  using the top layer of the [CLS] token to represent the article

- **Argumentation Features**
  Argumentative types of sentences (Claim; Premise) in the articles
  1. Aggregate features (percentages) SVM
  2. Type sequence* RNN

* First 100 sentences
ARGUMENTATION FEATURES

- A corpus of 300 editorials annotated with six argumentative types (Al Khatib et al., 2016)
  
  Assumption
  Common-Ground, Testimony, Statistics, Anecdote
  Other

  Claim
  Premise
  Other

- Fine-tuning BERT to perform a three-way sentence classification
  
  Claim, Premise, or Other
  
  Macro F1 on the labeled test set: 0.76

- Use the BERT model to predict the argumentative types of sentences in our target datasets, and use those to generate features for the document-level task
FACT VS. OPINION: THE ROLE OF ARGUMENTATION FEATURES IN NEWS CLASSIFICATION.

Tariq Alhindi, Smaranda Muresan, and Daniel Preoțiuc-Pietro. COLING 2020

OUTLINE

- Related Work
- Data
- Features
- Models and Results
- Conclusion
MODELS

- SVM with a linear kernel
  Linguistic, Embeddings, and Argumentation Features

- BERT Fine-tuned

- RNN
  Argumentation Features

- RNN+BERT
  Argumentation Features+ Embeddings


### RESULTS

- **Single-Publisher (WSJ-NYT)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Features</th>
<th>WSJ</th>
<th>NYT-Def</th>
<th>NYT-Med</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVM</td>
<td></td>
<td>0.84</td>
<td>0.75</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>Ling.</td>
<td>0.99</td>
<td>0.79</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>Emb.</td>
<td>0.89</td>
<td>0.88</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>Arg.</td>
<td>0.99</td>
<td>0.79</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>Ling. + Emb.</td>
<td>0.91</td>
<td>0.79</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>Ling. + Arg.</td>
<td>0.99</td>
<td>0.88</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>Emb. + Arg.</td>
<td>0.99</td>
<td>0.79</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>ALL</td>
<td>0.99</td>
<td>0.79</td>
<td>0.78</td>
</tr>
<tr>
<td>SVM Ensemble</td>
<td>SVM Emb.</td>
<td>0.99</td>
<td>0.83</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>SVM Arg.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BERT</td>
<td></td>
<td>0.99</td>
<td>0.79</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>Arg.</td>
<td>0.94</td>
<td>0.91</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>Emb. + Arg.</td>
<td>0.99</td>
<td>0.79</td>
<td>0.78</td>
</tr>
<tr>
<td>RNN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RNN+BERT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Multi-Publisher**

<table>
<thead>
<tr>
<th>Model</th>
<th>Features</th>
<th>Multi Publisher</th>
<th>Unseen Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVM</td>
<td>Emb</td>
<td>0.93</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>Arg</td>
<td>0.84</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>Emb+Arg</td>
<td>0.93</td>
<td>0.89</td>
</tr>
<tr>
<td>BERT</td>
<td>–</td>
<td>0.93</td>
<td>0.90</td>
</tr>
<tr>
<td>RNN</td>
<td>Arg</td>
<td>0.85</td>
<td>0.86</td>
</tr>
<tr>
<td>RNN+BERT</td>
<td>Arg+Emb</td>
<td>0.93</td>
<td>0.91</td>
</tr>
</tbody>
</table>

---

Fact vs. Opinion: the Role of Argumentation Features in News Classification. Tariq Alhindi, Smaranda Muresan, and Daniel Preoțiuc-Pietro. COLING 2020
## RESULTS (SUB-TYPES OF OPINION)

### NEWS VS. EDITORIAL  

<table>
<thead>
<tr>
<th>Opinion Class</th>
<th>Data set</th>
<th>SVM (Arg. features)</th>
<th>BERT</th>
<th>RNN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Editorial</td>
<td>NYT-Def</td>
<td>0.90</td>
<td>0.63</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>NYT-Med</td>
<td>0.88</td>
<td>0.62</td>
<td>0.91</td>
</tr>
<tr>
<td>Letters</td>
<td>NYT-Def</td>
<td>0.89</td>
<td>0.98</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>NYT-Med</td>
<td>0.88</td>
<td>0.85</td>
<td>0.87</td>
</tr>
</tbody>
</table>

### Multi-Publisher

<table>
<thead>
<tr>
<th>Opinion Class</th>
<th>Dataset</th>
<th>SVM (Emb)</th>
<th>SVM (Arg)</th>
<th>SVM (Emb+Arg)</th>
<th>BERT</th>
<th>RNN</th>
<th>RNN+BERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Editorial</td>
<td>Multi Publisher</td>
<td>0.93</td>
<td>0.90</td>
<td>0.93</td>
<td>0.94</td>
<td>0.89</td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td>Unseen Publisher</td>
<td>0.89</td>
<td>0.88</td>
<td>0.88</td>
<td>0.89</td>
<td>0.87</td>
<td>0.90</td>
</tr>
<tr>
<td>Letters</td>
<td>Multi Publisher</td>
<td>0.98</td>
<td>0.86</td>
<td>0.98</td>
<td>0.99</td>
<td>0.89</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td>Unseen Publisher</td>
<td><strong>0.91</strong></td>
<td>0.88</td>
<td><strong>0.91</strong></td>
<td><strong>0.91</strong></td>
<td>0.87</td>
<td><strong>0.87</strong></td>
</tr>
</tbody>
</table>

---

Fact vs. Opinion: the Role of Argumentation Features in News Classification. 
*Tariq Alhindī, Smaranda Muresan, and Daniel Preoțiu-Pietro. COLING 2020*
FREQUENCY OF CLAIMS AND PREMISES AT EACH SENTENCE POSITION

Fact vs. Opinion: the Role of Argumentation Features in News Classification.
Tariq Alhindi, Smaranda Muresan, and Daniel Preoțiuc-Pietro. COLING 2020
OUTLINE

- Related Work
- Data
- Features
- Models and Results
- Conclusion
CONCLUSION

- Argumentation features transfer well
  - Particularly when the training data is from a single publisher

- Argumentation features are able to further improve upon rich contextualized models trained on more data from multiple publishers

- There are distinctive discourse patterns related to claims and premises that are able to generalize well across publishers and topics

Future Work

- Finer-grained argumentative styles and discourse categories e.g. explanations, background, context, reactions and evidence

- Expand the types of articles beyond the two types and two subtypes