Tackling the Headline Incongruity Problem using Stance Detection

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1. Background

- Headline incongruity problem = headlines which do not accurately represent the information contained in the article with which they occur.
- Recent because of the growth of the internet
- Problematic headline types such as clickbait and sensationalism lead to disinformation.
- Constant development of new state of the art models using stance detection to tackle this problem.
- Fake News Challenge sped up development in 2017

You would never believe what happens if you stop eating meat...

This new hamburger consists entirely of plant-based nutrients. The burger contains nothing that comes from animals. According to the manufacturer, it has the same texture as a regular hamburger and is much healthier. They concluded from various tests that the test subjects liked the new hamburger at least as much as the meat-containing comparison burger. They couldn't even taste the difference.

2. Research question

How effective are stance detection methods in solving the headline incongruity problem?

3. Research method

To answer my research question, a thoroughly comparison of models and datasets is needed.

Comparison of 3 datasets:
- FNC-1 dataset (2017)
- NELA-17 based dataset by Yoon et. al (2019)
- Real-News based dataset by Yoon et al. (2021)

Real-News most suitable dataset:
- Large (1.3m pairs)
- Balanced
- Tested

Comparison tests of 5 models on best dataset:
- UCL Machine Reading model (2017)
- Team Athene model (2017)
- Team Solat in the swen model (2017)
- Deep Hierarchical Encoder by Yoon et al. (2019)
- Graph Neural Network by Yoon et al. (2021)

Tests on TU Delft HPC cluster

4. Results

Results of ADHE and Graph Neural Network models are not reproduced due to time constraints

Similar dataset = similar headline-article body pairs

Model	Accuracy	AUROC
SOLAT in the SWEN	0.7254	0.7665
Athene (UKP Lab)	0.6989	0.7323
UCL Machine Reading	0.6761	0.6769
ADHE	0.797	0.879
Graph Neural Network	**0.852**	**0.928**

Random dataset = random headline-article body pairs

Model	Accuracy	AUROC
SOLAT in the SWEN	0.7543	0.7693
Athene (UKP Lab)	0.7140	0.7117
UCL Machine Reading	0.6993	0.6347
ADHE	0.922	0.971
Graph Neural Network	**0.959**	**0.989**

5. Conclusion

- Graphs work well for this problem.
- Processing article body paragraphs independently has a higher performance.
- Design a model with the characteristics of the dataset in mind.

6. Future work

- Reproduce results ADHE and Graph Neural Network
- Research for an approach with BERT and sufficient computational power