Automated Detection of Misinformation in Tweets about COVID-19

Caitlin Moroney [*]
Department of Mathematics and Statistics
American University
Washington, DC 20016
cm0246b@american.edu

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Abstract

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Keywords COVID-19 · NLP · machine learning · misinformation

1 Introduction

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2 Methodology

This paper explores a series of methods which seek to exploit linguistic features in raw text data in order to perform the automated detection of unreliable tweets. The experiments follow the same general framework with certain implementation details tweaked for each experiment. The first step in this framework is the application of NLP featurization methods to the raw tweet text. While different featurization methods are compared, all methods involve the use of NLP tools to represent the text with numeric features. Subsequently, latent variable methods are employed to reduce the dimensionality of the resulting X feature matrix (as well as to uncover latent variables). The latent variables are then used in the classification task. Finally, we evaluate the classification algorithms paired with the featurization methods with respect to performance and explainability. We use the typical performance metrics, including accuracy, F-score, precision, recall, and ROC-AUC. We use LIME to evaluate local explainability for non-interpretable methods. Furthermore, we present a new explainability framework for latent variable methods as well as a new explainability

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[*]Use footnote for providing further information about author (webpage, alternative address)—*not* for acknowledging funding agencies. Optional.

metric. Below, we explore in greater detail the methods used for featurization, latent variables, classification, and evaluation of explainability.

2.1 NLP featurization

2.2 Latent variable methods

2.3 Classification

2.4 Evaluation

3 Results

4 Discussion

5 Headings: first level

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See Section 5.

5.1 Headings: second level

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$$\xi_{ij}(t) = P(x_t = i, x_{t+1} = j | y, v, w; \theta) = \frac{\alpha_i(t) a_{ij}^{w_t} \beta_j(t+1) b_j^{v_{t+1}}(y_{t+1})}{\sum_{i=1}^{N} \sum_{j=1}^{N} \alpha_i(t) a_{ij}^{w_t} \beta_j(t+1) b_j^{v_{t+1}}(y_{t+1})}$$

5.1.1 Headings: third level

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6 Examples of citations, figures, tables, references

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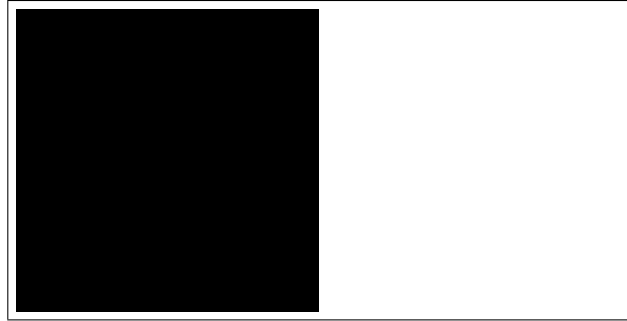
Figure 1: Sample figure caption.

placerat et, mollis vitae, dui. Sed ante tellus, tristique ut, iaculis eu, malesuada ac, dui. Mauris nibh leo, facilisis non, adipiscing quis, ultrices a, dui.

some text (Kour and Saabne 2014b, 2014a) and see Hadash et al. (2018).

The documentation for `natbib` may be found at

```
http://mirrors.ctan.org/macros/latex/contrib/natbib/natnotes.pdf
```

Of note is the command `\citet`, which produces citations appropriate for use in inline text. For example,

```
\citet{hasselmo} investigated\dots
```

produces

Hasselmo, et al. (1995) investigated...

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https://www.ctan.org/pkg/booktabs
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6.1 Figures

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See Figure 1. Here is how you add footnotes. [^Sample of the first footnote.]

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plot(mtcars$mpg)
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Table 1: Sample table title

	Part		Size (μm)
Name	Description		
Dendrite	Input terminal		$\sim$100
Axon	Output terminal		$\sim$10
Soma	Cell body		up to 10^6
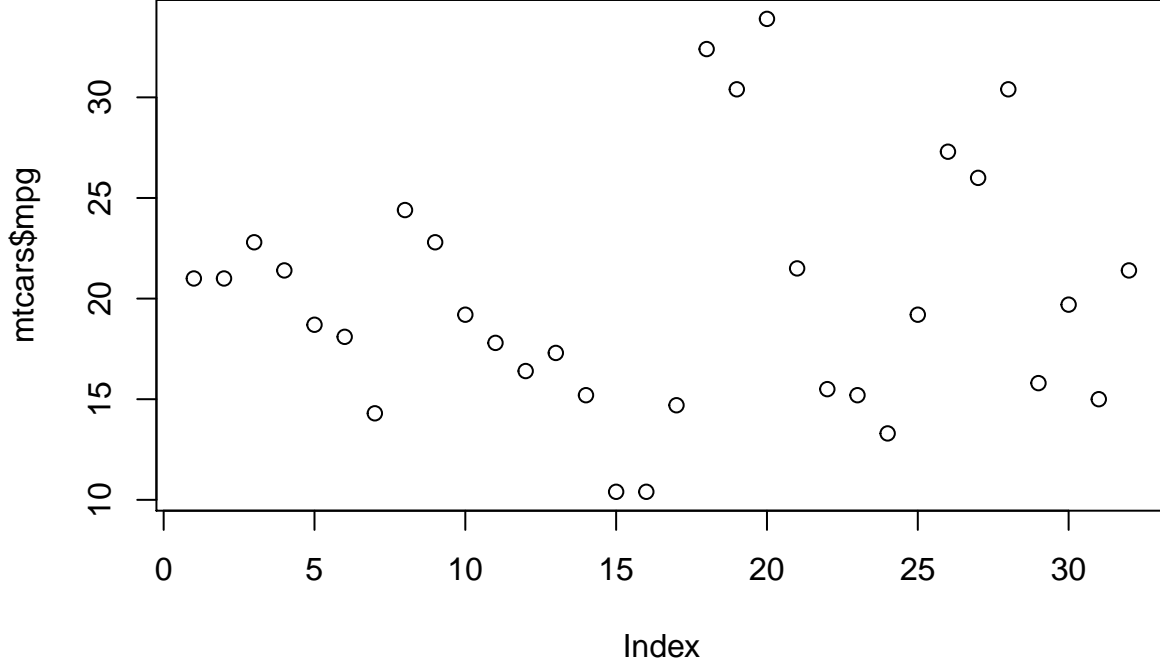
6.2 Tables

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See awesome Table~1.

6.3 Lists

- Lorem ipsum dolor sit amet
- consectetur adipiscing elit.
- Aliquam dignissim blandit est, in dictum tortor gravida eget. In ac rutrum magna.

References

Hadash, Guy, Einat Kermany, Boaz Carmeli, Ofer Lavi, George Kour, and Alon Jacovi. 2018. "Estimate and Replace: A Novel Approach to Integrating Deep Neural Networks with Existing Applications." *arXiv Preprint arXiv:1804.09028.*

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