# Automated Fake News Detection Using Linguistic Analysis and Machine Learning

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# MOTIVATION

- Automatically detecting fake news is important from a social, political, and security-oriented perspective.

***Can we automatically differentiate between valid and fake news articles?***


# DATASETS USED

- **Fake News Samples**
  - Used the "BS" or "Fake" Kaggle dataset provided by the SBP-BRIMS Grand Data Challenge organizers. (N=11,494.)
- **Valid News Samples**
  - Created two new "Valid" news article datasets
  - Dataset 1:
    - Sampled 115 articles each from three well-known and largely respected news agencies: National Public Radio, New York Times, and Public Broadcasting Service. (N=445).
  - Dataset 2:
    - Downloaded from PBS (Public Broadcasting Service) website. (N=23,635).
  - Both datasets (including extracted features) are publically available at: http://bit.ly/2sGcJz4

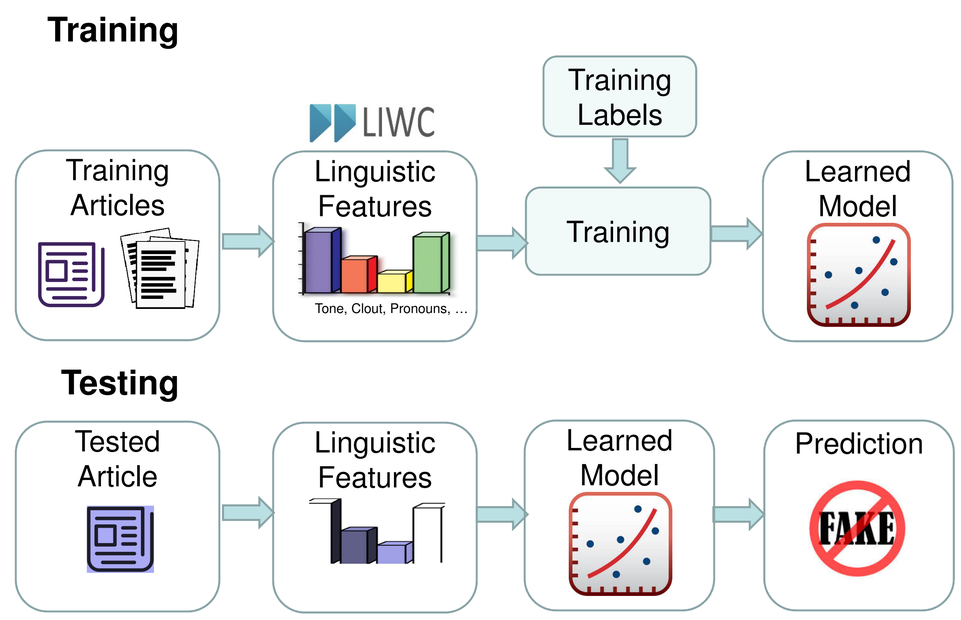
# CONTRIBUTIONS

(1) Creation of two new public datasets of valid news articles.

(2) Creation of a linguistic analysis based machine learning model for identification of fake news articles with high accuracy.

(3) Identification of features most commonly associated with fake news.

# APPROACH




- Derived linguistic features using LIWC 2015- Linguistic features and Word Count Engine.
- Undertook 80-20 split of datasets for training and testing.
- Applied multiple well known machine learning algorithms including logistic regression, support vector machine, random forest, decision tree, k-neighbors classifier.
- Tested over two different datasets.

# RESULTS

Dataset 1

- Best Algorithm: Support Vector Machine (SVM)
- Balanced - Random subset of majority class
- Accuracy: 87%, F1-Score: 0.87, Support = 138
- Top five features

| Feature | Higher likelihood with class? |
|---|---|
| Word count | Valid |
| Authenticity (expressed as personal, disclosing text) | Fake |
| Clout or expertise of speaker/writer | Valid |
| Positivity of tone | Valid |
| Analytical thinking | Valid |

Dataset 2

- Best Algorithm: Support Vector Machine (SVM)
- Imbalanced – All available data
- Accuracy: 92%, F1-Score: 0.93, Support = 6,558
- Top five features

| Feature | Higher likelihood with class? |
|---|---|
| "You" frequency | Fake |
| Words per sentence | Fake |
| Functional words (pronouns and verbs) frequency | Fake |
| Certainty related words (e.g., always, never) | Fake |
| Auditory process (e.g., listen, hear) | Valid |