

Linguistic Analysis of the bioRxiv Preprint Landscape

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Abstract

Introduction

1. What is a preprint
2. Why are preprints important?
3. Mention how preprints are being integrated into scientist's everyday workflow
4. Talk about biorxiv and discuss how it is one of the repositories that maintains preprints along with citation of others such as arxiv/medrxiv etc.
5. Discuss works that analyze biorxiv from an audience perspective (quantifying tweets etc.)
6. Mention the gap which consists of analysing the language of biorxiv preprints (first to do this)
7. ^ Why is this important? What will this allow for future research projects?
8. Provide list of contributions within this manuscript

Methods

Datasets

BioRxiv

BioRxiv [1] is a repository of biological and biomedical research preprints. We downloaded an xml snapshot of this repository on February 3, 2020 from bioRxiv's Amazon S3 resource [???] that contained the full text and image content of 98,023 preprints. Preprints on bioRxiv are versioned, and in our snapshot 26,905 of 98,023 contained more than one version. When preprints had multiple versions, we used only the latest one. Preprints in this snapshot were grouped into one of twenty-nine different categories. Each preprint was also classified as a new result, confirmatory finding, or contradictory finding. Some preprints in this snapshot have been withdrawn from bioRxiv. When a preprint is withdrawn, its content is replaced with the reason for withdrawal. Because we used the latest version, withdrawn preprints in our analysis contained only statements indicating their removal.

PubMed Central

PubMed Central (PMC) [2] is a repository that contains free-to-read articles. PMC contains two types of contributions: closed access articles from research funded by the United States National Institutes of Health (NIH) appearing after an embargo period and articles published under Gold Open Access [3] publishing schemes. Paper availability within PMC is largely dependent on the journal's participation level [???]. Individual journals have can fully participate in submitting articles to PMC, selectively participate sending only a few few of papers to PMC, only submit papers according to NIH's public access policy [???], or not participate at all. As of September 2019, PMC had 5,725,819 articles available [???]. Out of these 5 million articles, about 3 million were open access and available for text processing systems [4,5]. We downloaded a snapshot of this open access subset on January 31, 2020. This snapshot contains papers such as literature reviews, book reviews, editorials, case reports, research articles and more; however, we used only the research articles.

Comparing Corpora

1. Spacy to process text via - Lemmatization, removal of stop words
2. Describe counting frequencies of each lemma
3. Describe using chi-square test
4. Describe how to calculate the likelihood and log odds ratio

Visualizing the Preprint Landscape

Generate Document Representation

1. Describe how word2vec works
2. Talk about training word2vec on entire biorxiv repository
3. Discuss how to generate a document representation using word2vec model

Dimensionality Reduction of Document Embeddings

1. Explain how tSNE works (paragraph one)
2. Explain how PCA works (paragraph two)
3. Discuss how words were mapped onto PC components via cosine similarity
4. ^ Explain cosine similarity

Recommending Journals/ bioRxiv Audience Analysis

1. This title will update as analysis is completed
2. This section will describe how the above process is conducted

Results

Comparing bioRxiv to PubMed Central

Global View

1. Create a treemap visualization of top X terms that are different between bioRxiv and PubMed Central (based on odds ratio)

Published Preprint Differences

1. Create a treemap visualization of top X terms that are different between Preprint and Published documents (based on odds ratio)

The bioRxiv Preprint Landscape

1. Provide the tSNE figure of the bioRxiv
2. Discuss the results of the tSNE figure and highlight that there are category clusters within the figure

Topic Analysis of Principal Components

1. Provide an example of the word cloud for principal components
2. Show plot of the principal components and the scatterplot
3. Mention that the word clouds can be found at xyz

Journal Recommendations/Audience Associations

1. Title will change once analysis is finished
2. Provide key figure for this section and take-home message

Discussion

Conclusion

Acknowledgements

References

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Richard Sever, Ted Roeder, Samantha Hindle, Linda Sussman, Kevin-John Black, Janet Argentine, Wayne Manos, John R. Inglis

bioRxiv (2019-11-06) <https://doi.org/ggc46z>

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2. PubMed Central: The GenBank of the published literature

R. J. Roberts

Proceedings of the National Academy of Sciences (2001-01-16) <https://doi.org/bbn9k8>

DOI: [10.1073/pnas.98.2.381](https://doi.org/10.1073/pnas.98.2.381) · PMID: [11209037](https://pubmed.ncbi.nlm.nih.gov/11209037/) · PMCID: [PMC33354](https://pubmed.ncbi.nlm.nih.gov/PMC33354/)

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M. A. G. van der Heyden, T. A. B. van Veen

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4. PMC text mining subset in BioC: about three million full-text articles and growing

Donald C Comeau, Chih-Hsuan Wei, Rezarta Islamaj Doğan, Zhiyong Lu

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5. PubTator central: automated concept annotation for biomedical full text articles

Chih-Hsuan Wei, Alexis Allot, Robert Leaman, Zhiyong Lu

Nucleic Acids Research (2019-07-02) <https://doi.org/ggzfsc>

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