CORRELATING SENTIMENT WITH JOURNAL ARTICLE SUCCESS

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INTRODUCTION

Effective writing in the form of published research papers is essential for communication and engagement between researchers and their audiences.[1] Abstracts in those research papers are particularly important and serve as a tool for peer review where readers can find key information.[2] It is widely accepted that qualitative papers should be neutral in order to promote an unbiased basis on which others can form their own opinions.[3] However, not all papers - specifically, abstracts - accomplish the task of neutrality.

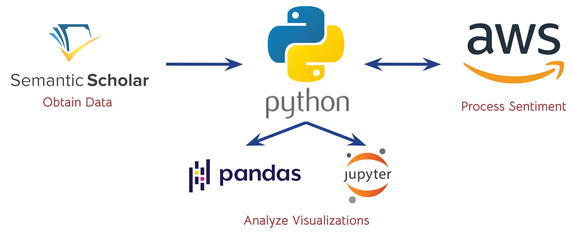
Does tone, diction, and readability influence the success of journal articles? Provocative vocabulary can ignite passionate responses and cause readers to conflate sentiment with quality. Change in tone from neutral to positive such as in this introduction should not influence success. Nevertheless, researchers are human and cannot escape subjectivity. This project seeks to determine if sentiment is correlated with journal article success as determined by in-field citations.

DATA AND CLEANING

- Gathered data from Semantic Scholar Open Research Corpus[4]
  - Over 132 million English-language academic papers spanning many academic disciplines
- Sentiment analysis performed by Amazon Web Services (AWS) Comprehend, an ML-driven natural language processing (NLP) service[5]
  - Returns the percent likelihood that an abstract is neutral, positive, negative, or mixed
- Collected raw text of abstract and number of inbound citations for roughly 10 million papers
  - Ignored papers without abstracts and/or citations (papers with relevant content receive at least 1 citation)

PROCEDURE

- Split papers by discipline to account for differences between subjects
  - Computer Science - quantitative and objective in nature; linguistic differences are irrelevant to findings
  - Political Science - some quantitative and objective data, but subjective opinions and theories are a relevant factor
  - Art - qualitative and subjective in nature; different interpretations are the essence of findings
- Compared distribution of sentiment using basic descriptive statistics
- Visualized relationship between sentiment and citations with scatterplots
- All coding in Python; statistical analysis using Pandas and SciKitLearn; visualization in Altair; organization in Jupyter Notebook



Procedure Visualization

VISUALIZATION AND RESULTS

Exploratory data analysis showed that the distributions of sentiment scores and citations are very skewed. There are dozens of outliers in both distributions and many standard deviations from the mean, so traditional regression analysis could not be performed. Analyses are based on qualitative interpretation of boxplots and scatterplots.

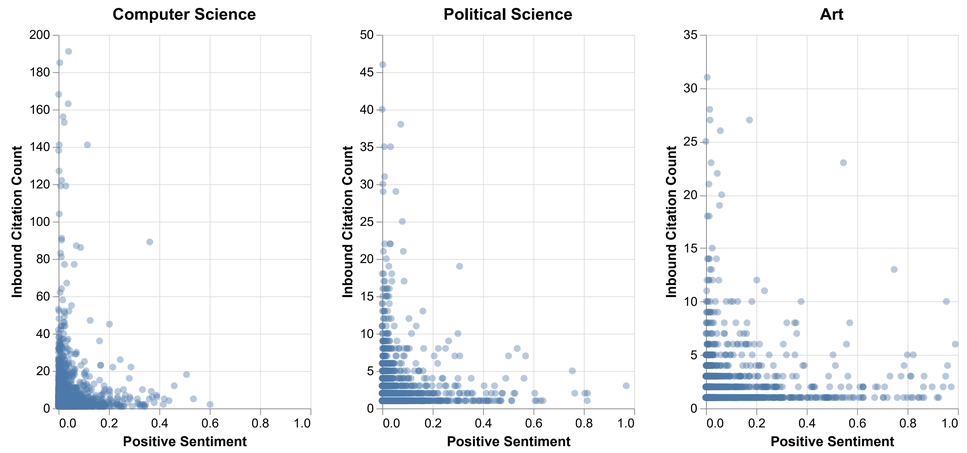
Boxplots:
1) The majority of abstracts are neutral. Of the ones with non-neutral sentiment, the majority are positive

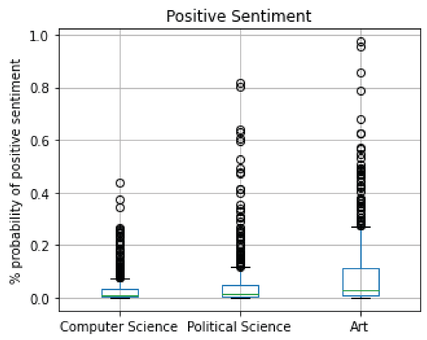
2) Non-neutral sentiment is most prevalent and variable in art, followed by political science and computer science

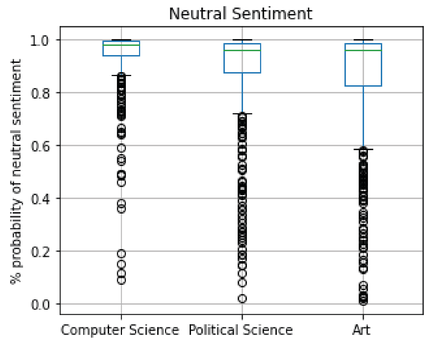
Scatterplots:
1) Almost no successful papers have noticeable sentiment
Apart from 4 papers in art, papers with more than 25% positive sentiment never have more than 10 citations.

2) The differences in sentiment between successful papers are negligible
Excluding a couple art papers, the top 5% of papers in every field have below 10% positive sentiment.

When comparing the abstracts of these papers manually, we found that the small sentiment differences can be attributed to simply the topic of the paper. As a result, the variance is too high to create a statistically significant correlation.







IMPLICATIONS

1) Only papers with neutral abstracts become massively successful, as expected. Thankfully, there is no evidence here that researchers would gain anything by abandoning objectivity and neutrality, even when writing about subjective interpretations of topics.

2) Sentiment analysis alone does not provide enough granularity to analyze the effect of subtle linguistic differences (i.e. tone, diction, rhetoric) on paper success. A controlled experiment with tight restrictions around topic and target audience is necessary to test the validity of this approach.

CITATIONS

[1] Sayer, E. J. (2019). The Essentials of Effective Scientific Writing – a revised alternative guide for authors. Functional Ecology, 33(9), 1576–1579. https://-doi.org/10.1111/1365-2435.13391
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