Crucial factors determining the popularity of scientific articles

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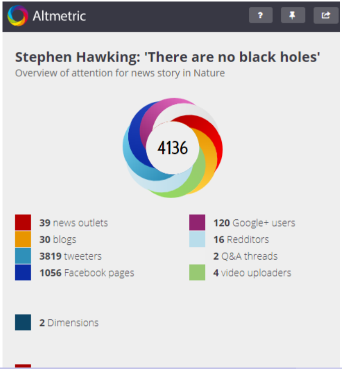
Goals

- Find critical factors which determine the popularity of scientific articles
- Calculate the popularity threshold of the articles

DIFFERENT POPULARITY METRICS

1. Google Scholar
2. PLoS ONE
3. Scopus
4. Web Of Science

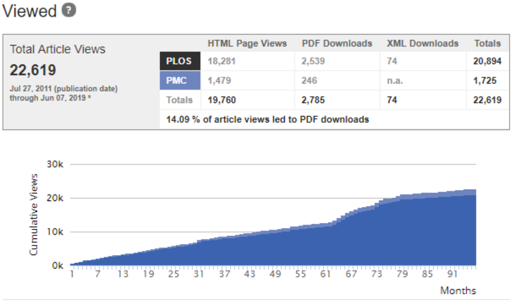


Stephen Hawking: 'There are no black holes'

Overview of attention for news story in Nature

🟥 **39** news outlets	🟪 **120** Google+ users
🟧 **30** blogs	🟦 **16** Redditors
🟦 **3819** tweeters	**2** Q&A threads
🟦 **1056** Facebook pages	🟩 **4** video uploaders

🟦 **2** Dimensions



Viewed ?

Total Article Views

22,619

Jul 27, 2011 (publication date)
through Jun 07, 2019 *

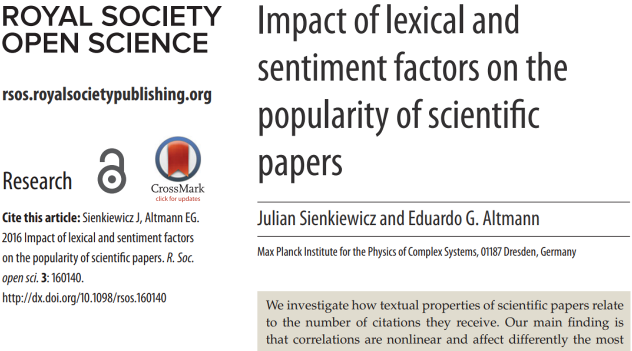
	HTML Page Views	PDF Downloads	XML Downloads	Totals
PLOS	18,281	2,539	74	20,894
PMC	1,479	246	n.a.	1,725
Totals	19,760	2,785	74	22,619

14.09 % of article views led to PDF downloads

Impact of lexical and sentiment factors on the popularity of scientific papers

Introduction

- over **4.3 million** papers, over **1500** different journals
- text length, text complexity, sentiment



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Impact of lexical and sentiment factors on the popularity of scientific papers

Julian Sienkiewicz and Eduardo G. Altmann

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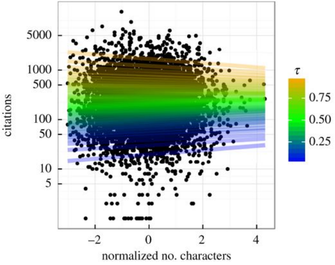
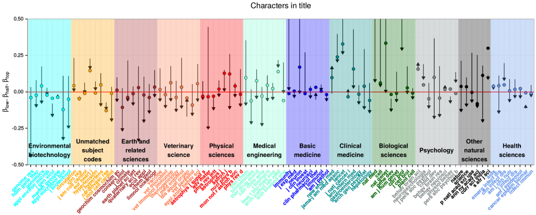
We investigate how textual properties of scientific papers relate to the number of citations they receive. Our main finding is that correlations are nonlinear and affect differently the most

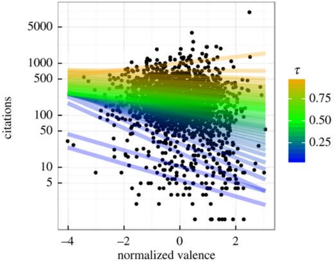
Results

Summary

- Correlations are **non-linear** and affect differently most-cited and typical papers
- In most journals short titles correlate positively with citations only for the most cited papers, for typical papers the correlation is in most cases negative
- Large variability across journals







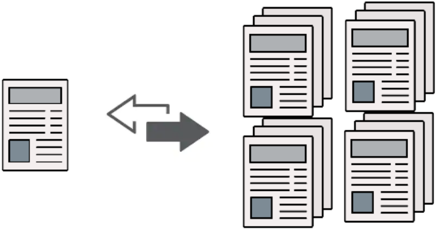
ANALYSIS FROM ANOTHER PERSPECTIVE

METHODS

- Classification vs Statistical analysis

DATA

- One journal vs 1500 different journals
- Number of views vs Number of citations



DATA

PLoS ONE service

FILTERING

- one part over 140.000
- second part over 80.000

OUTCOME

- over 70 000 papers from **2003** to **2014**
- information about the title, authors, full abstract contents and number of views per month
- mean of the **total** number of views

METRICS

LENGTH

- number of characters
- number of words
- number of sentences

Metrics

Length

- number of characters
- number of words
- number of sentences

Complexity

- Fog index: $F = \left(\frac{\#words}{\#sentences} + 100 \frac{\#complex\ words}{\#words} \right)$
- Herdan's C: $C = \frac{\log N}{\log M}$, M - text length, N - vocabulary size

Metrics

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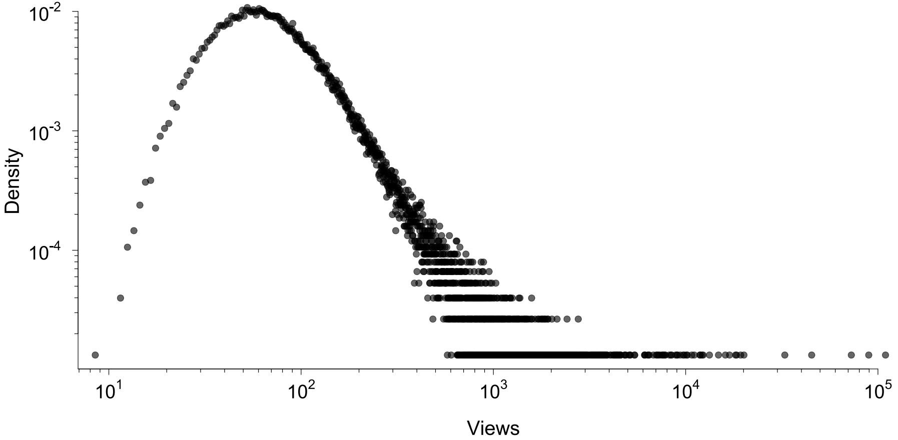
Sentiment

- valence - emotional sign of the text
- arousal - level of emotional activation

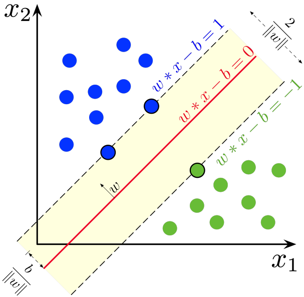
VIEWS DISTRIBUTION



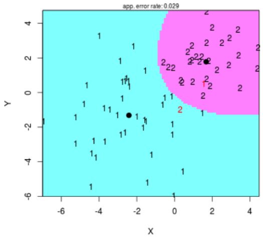
MODEL

CLASSIFICATION MODELS

- LDA, QDA
- SVM (Support-vector machine)
- Random forest



(a) SVM

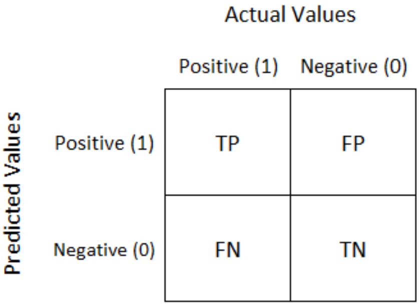


(b) QDA

Measure

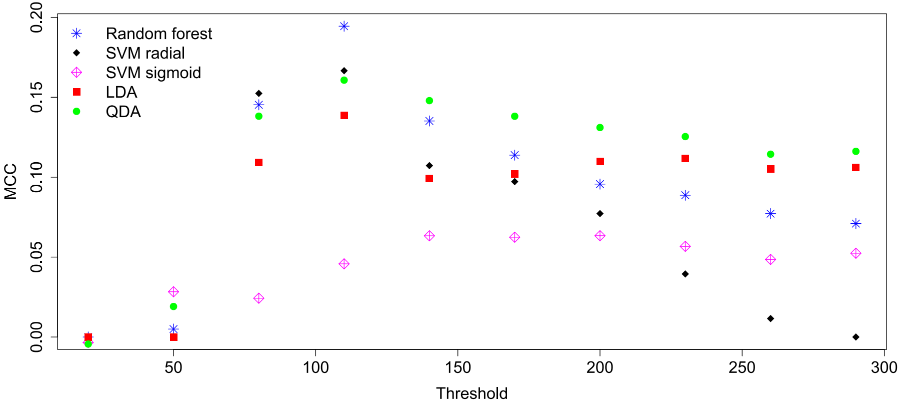
Metrics

1. F1 score ($F1 \in [0, 1]$)
2. Matthews correlation coefficient ($MCC \in [-1, 1]$)

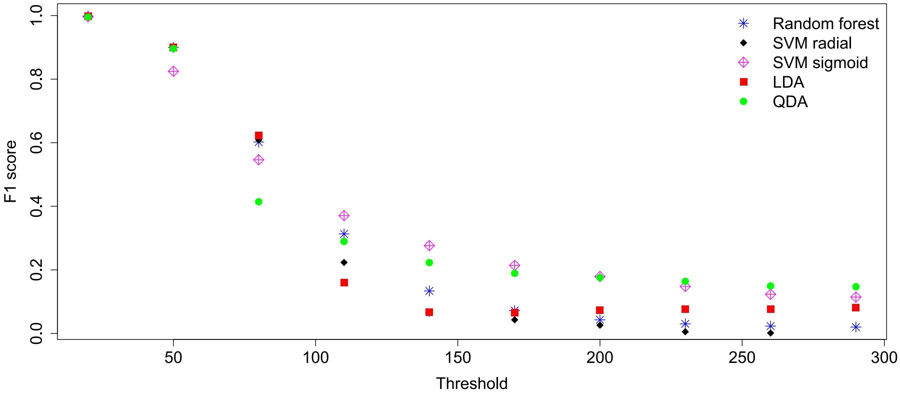


		Actual Values	
		Positive (1)	Negative (0)
Predicted Values	Positive (1)	TP	FP
	Negative (0)	FN	TN

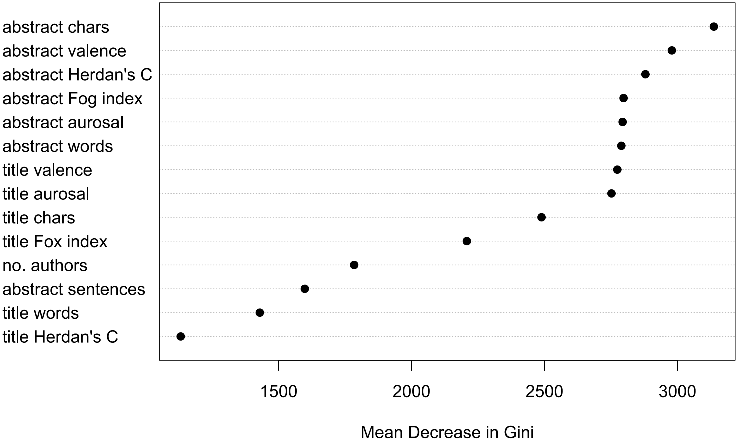
IMPLEMENTATION



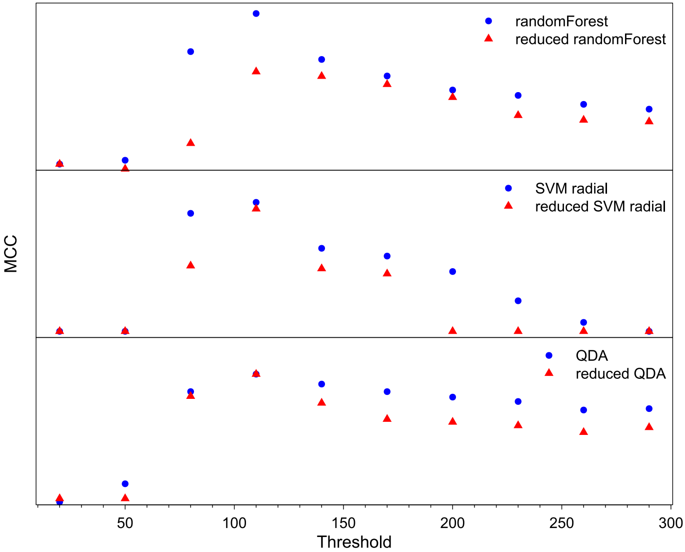
IMPLEMENTATION



REDUCED MODELS



REDUCED MODELS



RESULTS

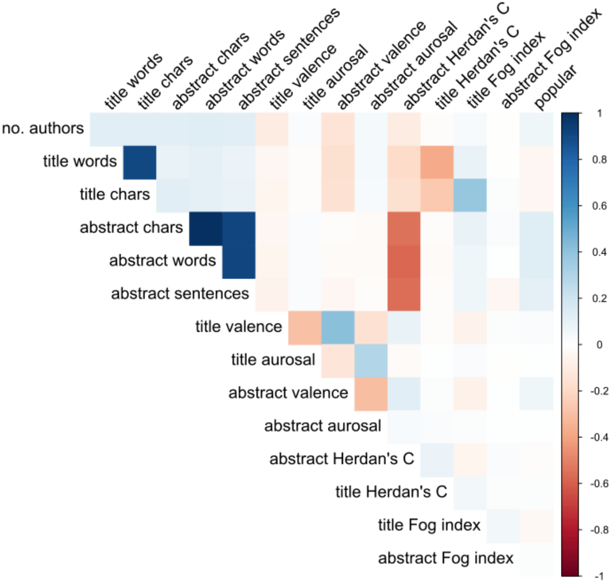
RESULTS

- the best popularity threshold for classification - **80-140** views
- number of **characters** and **valence** in abstract - critical factors
- inferior classification for the reduced number of features

FURTHER WORK

- sentiment **in each part** of the article full text (e.g introduction, discussion) and **around citation**
- a **yearly** number of views from date of publication

CORRELATION MATRIX


title words
title chars
abstract chars
abstract words
abstract sentences
title valence
title aurosal
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abstract Herdan's C
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