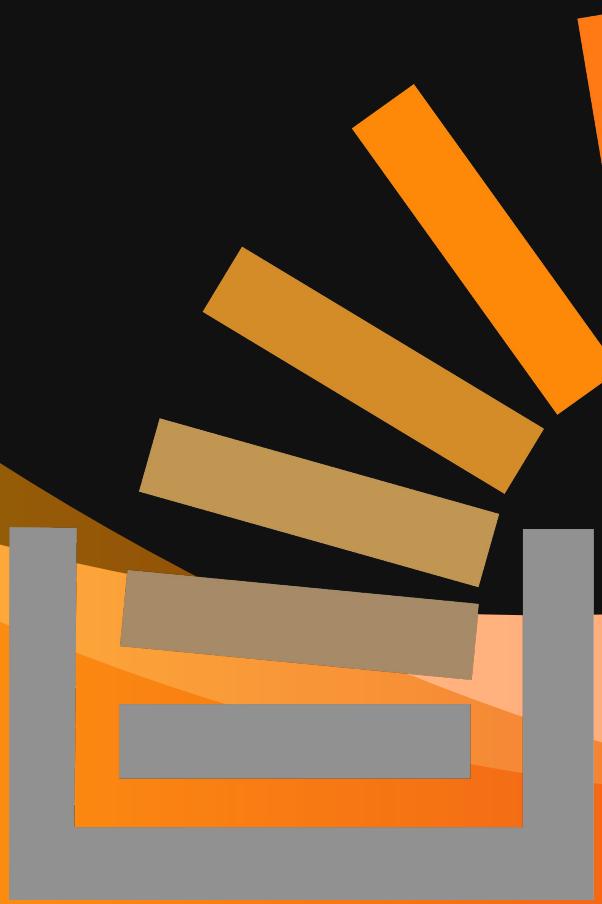
Will G. Nobles



What makes a question useful?

Topic Modeling of Stack Overflow Text

Introduction

- **Motivation**: understand questions that are commonly the most difficult
- **Objective**: identify terms associated with high scoring posts
- **Goal**: determine topics associated with helpful questions

Methodology

Data

Stack Overflow dataset from BigQuery

Metrics

Term frequency, topic probability

Model

Latent Dirichlet Allocation with CountVectorizer

Tools

Standard SQL, NLTK, Gensim, Seaborn, Matplotlib

“can anyone please explain and please do give examples of other situations also i have seen large lines of code where its just hex numbers and never really understood why

Text from Topic 6 with > 97% probability

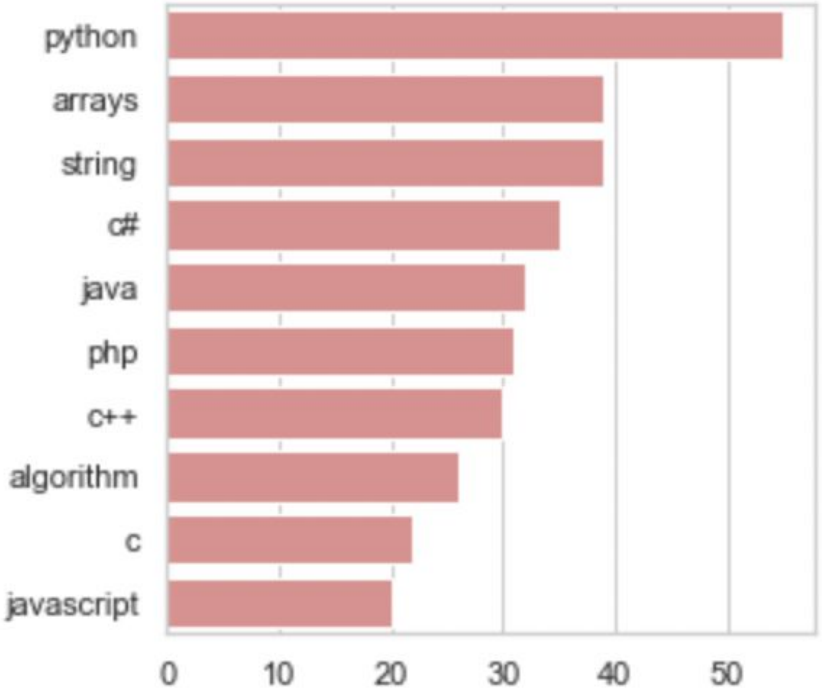
Results

Keywords that define the dominant topic in question samples

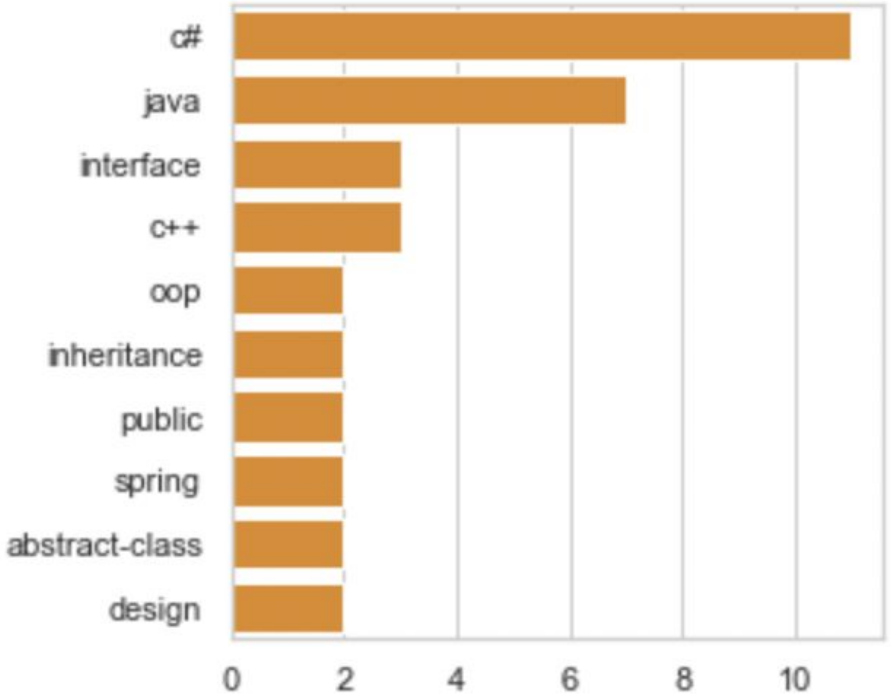
Dominant Topic	Topic Percent Contribution	Keywords
5	**29**	**like, way, want, im, data, code, using, string...**
16	**34**	**new, object, var, null, test, code, error, exc...**
1	**37**	**warning, compiler, difference, reference, pers...**

Counts of Top 10 Tags per LDA Topic

Topic 6



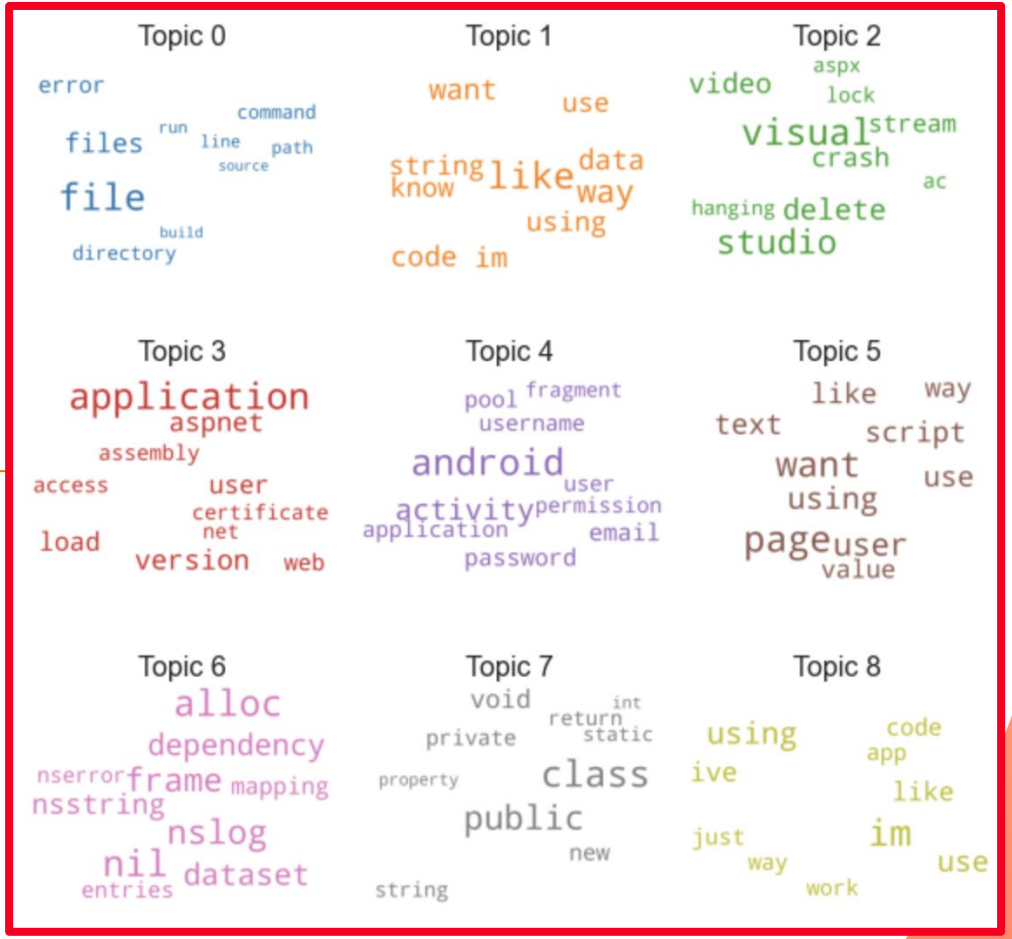
Topic 8



Questions filtered for >80% probability

Word Cloud

Top 10 Words in Each Topic



Conclusions

Recommendations

- Use the model to identify commonly misunderstood topics

Impact

- Educators can prioritize
- Users can increase reputation
- Question posters can use helpful language

Insights

48%

Average topic probability

14,772

Top scoring post

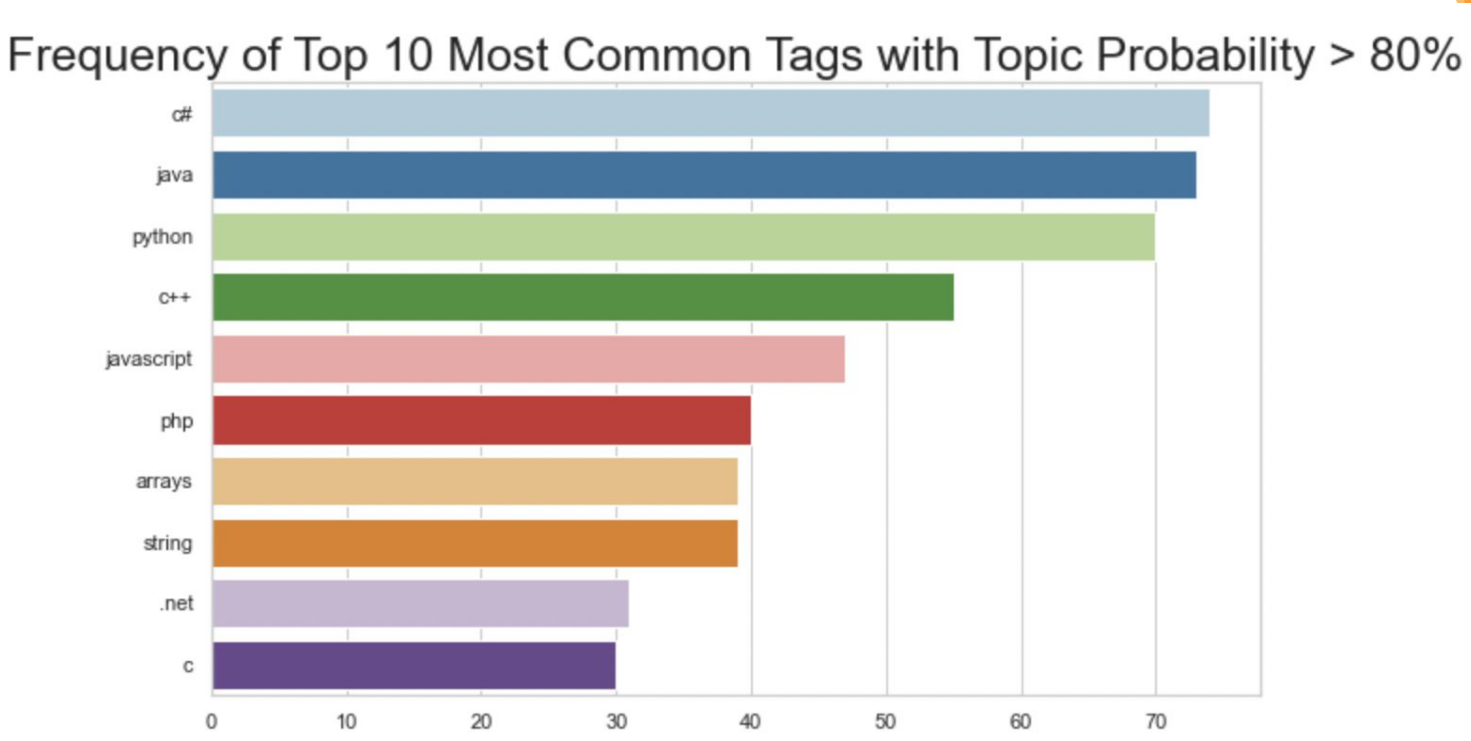
2,141,036

Post with highest number of views

Future Work

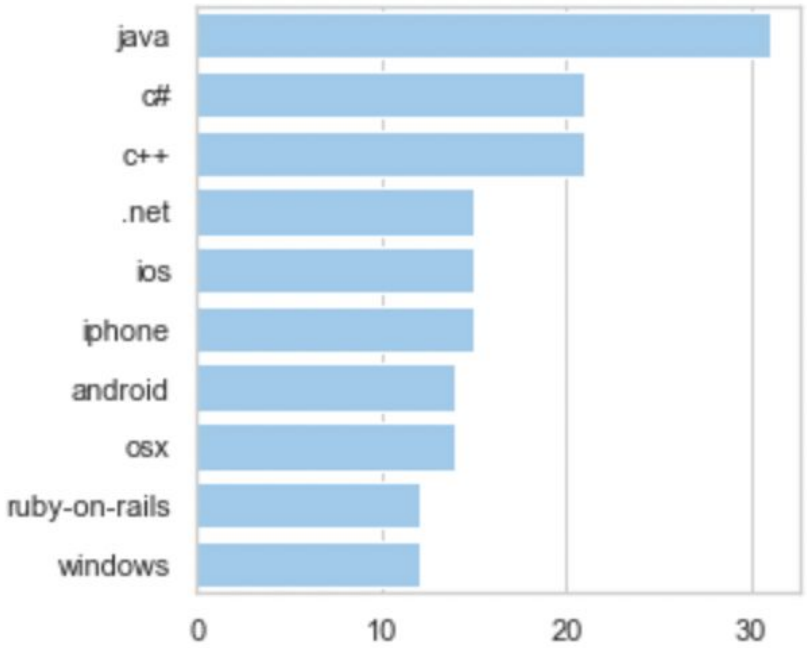
- Increase Stack Overflow domain knowledge on text that isn't normally defined as a word
- Try again with NMF to see if better results can be gained

Appendix

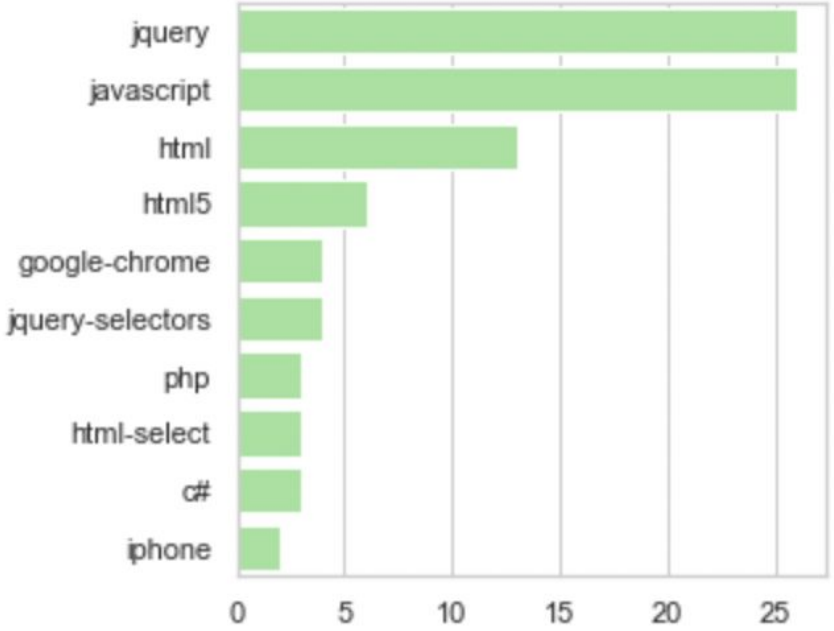

Frequency of Top 10 Most Common Tags with Topic Probability > 80%
c#
java
python
c++
javascript
php
arrays
string
.net
c
0
10
20
30
40
50
60
70

Counts of Top 10 Tags per LDA Topic

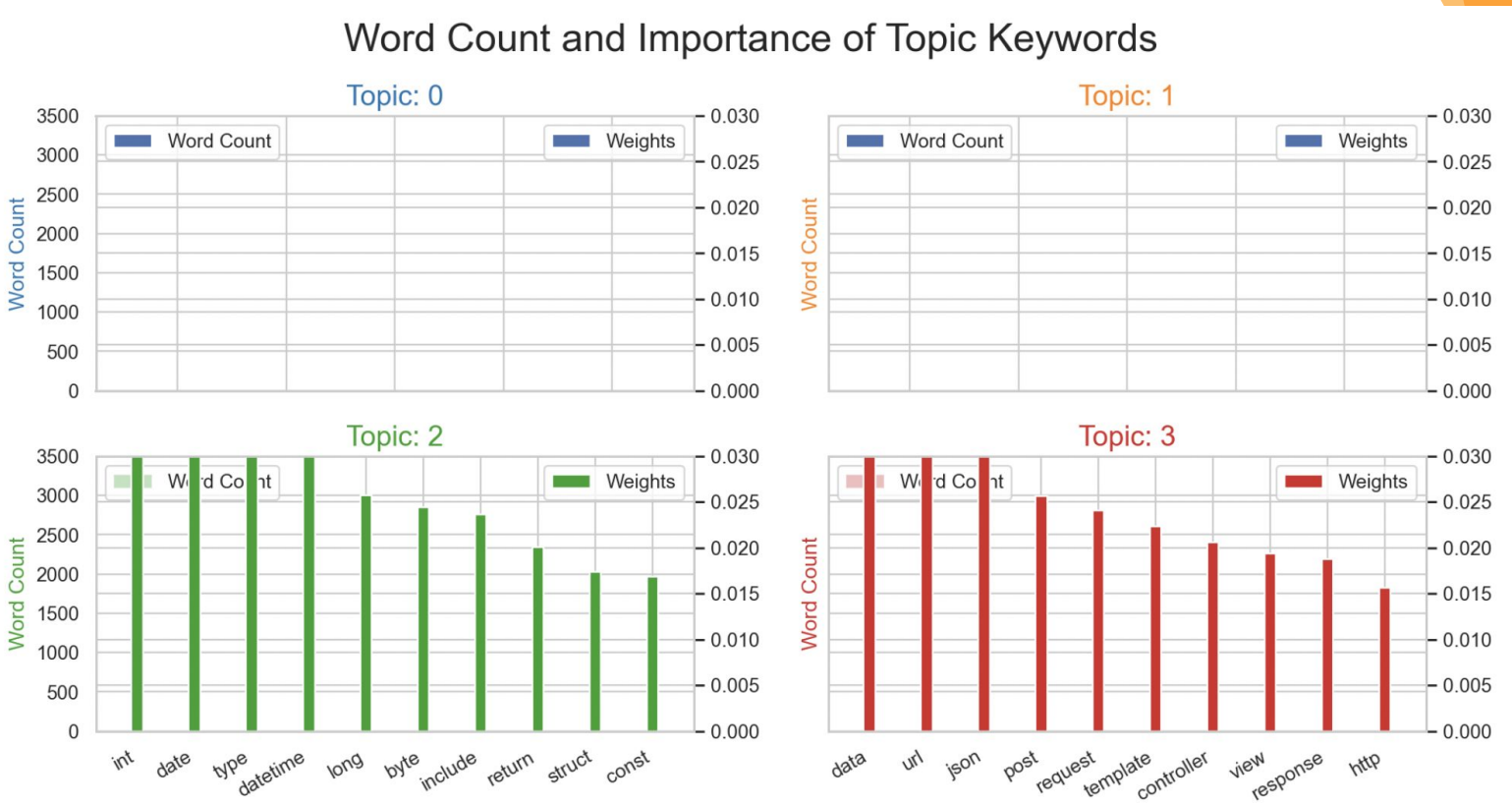
Topic 6



Topic 8



Questions filtered for >80% probability


Word Count and Importance of Topic Keywords
Topic: 0
Topic: 1
Topic: 2
Topic: 3
Word Count
Weights
int
date
type
datetime
long
byte
include
return
struct
const
data
url
json
post
request
template
controller
view
response
http