

Air Force Materiel Command

SLANG (Survey, Linguistic ANalysis Guide)



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17 OCT 22



Purpose

To provide a demonstration of SLANG as an analytic tool, and the applications of linguistic analysis to a wide range of projects across the realm of defense



Overview

- Background
- Benefits of SLANG
- Limitations of SLANG
- Demonstration
- Questions/Feedback





Background



- Several text analysis projects had been requested
- Master's ORA thesis at Air Force Institute of Technology: *"Automated Sentiment Analysis for Personnel Survey Data in the US Air Force Context"*
- Survey analysis, document analysis, automated and supervised topic modeling and sentiment analysis
- Difficulty with customers not having tools such as R/PowerBI/Tableau/etc
- None of the data is "clean", text-based analysis can be very subjective



Demonstration



- Tool requires 3 total files and one folder
 - Server.R – computation
 - Ui.R – user interface
 - Report.Rmd – file for output to HTML tool
 - WWW folder – pairs with ui.R, contains images such as logo
- Sentiment Analysis may require custom dictionary file
- Topic Modeling requires topic definitions file
 - Instructions for file formats contained in tool



Demonstration



The screenshot shows a web browser window displaying the SLANG TOOL Shiny application. The browser address bar shows the URL `http://127.0.0.1:3963`. The application title is `~/Projects/SLANG/SLANG - Shiny`. The main content area features the title **SLANG TOOL** and a navigation menu with the following items: [Instructions](#), [Import Data](#), [General Overview](#), [Sentiment Analysis](#), [Topic Modeling](#), [Table View](#), and [More Lex Info](#). Below the navigation menu is a section titled **Choose Section to Get Started** with four radio button options: Purpose, Uploading Data, Sentiment Analysis, and Topic Modeling. The main content area also includes a section titled **What is SLANG?** with the following text: "SLANG stands for Survey, Linguistics, Analysis kNowledge Guide. This is an R Shiny App developed for the purpose of assisting analysts with basic text analysis, regardless of coding background. If you follow the instructions contained within this guide, you should be able to easily upload text and generate wordclouds, conduct sentiment analysis and topic modeling, and generate an HTML tool independent of R dependencies." Below this is another section titled **In what formats can I upload text?** with the following text: "SLANG has the ability to process text of many formats. This can be a PDF or TXT document, or a CSV file with lines of text as rows. Instances where a CSV may be better suited is if you have a list of tweets, customer reviews, survey responses or comments that you want to..."



Demonstration

SLANG TOOL



Instructions **Import Data** General Overview Sentiment Analysis Topic Modeling Table View More Lex Info

Extra Charts

Uploading File

Please select a data set

Name of Data

MyData

File Type

- CSV
- PDF
- TXT

Choose File

Browse... No file selected

Header

- Profanity Filter
- Remove Names
- Filter Data by Column
- Combine Terms



U.S. Air Force Employee Reviews

Review this company

Job Title

All

Location

United States 27,278 reviews

Ratings by category

3.9 ★ Work-Life Balance

4.5 ★ Pay & Benefits

4.5 ★ Job Security & Advancement

4.0 ★ Management

4.2 ★ Culture

Sort by

Helpfulness

Rating

Date ↓

Language

Any

Found 27,278 reviews matching the search See all 28,918 reviews



Demonstration



- Instructions
- Import Data
- General Overview
- Sentiment Analysis
- Topic Modeling
- Table View
- More Lex Info
- Extra Charts

Uploading File

Name of Data

MyData

File Type

- CSV
- PDF
- TXT

Choose File

Browse... USAFIndeed.csv

Upload complete

Header

- Profanity Filter
- Remove Names
- Filter Data by Column
- Combine Terms

Show 10 entries

Search:

	text	Sentiment	person	place	date	iteration
1	My boss Jane Doe didn't care and kept making the issue worse. Its a great choice for a lot of people comes with full benefits and college payment, but bad leadership and micromanagement can be a headache	Negative	Contracting Officer (Former Employee)	GA	5/1/2022	1
2	The compensation is limited by POTUS and Congressional leaders. The USAF and Reserves can beg but it comes down to them. As for work hours and flexibility, there is no such thing. I worked shift work where by the mission ALWAYS came and continues to come first. No if, and, or buts about it. After 28 years of service (19 active and 9 Reserves) Im taken back by the timing of this survey.	Negative	Intelligence Analyst (Former Employee)	TX	5/1/2022	1
3	I met great people and had great leadership. It was rough at times, but I wouldn't trade my time in the Air Force for anything. I have lifelong friendships and skills.	Positive	Division Manager (Former Employee)	GA	5/1/2022	1
4	I was stationed at Cannon AFB so my experience is not the best. The mission was great and the job was fulfilling. Leadership didn't do a good job of making you feel like a person or someone they actually care about.	Positive	RPA Sensor Operator (Former Employee)	NM	5/1/2022	1
5	You smell like fuel all the time and the location on the air force base sucked. Management sucked. Constantly got micromanagement. They do not care about mental health and its get freezing in Minot.	Neutral	Aircraft Fuel Systems Journeyman (Former Employee)	NJ	5/1/2022	1



Demonstration



Profanity Filter: Know your audience

Profanity Filter

5 You smell like fudging fuel all the time and the carp location on the air force base sucked. They do not care about mental health and it gets freezing like heck.

Filter Data By Column: Drilling down to specific groups

Filter Data by Column

State column name as it appears to the right

person

Which value(s) in Above Column would you like to focus on?

Current Employee

	text	Sentiment	person
1	Being an engineer with the Air Force really means managing engineering work done by others. If you want a stable career with comfortable pay, are looking to get into engineering management right out of school, or finish up a career with good benefits, come to the Air Force.	Positive	Propulsion Engineer Current Employee
2	Good but work to hard with 100k annual ops for E-5 pay. Distribution of paying more for higher op facilities would greatly help. However, the experience you get from working this kind of traffic is amazing for your career.	Positive	Air Traffic Controller Current Employee



Demonstration



■ Remove Names: Confidentiality/Privacy of survey data

Remove Names

Names To Remove:

Jane Doe

1 My boss Jane Doe didn't care and kept making the issue worse. Its a great choice for a lot of people comes with full benefits and college payment, but bad leadership and micromanagement can be a headache



1 My boss NAME didn't care and kept making the issue worse. Its a great choice for a lot of people comes with full benefits and college payment, but bad leadership and micromanagement can be a headache



Demonstration



■ Combine Terms: Defining acronyms and like-terms

Combine Terms

Term to replace=replacement

Air Force=USAF





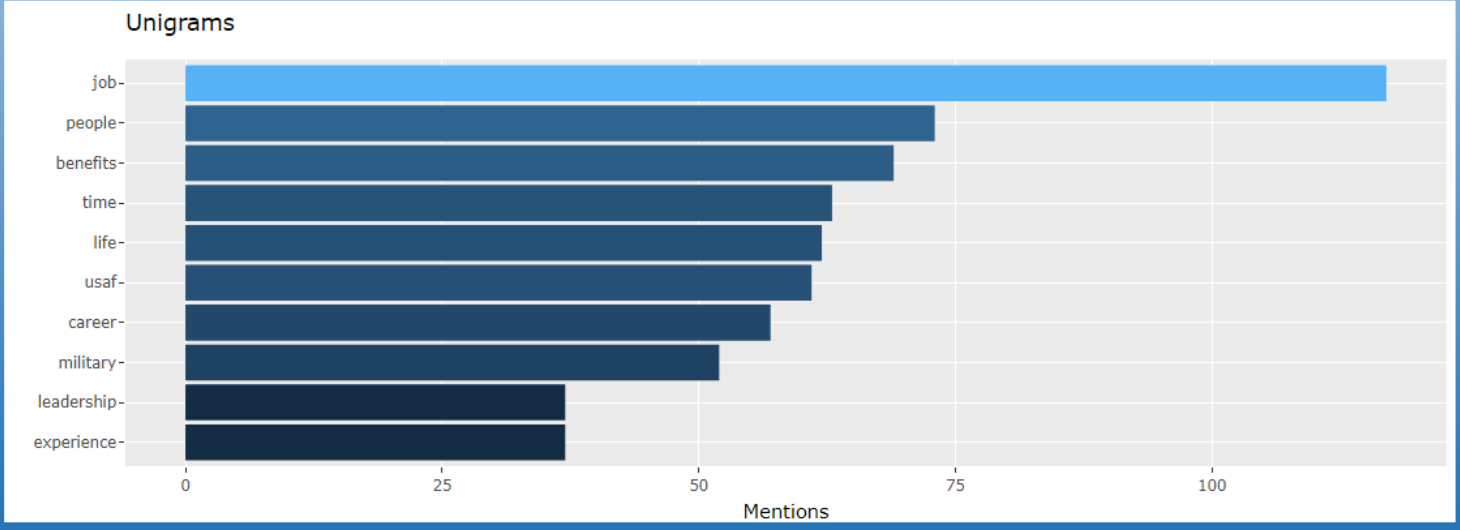
General Overview

General Overview

Unigrams Bigrams Trigrams

Stopwords:

Graph Table Wordcloud

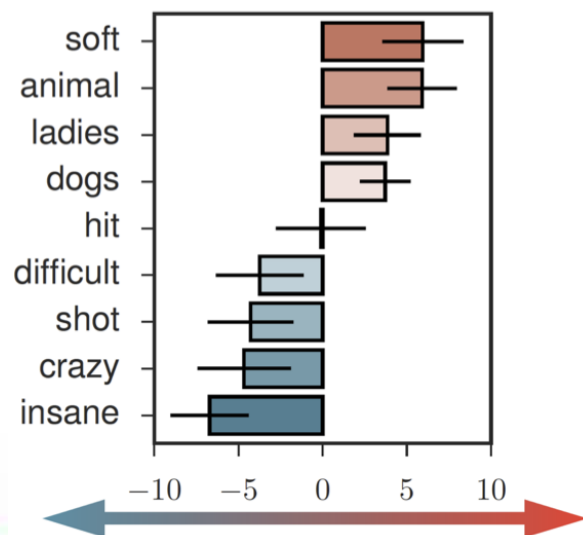


Word	Frequency
achieve mission success	2
benefits 30 days	2



Sentiment Analysis

- Lexicon-based sentiment analysis highly variable
- Unique DoD context



1998 NRC Sentiment

anger	anticipation	disgust	fear	joy	negative	positive	sadness	surprise	trust
		waste			wild	truth		wild	truth
suicide	time			sun	waste			sun	sun
sucker	sun		suicide	sex		sex	pain		sex
money	sex		pain	music		music	music	money	
mad	money	mad	mad	lover	mad	lover	mad		lover
	lover	lose		love		love	lost	lose	
		lord			lie		lie	leave	lord
lie	kiss	lie		kiss	leave	jam	leave	kiss	
hurt			hurt		hit		hurt		
hit	happy		hide	happy				guess	happy
grab	god		god	fun	grab				
fear	fun		fire	friend		expert			friend
		dirty	fear		dirty				expert
			die		die		die	dawn	
	dare	curse		dance			dark		
		boy				crystal			dance
		bang				cool			
bang		bad	bang		bang	brother		break	brother
							bang	bang	

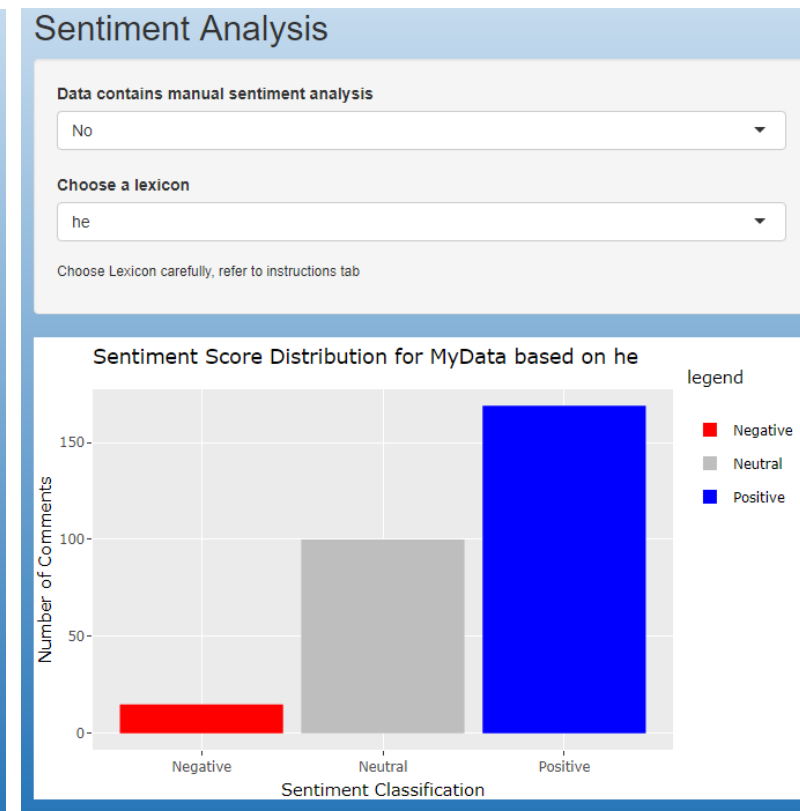
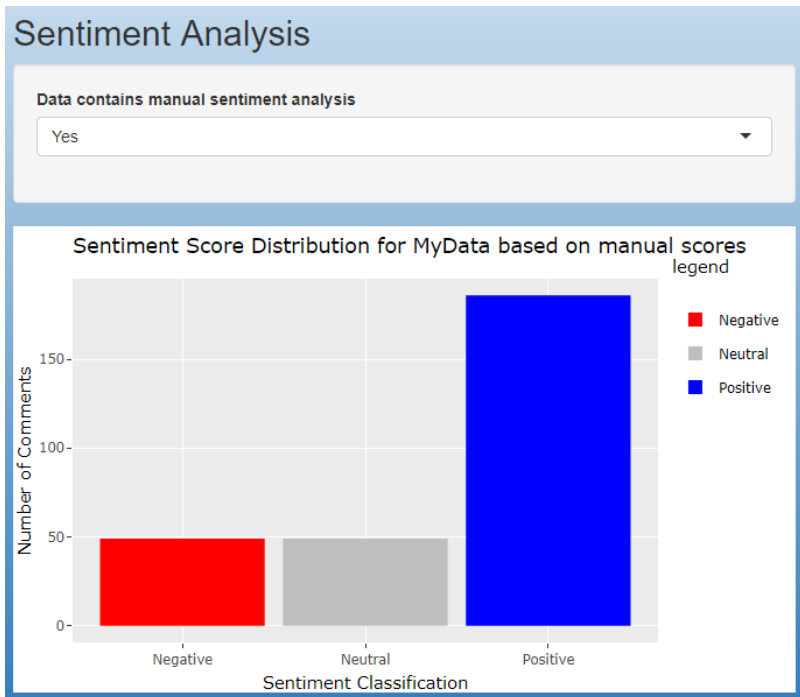


Sentiment Analysis

Choose a lexicon

vader

Choose Lexicon carefully, refer to instructions tab





Sentiment Analysis



Instructions Import Data General Overview Sentiment Analysis Topic Modeling Table View More Lex Info Extra Charts

Lexicon Comparisons

lexicon	words_in_lexicon	negative	positive
afinn	2476	1598	878
bing	6783	4781	2005
GI	3023	1746	1316
HE	97	44	53
LM	1030	885	145
nrc	5555	3324	2312
QDAP	4213	2952	1280
syuzhet	10747	7160	3587



Sentiment Analysis



Data/Lexicon Comparisons

lexicon	lex_match_words	words_in_data	match_ratio
afinn	226	1537	0.1470
bing	312	1537	0.2030
GI	187	1537	0.1217
HE	18	1537	0.0117
LM	61	1537	0.0397
nrc	362	1537	0.2355
QDAP	150	1537	0.0976
syuzhet	495	1537	0.3221



Sentiment Analysis

Check These Words

fight

word	sentiment	lexicon
fight	negative	nrc
fight	negative	afinn
fight	negative	syuzhet
fight	negative	GI

word	sentiment	lexicon
work	positive	bing
work	positive	syuzhet
work	positive	QDAP

word	sentiment	lexicon
hit	negative	nrc
hit	negative	syuzhet
hit	positive	GI
hit	negative	GI



Topic Modeling

- Instructions
- Import Data
- General Overview
- Sentiment Analysis
- Topic Modeling**
- Table View
- More Lex Info
- Extra Charts

Topic Modeling

Upload a Topic Definitions File

Data contains manual topic modeling

No

Choose File

Browse... No file selected

Include Sentiment

	A	B	C	D
1	climate.topic	leadership.topic	appraisalcycle.topic	development.topic
2	climate	boss	appraisal	training
3	morale	supervisor	acqdemo	promote
4	environment	leadership	pay raise	promotion
5	workplace	top-3	bonus	experience
6	pressure	SES	dp map	mentor
7	work life balance	officer	assessment	mentee
8	culture	lieutenant	compensation	learn
9	professional	captain	paycheck	grow
10	tempo	general	pay check	educate
11	flexible	micromanagement		education
12	flexibility	supervision		learn
13	mental	leader		trained
14		leaders		
15		lead		
16		management		

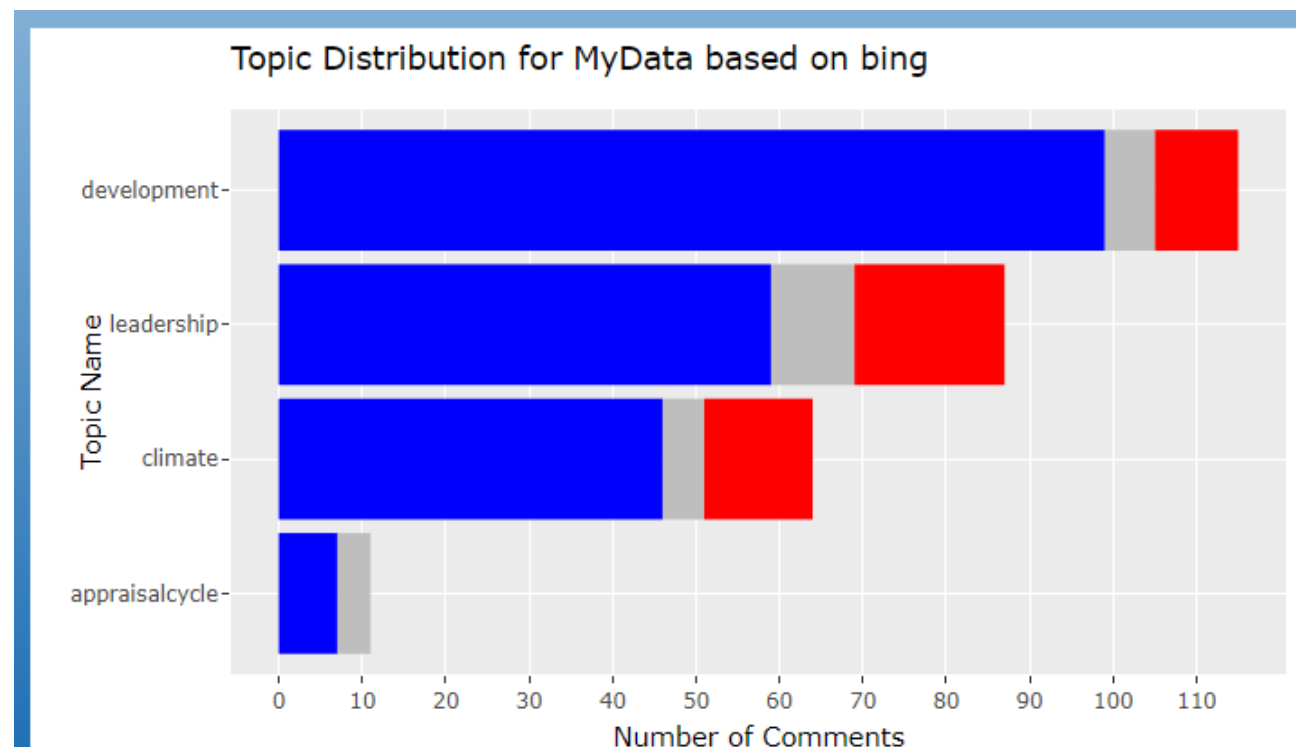




Topic Modeling

■ What are people saying, and about what?

	A	B	C	D
1	climate.topic	leadership.topic	appraisalcycle.topic	development.topic
2	climate	boss	appraisal	training
3	morale	supervisor	acqdemo	promote
4	environment	leadership	pay raise	promotion
5	workplace	top-3	bonus	experience
6	pressure	SES	dp map	mentor
7	work life balance	officer	assessment	mentee
8	culture	lieutenant	compensation	learn
9	professional	captain	paycheck	grow
10	tempo	general	pay check	educate
11	flexible	micromanagement		education
12	flexibility	supervision		learn
13	mental	leader		trained
14		leaders		
15		lead		
16		management		





Final Table

Final Table

Show 10 entries

Search:

	text	Sentiment	person	place	date	iteration	climate.topic	leadership.topic	appraisalcycle.topic	development.topic
1	My boss NAME didn't care and kept making the issue worse. Its a great choice for a lot of people comes with full benefits and college payment, but bad leadership and micromanagement can be a headache	Negative	Contracting Officer (Former Employee)	GA	5/1/2022	1	false	true	false	false
2	The compensation is limited by POTUS and Congressional leaders. The USAF and Reserves can beg but it comes down to them. As for work hours and flexibility, there is no such thing. I worked shift work where by the mission ALWAYS came and continues to come first. No if, and, or buts about it. After 28 years of service (19 active and 9 Reserves) Im taken back by the timing of this survey.	Positive	Intelligence Analyst (Former Employee)	TX	5/1/2022	1	true	true	true	false
3	I met great people and had great leadership. It was rough at times, but I wouldn't trade my time in the USAF for anything. I have lifelong friendships and skills.	Neutral	Division Manager (Former Employee)	GA	5/1/2022	1	false	true	false	false

Choose What to Include

- Text
- Sentiment
- Topic(s)
- IncludeOriginal

Color-Code Table based on Sentiment

Sentiment must be checked in order to use Color-Code feature

[Download Data](#)

[Download xgrams](#)

[Download Report](#)



Benefits of SLANG



- Available to anyone with R
- User Interface designed for non-R experts
- Tool can be output to an HTML format, non-R dependent
- Saves countless hours manually grading sentiment and assigning topics
- Analysts maintain control of CUI/PII potential information
 - Maintains faith in anonymity of survey process
 - Reduces potential extrapolation
 - Keeps survey analysis in broader context
- Sentiment analysis can be based on user-defined dictionary
- Capabilities of SLANG are limited so that further requests for deep dives return to the analyst
- Version control and Consistency



Limitations of SLANG



- Answers specific questions
- Time to compute sentiment scores depending on lexicon choice
- Categories of text (such as Center, Question, etc) requires version2 or return to analyst for additional questions
- R is needed to generate results
- Sarcasm



Questions/Feedback

- Plans to implement any feedback in working Version 2 of the SLANG tool
- Future versions released on an as-needed basis, depending on complexity of requests
- Any potential customers/projects that would benefit can contact me for additional demonstrations or request the tool itself for immediate application

