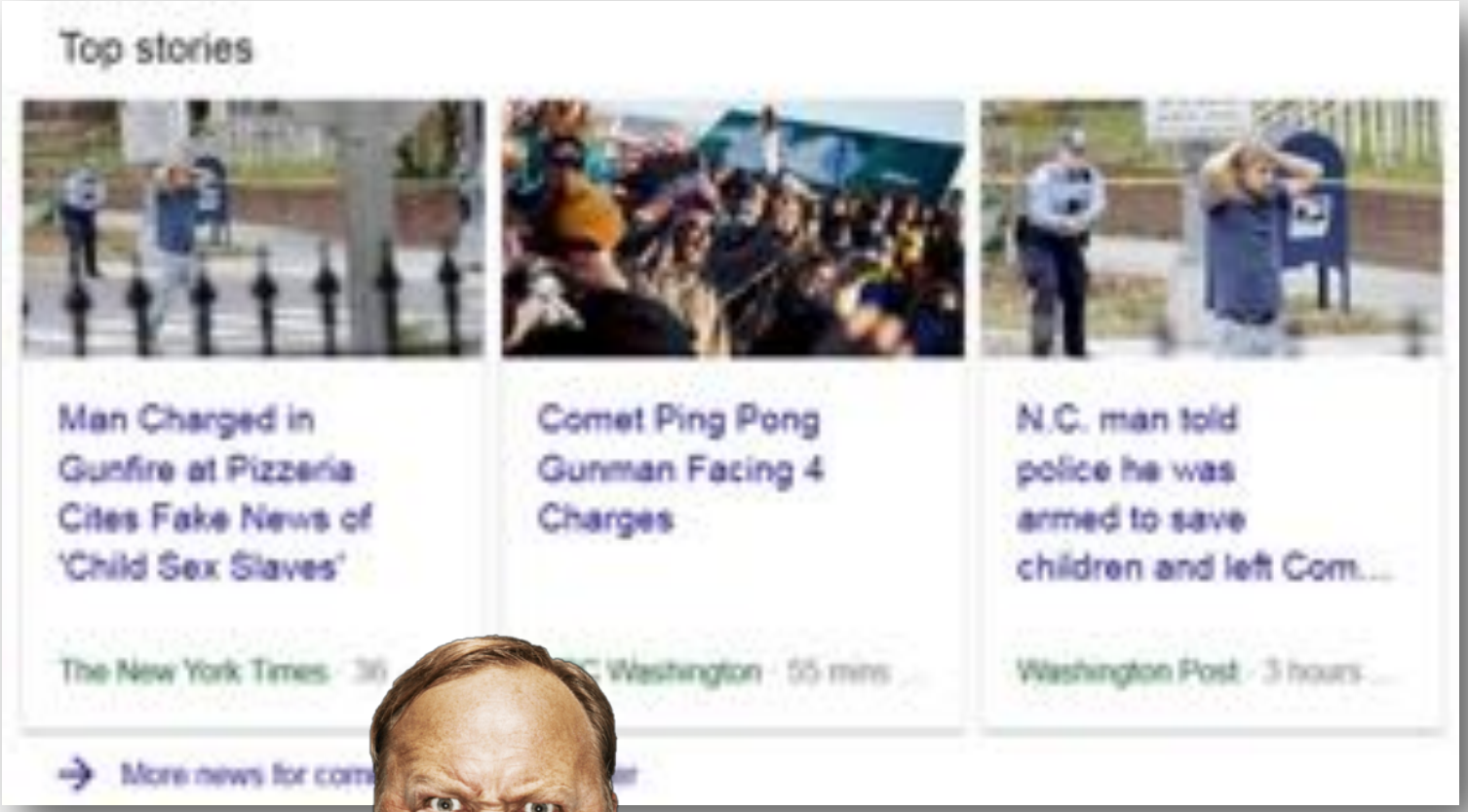
CSC401/2511
ONE OF THE FIRST TUTORIALS EVER, EVERYBODY SAYS SO

Frank Rudzicz

THE WORLD WE LIVE IN



THE WORLD WE LIVE IN

The_Donald before learning the Vegas shooter was an old white man


[redacted] 130 points
This is why we do the travel ban
[redacted] 183 points
Fuck the travel ban. Forced deportation. 1 week or 10 years in jail. GTFO
[redacted] 14 points
I know what we are all thinking there is no doubt that this is an islamic terror attack.
[redacted]
Well, here's the culture war the left wants. Time to pick a side. Time to be as offensive as possible. Time to stereotype. Time to profile. Time to pack heat wherever you go. Time to shoot back.
[redacted] 89 points
Travel ban is useless, we need a Muslim Ban, and we need it yesterday!
[redacted] 19 points
Not only that. We need a Muslim Deportation. All visas revoked. All "refugees" need to leave now. That filth does not belong in Western civilization.
[redacted] 35 points
Terror attacks around the globe and now in the most haram city in the world...this is pretty obvious Islam is involved.
[redacted] 9 points
Religion of Peace[TM]
[redacted] 37 points
Say no to refugees.
[redacted] 10 points
RELIGION OF PEACE TMD
[redacted] 40 points
Is there any confirmation on the shooters being muslim?
[redacted] 13 points
Magic 8 Ball says, "Signs point to yes."
[redacted] 17 points
Outlook good
[redacted] 13 points
ISIS or ANTIFA? We will soon find out

After

[redacted]

Something is not right here. This narrative doesn't make any sense, there is something big missing that we'll probably find out in the next few days.

[redacted]

Don't you find it odd that the shooter had no motivation? Have you seen the born identity super soldier concept? They basically program shooters to act when given a command.

[redacted]

This feels fishy. A 63 year old retiree manages to get a fully automatic weapon and several hundred rounds of ammo & decides to go on a rampage and a country music concert?
What are we missing here?

[redacted]

Antifa?

[redacted]

This smells like a false flag, research this.

[redacted]

Yeah a white supremacist is gonna shoot up a country music concert. Uh huh. Either false flag or demo-commie trash.

[redacted]

Oh fuck, didn't Alex Jones very recently warn of an impending false flag??

[redacted]

So this shooter may have been ISIS. Why did the FBI already dismiss links to terrorism... something smells

[redacted]

Why is EVERY news outlet pushing the ISIS claim?? This is really smelling like a false flag op to me now! Soros is my main suspect!!

[redacted]

Bitch ass shillary using this to attack suppressors and the ebil nra. Fuck that stupid cunt. This has false flag written all over it.

[redacted]

Something about the known facts is very fishy right now.

We don't even know for sure at the moment Paddock was the killer. They found him dead of an apparent suicide in the hotel room, but he might have been killed by whoever actually shot the guns and those people left before the police arrived. I'm not calling conspiracy yet but its probably way too early and the pieces we have so far dont really fit yet.

Silence is Consent
1 hr ·

REPORT: Was Vegas Shooter Part of Antifa? Here's What The Media Isn't Saying (VIDEO)

REPORT: Was Vegas Shooter Part of Antifa? Here's What The Media Isn't Saying (VIDEO) · Silence is Consent

SILENCEISCONSENT.NET

Like Comment Share

305 Top Comments

243 Shares 54 Comments

WorldTruth.TV
22 hrs ·

Five Things That Just Don't Add Up About The Las Vegas Mass Shooting

Five Things That Just Don't Add Up About The Las Vegas Mass Shooting

Our hearts and prayers go out to all those killed or injured in the Las Vegas shooting, and in a nation where so many anti-Americans are kneeling in...

WORLDTRUTH.TV | BY EDDIE LEVIN

Like Comment Share

1.1K Top Comments

7,254 Shares 257 Comments

The People's Voice
17 hrs ·

The mainstream media narrative about the Las Vegas shooting has been debunked by two videos proving there were multiple gunmen involved in an orchestrated attack.

Las Vegas: Video Confirms Multiple Shooters, Co-ordinated Attack

The mainstream media narrative about the shooting has been debunked by two videos proving there were at least two gunmen.

YOURNEWSWIRE.COM | BY BAXTER DMITRY

Like Comment Share

2.1K Top Comments

6,072 Shares 541 Comments

LOGICAL FALLACIES

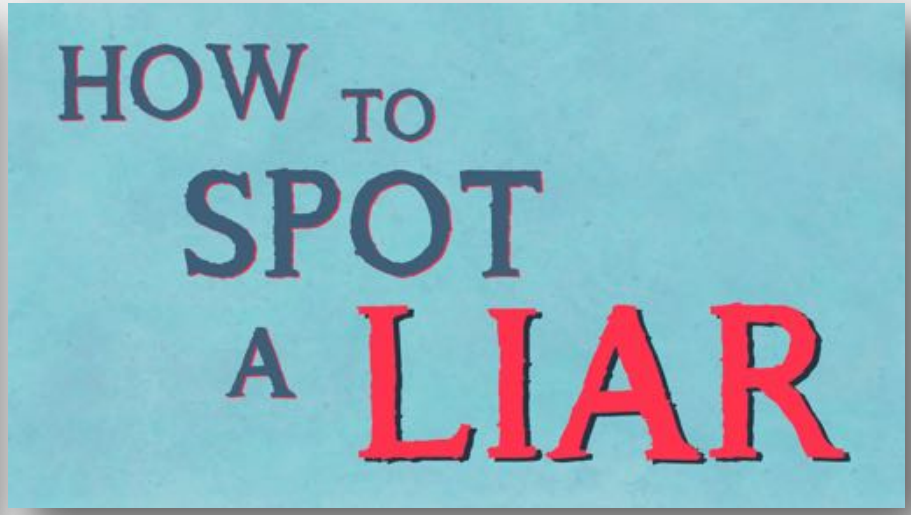
WHAT CAN BE DONE?

- There are probably many solutions, including better education and a ramping down of political zealotry from Our Glorious Leaders.
- But this is a class on natural language processing.
- *Can we detect bias automatically from online texts?*

LANGUAGE ANALYSIS AND LYING

"Don't use a big word when a diminutive one would suffice."

https://youtu.be/4ab2ZeZ-krY



https://youtu.be/H0-WkpmTPrM

REDDIT CORPUS

- We have curated data from Reddit by scraping subreddits, using Pushshift, by perceived political affiliation.

Left (598,944)	Center (599,872)	Right (600,002)	Alt (200,272)
twoXChromosomes (7,720,661)	news (2,782,9911)	theNewRight (19,466)	conspiracy (6,767,099)
occupyWallStreet (397,538)	politics (60,354,767)	whiteRights (118,008)	911truth (79,868)
lateStageCapitalism (634,962)	energy (416,926)	Libertarian (3,886,156)	
progressive (246,435)	canada (7,225,005)	AskTrumpSupporters (1,007,590)	
socialism (1,082,305)	worldnews (38,851,904)	The_Donald (21,792,999)	
demsocialist (5269)	law (464,236)	new_right (25,166)	
Liberal (151,350)		Conservative (1,929,977)	
		tea_party (1976)	

- These data are stored on the teach.cs servers under `/u/cs401/A1/data/`. These files should only be accessed from that directory (and not copied). All data are in the JSON format.

A COMMENT, IN JSON


```
"{"id":"c05os7s", "author":"[deleted]",
"subreddit":"conspiracy", "author_flair_css_class":null,
"ups":-1, "archived":true, "edited":true,
"subreddit_id":"t5_2qh4r", "body":"WAIT! Are you saying
that 9/11 was a *conspiracy*?! Like...an *inside job* or
something?", "score_hidden":false,
"parent_id":"t3_74xuq", "distinguished":null,
"link_id":"t3_74xuq", "author_flair_text":null,
"created_utc":"1223008247",
"retrieved_on":1425887728,"gilded":0,"name":"t1_c05os7s",
"controversiality":0,"score":-1,"downs":0}",
```


- If you want to experiment a bit, there are some fields of metadata that might be interesting, but the main thing is **body**.

THREE STEPS

- In order to **infer** whether the author of a given comment leans a certain way, politically, we use three steps:
  1. **Preprocess** the data, so that we can extract meaningful information, and remove distracting 'noise'.
  2. **Extract** meaningful information.
  3. **Train** classifiers, given labeled data.

PREPROCESSING I

1. Remove all newline characters.
2. Replace HTML character codes (i.e., &...;) with their ASCII equivalent.
3. Remove all URLs (i.e., tokens beginning with *http* or *www*).
4. Split each punctuation (see `string.punctuation`) into its own token using whitespace except:
    1. Apostrophes.
    2. Periods in abbreviations (e.g., e.g.) are not split from their tokens. E.g., e.g. stays e.g.
    3. Multiple punctuation (e.g., *!?!*, ...) are not split internally. E.g., *Hi!!!* becomes *Hi !!!*
    4. You can handle single hyphens (-) between words as you please.
5. Split clitics using whitespace.
    1. Clitics are contracted forms of words, such as *n't*, that are concatenated with the previous word.
    2. Note: the possessive *'s* has its own tag and is distinct from the clitic *'s*, but also must be separated by a space; likewise, the possessive on plurals must be separated (e.g., dogs ').

PREPROCESSING 2

6. Each token is tagged with its part-of-speech using spaCy (see below).
    1. A tagged token consists of a word, the '/' symbol, and the tag (e.g., *dog/NN*). See below for information on how to use the tagging module. The tagger can make mistakes.
7. Remove stopwords. See `/u/cs401/Wordlists/StopWords`.
8. Apply **lemmatization** using spaCy (see below).
9. Add a newline between each sentence.
    1. This will require detecting end-of-sentence punctuation. Some punctuation does not end a sentence; see standard abbreviations here: `/u/cs401/Wordlists/abbrev.english`.
    2. It can be difficult to detect when an abbreviation ends a sentence; e.g., in *Go to St. John's St. John is there.*, the first period is used in an abbreviation, the last period ends a sentence, and the second period is used both in an abbreviation and an end-of-sentence.
    3. You are not expected to write a 'perfect' pre-processor (none exists!), but merely to use your best judgment in writing heuristics; see section 4.2.4 of the Manning and Schütze text.
10. Convert text to lowercase.

LEMMATIZATION V STEMMING: DAWN OF SPARSENESS

- Both **lemmatization** and **stemming** are often used to transform word tokens to a more base form.
  - This helps to improve sparseness.
  - It also helps in using various resources.
    - e.g., *funkilicious* might not exist in a norm or embedding, but '*funk*' ought to).

LEMMATIZATION V STEMMING: DAWN OF SPARSENESS

- **lemma**: *n.* an abstract conceptual form of a word that has been mentally selected for utterance in the early stages of speech production.
  - E.g., $lemma(best) = good$ (degree)
  - E.g., $lemma(words) = word$ (number/amount)
- **stem**: *n.* usually, a part of a word to which affixes can be attached.
  - E.g. $stem(houses) = stem(housing) = hous$
- We use lemmatization given some of our features, but check out `nltk.stem` in the NLTK package.

PREPROCESSING: YOUR TASK

- Copy the template from `/u/cs401/A1/code/a1_preproc.py`. There are two functions you need to modify:
  - In `preproc1`, perform each preprocessing step above.
  - In `main`, replace the lines marked with TODO with the code they describe. Add a new **cat** field with the name of the class
- The program takes three arguments:
  1. your student ID (mandatory),
  2. the output file (mandatory), and
  3. the maximum **number of lines** to sample from each category file (optional; default=10,000).

```
python a1_preproc.py 999123456 -o preproc.json
```

SPACY.IO
NLP IN PYTHON


```
import spacy

nlp = spacy.load('en', disable=['parser', 'ner'])
utt = nlp(u"I know the best words")
for token in utt:
...     print(token.text, token.lemma_, token.pos_, token.tag_, token.dep_,
...           token.shape_, token.is_alpha, token.is_stop)
```

See next tutorial for details on how to handle tokenization in spaCy.

PREPROCESSING: SUBSAMPLING

- We provide our student IDs so we each see a different part of the available data.
  - By default, you should only sample 10,000 lines from each of the `Left`, `Centre`, `Right`, and `Alt` files, for a total of 40,000 lines.
  - From each file, start sampling lines at index [ID % len(X)]

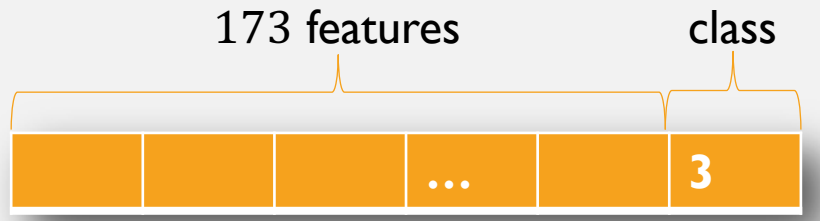
- Feel free to play around with more or less data, *respectful of your peers on the servers*, but this step guarantees it's tractable (and that there's no 'desired' level of accuracy).

FEATURE EXTRACTION

- The `a1_extractFeatures.py` program reads a preprocessed JSON file and extracts features for each comment therein, producing and saving a $D \times 174$ NumPy array, where the i^{th} row is the features for the i^{th} comment, followed by an integer for the class (0: Left, 1: Center, 2: Right, 3: Alt), as per the cat JSON.


```
"{"id":"c05os7s",
"body":"wait ! be you say
that 9 / 11 be a *
conspiracy *?! like ...
an * inside job * or
something ?",cat:"Alt"}",
```


i^{th} comment in input



i^{th} row in output

1. Number of first-person pronouns
2. Number of second-person pronouns
3. Number of third-person pronouns
4. Number of coordinating conjunctions
5. Number of past-tense verbs
6. Number of future-tense verbs
7. Number of commas
8. Number of multi-character punctuation tokens
9. Number of common nouns
10. Number of proper nouns
11. Number of adverbs
12. Number of *wh-* words
13. Number of slang acronyms
14. Number of words in uppercase ($\geq$ 3 letters long)
15. Average length of sentences, in tokens
16. Average length of tokens, excluding punctuation-only tokens, in characters
17. Number of sentences.
18. Average of AoA (100-700) from Bristol, Gilhooly, and Logie norms
19. Average of IMG from Bristol, Gilhooly, and Logie norms
20. Average of FAM from Bristol, Gilhooly, and Logie norms
21. Standard deviation of AoA (100-700) from Bristol, Gilhooly, and Logie norms
22. Standard deviation of IMG from Bristol, Gilhooly, and Logie norms
23. Standard deviation of FAM from Bristol, Gilhooly, and Logie norms
24. Average of V.Mean.Sum from Warringer norms
25. Average of A.Mean.Sum from Warringer norms
26. Average of D.Mean.Sum from Warringer norms
27. Standard deviation of V.Mean.Sum from Warringer norms
28. Standard deviation of A.Mean.Sum from Warringer norms
29. Standard deviation of D.Mean.Sum from Warringer norms

30-173. LIWC/Receptiviti features

	A	B	C	D	E	F	G	H	I
1		Word	V.Mean.Sum	V.SD.Sum	V.Rat.Sum	A.Mean.Sum	A.SD.Sum	A.Rat.Sum	D.Mean.Sum
2	1	aardvark	6.26	2.21	19	2.41	1.4	22	4.27
3	2	abalone	5.3	1.59	20	2.65	1.9	20	4.95
4	3	abandon	2.84	1.54	19	3.73	2.43	22	3.32
5	4	abandonmer	2.63	1.74	19	4.95	2.64	21	2.64
6	5	abbey	5.85	1.69	20	2.2	1.7	20	5
7	6	abdomen	5.43	1.75	21	3.68	2.23	22	5.15
8	7	abdominal	4.48	1.59	23	3.5	1.82	22	5.32
9	8	abduct	2.42	1.61	19	5.9	2.57	20	2.75

Warringer: These norms measure the valence (V), arousal (A), and dominance (D) of each **lemma**, according to the VAD model of human affect and emotion.

See: Warriner, A.B., Kuperman, V., & Brysbaert, M. (2013). **Norms of valence, arousal, and dominance for 13,915 English lemmas**. *Behavior Research Methods*, **45**:1191-1207.

	A	B	C	D	E	F	G	H	I
1	Source	WORD	AoA (Yrs)	AoA (100-70	IMG	FAM	Length (Letters)		
2	GL	abandonmer	NA	359	348	359	11		
3	GL	abatement	NA	294	189	294	9		
4	BN	abbey	7.8	480	575	429	5		
5	GL	abdomen	NA	426	548	426	7		

Bristol et al: measure the age-of-acquisition (AoA), imageability (IMG), and familiarity (FAM) of each word, which we can use to measure lexical complexity.

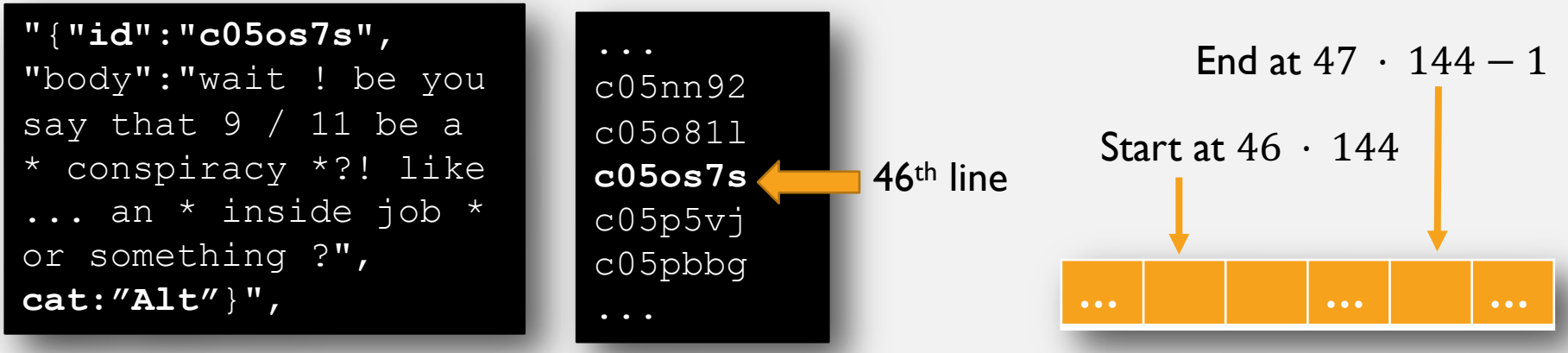
See: Gilhooly, KJ, Logie, RH (1980). Age-of-acquisition, imagery, concreteness, familiarity, and ambiguity measures for 1,944 words *Behavior Research Methods*, **12**(4):394-427.

LIWC/RECEPTIVITI I

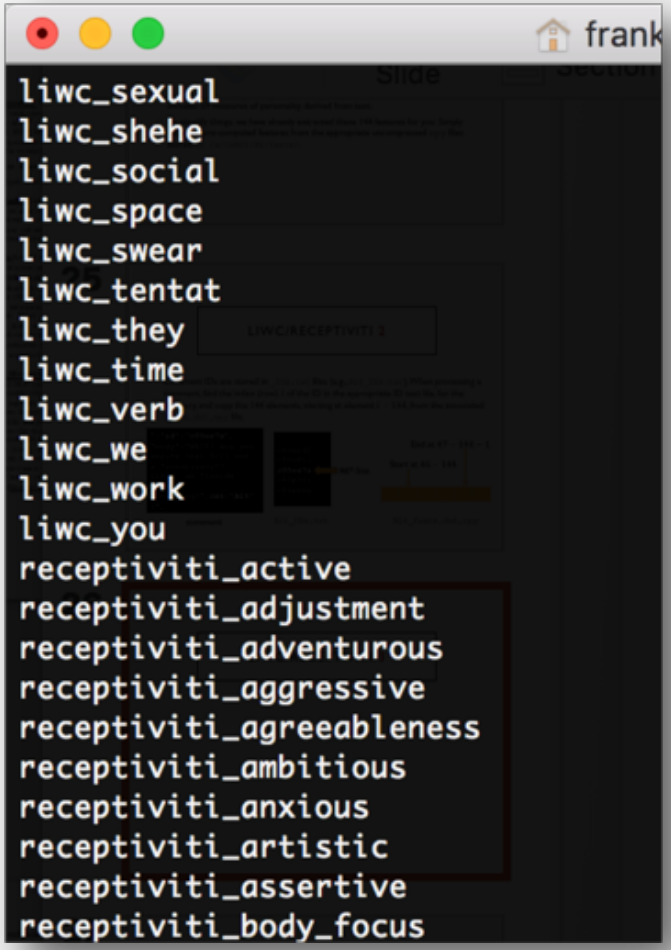
- The **Linguistic Inquiry & Word Count** (**LIWC**) tool has been a standard in a variety of NLP research, especially around authorship and sentiment analysis.
  - This tool provides 85 measures mostly related to word choice.
- The company **Receptiviti** provides a superset of these features, which also includes 59 measures of personality derived from text.
- To simplify things, we have already extracted these 144 features for you. Simply copy the pre-computed features from the appropriate uncompressed `npy` files stored `in /u/cs401/A1/feats/`.

LIWC/RECEPTIVITI 2

- Comment IDs are stored in `_IDs.txt` files (e.g., `Alt_IDs.txt`). When processing a comment, find the index (row) i of the ID in the appropriate ID text file, for the category, and copy the 144 elements, starting at element $i \cdot 144$, from the associated `feats.dat.npy` file.



LIWC/RECEPTIVITI 3: FEATURE NAMES



feats.txt

CLASSIFICATION

- Four parts:
  - Compare classifiers
  - Experiment with the amount of training data used
  - Select the best features for classification
  - Do cross-fold validation

CLASSIFICATION I: COMPARE CLASSIFIERS

- *Randomly* split data into 80% training, 20% testing.

- We have 5 classification methods, which you can consider to be 'black boxes' (input goes in, classes come out).
  1. Support vector machine with linear kernel
  2. Support vector machine with radial basis kernel
  3. Random forest classifier
  4. Neural network
  5. Adaboost (with decision tree)

CLASSIFICATION I: COMPARE CLASSIFIERS

- **Accuracy**: the total number of correctly classified instances over all classifications: $\mathrm{A} = \frac{\sum_i c_{i,i}}{\sum_{i,j} c_{i,j}}$.
- **Recall**: *for each class* κ, the fraction of cases that are truly class κ that were classified as κ: $\mathrm{R}(\kappa) = \frac{c_{\kappa,\kappa}}{\sum_j c_{\kappa,j}}$
- **Precision**: for each class κ, the fraction of cases classified as κ that truly are κ: $\mathrm{P}(\kappa) = \frac{c_{\kappa,\kappa}}{\sum_i c_{i,\kappa}}$

Predicted class

True class

	L	C	R	A
L				
C			8	
R				
A				

$c_{i,j}$: number of times class i was classified as class j

CLASSIFICATION 2: AMOUNT OF DATA

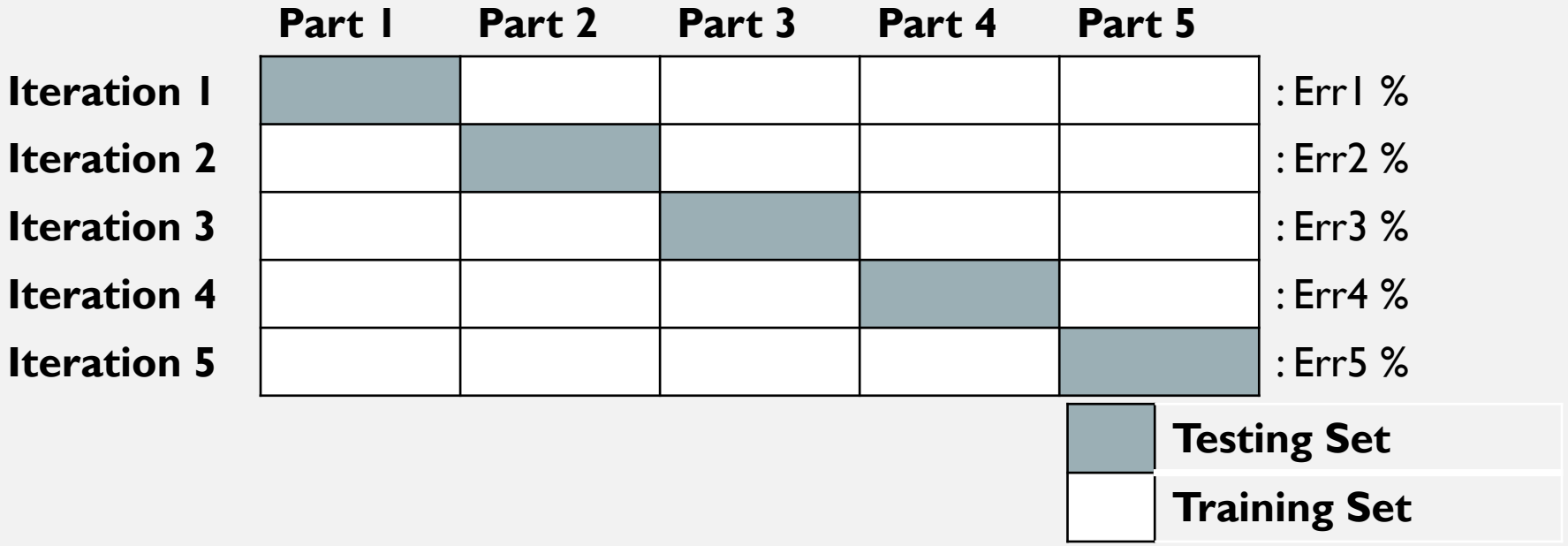
- You previously used a random $0.8 \cdot 40K = 32K$ comments to train.
- Using the classifier with the highest accuracy from Sec3.1, retrain the system using an arbitrary $1K, 5K, 10K, 15K, 20K$ samples from the original $32K$.
- One might expect something like a logarithmic growth in accuracy over training set size, but do we (see|expect) that?

CLASSIFICATION 3: FEATURE ANALYSIS

- Certain features may be more or less useful for classification, and too many can lead to various problems.
- Here, you will select the best k features for classification for $k = \{5,10,20,30,40,50\}$.
- Train the best classifier from Sec3.1 on just $k = 5$ features on both $1K$ and $32K$ training samples.
- Are some features always useful? Are they useful to the same degree (p-value)? Why are certain features chosen and not others?

CLASSIFICATION 4: CROSS-FOLD VALIDATION

- What if the 'best' classifier from Sec3.1 only appeared to be the best because of a random accident of sampling?
- Test your claims more rigorously.



BONUS

- You have **complete freedom** to expand on this assignment in any way you choose.
- You should have no expectation to the *value* of such an exploration – **check with us** (privately if you want) about the appropriateness of your idea.
- Bonus marks can make up for marks lost in other sections of the assignment, but your overall mark **cannot exceed 100%**.

FESTIVAL DE MIERDA DE TORO

- If things go well, we would love to run a special 'workshop' where:
  1. students who did interesting **bonuses** could describe their work
  2. grad students (working around the theme) could present their **projects**
  3. we could hold a **competition** for best systems in A1, A2, A3
- Problem: the TAs are already doing a lot of work, and I'm fairly busy.
- Solution (?): If any of you are interested in spearheading such a get-together at the end of the term (and getting bonus marks), we'd be glad to support.

RULES OF LOGARITHMS

- You may need these in later assignments:
  - **Definition**: $\log_a x = N \leftrightarrow a^N = x$
  - **Product**: $\log_a(xy) = \log_a x + \log_a y$
  - **Quotient**: $\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$
  - **Power**: $\log_a(x^p) = p \log_a x$
  - **Base change**: $\log_a x = \frac{\log_b x}{\log_b a}$

- Reminder: avoid common logarithmotechnic errors:
  - $\log_a(x + y) \neq \log_a x + \log_a y$
  - $\log_a(x - y) \neq \log_a x - \log_a y$