Dictionary based text classification

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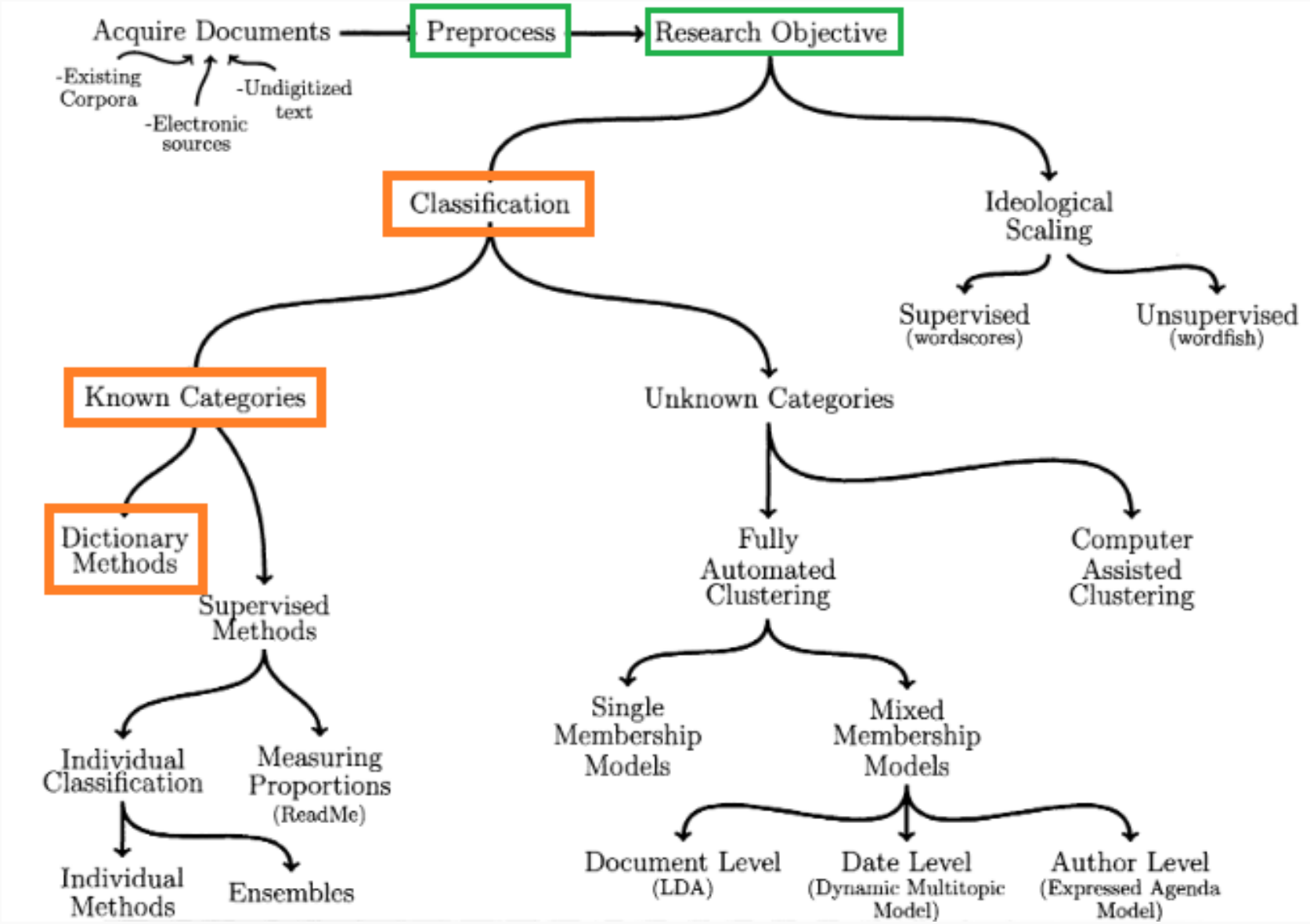
For Today

1. Where are we?
2. Dictionary based classification
3. Pros and cons
4. Some notable dictionaries
5. Building a dictionary

Dictionary methods



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- Validate, validate, validate

Dictionaries, how do they look like?

Example dictionary for negative and positive categories (random items from the Lexicoder dictionary):

- **negative:** ”nonsens*”, ”vengeanc*”, ”ironic*”, ”unpredictab*”, ”shamefaced*”
- **positive:** ”high regard”, ”hardi*”, ”goodx”, ”trusts”, ”spectacular*”

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- wide range of applicability (measuring populism, racism, emotions)
- Can be adapted for other languages relatively cheaply (e.g.: using Google Translate)

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- Dictionary building is a qualitative process (see KWIC in Yound and Soroka (2012) and tax example in Laver and Garry (2000))
- Creating a good dictionary is costly

The problem of context

The key problem with dictionaries not measuring what they intend to: **polysemes**. See Loughran and McDonald (2011) in the extra readings.

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- Extreme word frequency issues might bias results (Pury 2011 in the extra readings)

Table 2

Pairwise correlations, automated dictionaries

	LSD	GI	ROG	RID	ANEW	DAL	LIWC	PMI	TAS/C
GI	0.672								
ROG	0.471	0.469							
RID	0.669	0.480	0.350						
ANEW	0.500	0.464	0.236	0.367					
DAL	0.519	0.481	0.285	0.385	0.482				
LIWC	0.753	0.598	0.428	0.663	0.488	0.490			
PMI	0.228	0.172	0.093	0.128	0.115	0.201	0.159		
TAS/C	0.663	0.601	0.455	0.513	0.438	0.432	0.635	0.178	
WNA	0.230	0.220	0.102	0.068	0.076	0.155	0.224	0.176	0.178

Note. $N = 900$. All correlations are significant at $p < .001$.

Dictionaries and preprocessing

- Check the dictionary, does it include:
  - lowercase / uppercase
  - wordstems / wildcards
  - unigrams or bi or tri-grams?
- our dfm needs to match the dictionary format to get matches

Some dictionaries

- General Inquirer (GI)
- Lexicoder Sentiment Dictionary (LSD)
- Linguistic Inquiry and Word Count (LIWC)
- NRC Word-Emotion Lexicon

General Inquirer

- Introduced in Stone, P. J., Dunphy, D. C., & Smith, M. S. (1966). The general inquirer: A computer approach to content analysis.
- Currently: containts the ”Harvard IV-4” and the ”Lasswell” dictionaries
- 182 categories (largest is ”negative” with 2291 entry)
- more info: `http://www.wjh.harvard.edu/~inquirer/homecat.htm`

Lexicoder sentiment dictionary

- Two categories: positive; negative
- Domain: political texts (media)
- Composed from Roget's Thesaurus; GI; and the Regressive Imagery Dictionary (RID)
- Method: if word is POS in three source $\rightarrow$ POS (or POS in two source with NA in third)

Categories in LSD (some attention to context)

- negative (2858 items)
- positive (1709 items)
- positive words preceded by negation (1721)
- negative words preceded by negation (2860)

LIWC

- It is a commercial software
- ”it calculates the percentage of total words that match each of the dictionary categories”
- 82 categories and 4500 words and wordstems
- Developed by Pennebaker et al.
- More info: Tausczik, Y. R., & Pennebaker, J. W. (2010). The psychological meaning of words: LIWC and computerized text analysis methods. *Journal of language and social psychology*, 29(1), 24-54.

(Open source alternative to LIWC: VADER `https://github.com/cjhutto/vaderSentiment`)

NRC Word-Emotion Lexicon

Summary Details of the NRC Emotion Lexicon

Association Lexicon	Version	# of Terms	Categories	Association Scores	Method of Creation	Papers
Word-Emotion and Word-Sentiment Association Lexicon						
NRC Word-Emotion Association Lexicon (also called EmoLex) README	0.92 (2010)	14,182 unigrams (words) ~25,000 senses*	**sentiments:** negative, positive **emotions:** anger, anticipation, disgust, fear, joy, sadness, surprise, trust	0 (not associated) or 1 (associated) not associated, weakly, moderately, or strongly associated	**Manual:** By crowdsourcing on Mechanical Turk. **Domain:** General	**Crowdsourcing a Word-Emotion Association Lexicon**, Saif Mohammad and Peter Turney, *Computational Intelligence*, 29 (3), 436-465, 2013. Paper (pdf) BibTeX **Emotions Evoked by Common Words and Phrases: Using Mechanical Turk to Create an Emotion Lexicon**, Saif Mohammad and Peter Turney, In *Proceedings of the NAACL-HLT 2010 Workshop on Computational Approaches to Analysis and Generation of Emotion in Text*, June 2010, LA, California. Abstract Paper (pdf) Presentation

Dictionary building

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  - validity: are we capturing the categories we want with the dictionary?
  - precision: $\frac{TP}{TP+FP}$ How well the dictionary identifies the category only?
  - recall (or sensitivity): $\frac{TP}{TN+FP}$ How much of the content is miscategorized?

Confusion matrix for precision-recall

		Predicted	
		cat1	cat0
Actual	cat1	TP	FN
	cat0	FP	TN

- TP for words that are class 1 and predicted in class 1
- FN for words that are class 1 and predicted in class 0
- FP for words that are class 0 and predicted in class 1
- TN for words that are class 0 and predicted in class 0

Strategies for building dictionaries

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- Inductive: using reference texts
  - use texts with known positions to identify words (party manifestos of extreme right/left)
  - use KWIC to see context (precision, recall)
  - use word frequecies to see influental terms
  - make a decision if stemming or wildcarding would be used

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- Concurrent validity: our dictionary correlates with another pre-existing one, measuring the same concept
- Predictive validity: evaluate the predictive capabilities of our dictionary against a predicted outcome
- Construct validity: are we actually measuring the concept that we aim to?