Mentorship Program for ICML 2021

Building NLP Models for Detecting Drought Impacts

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Climate Assessment and Impacts

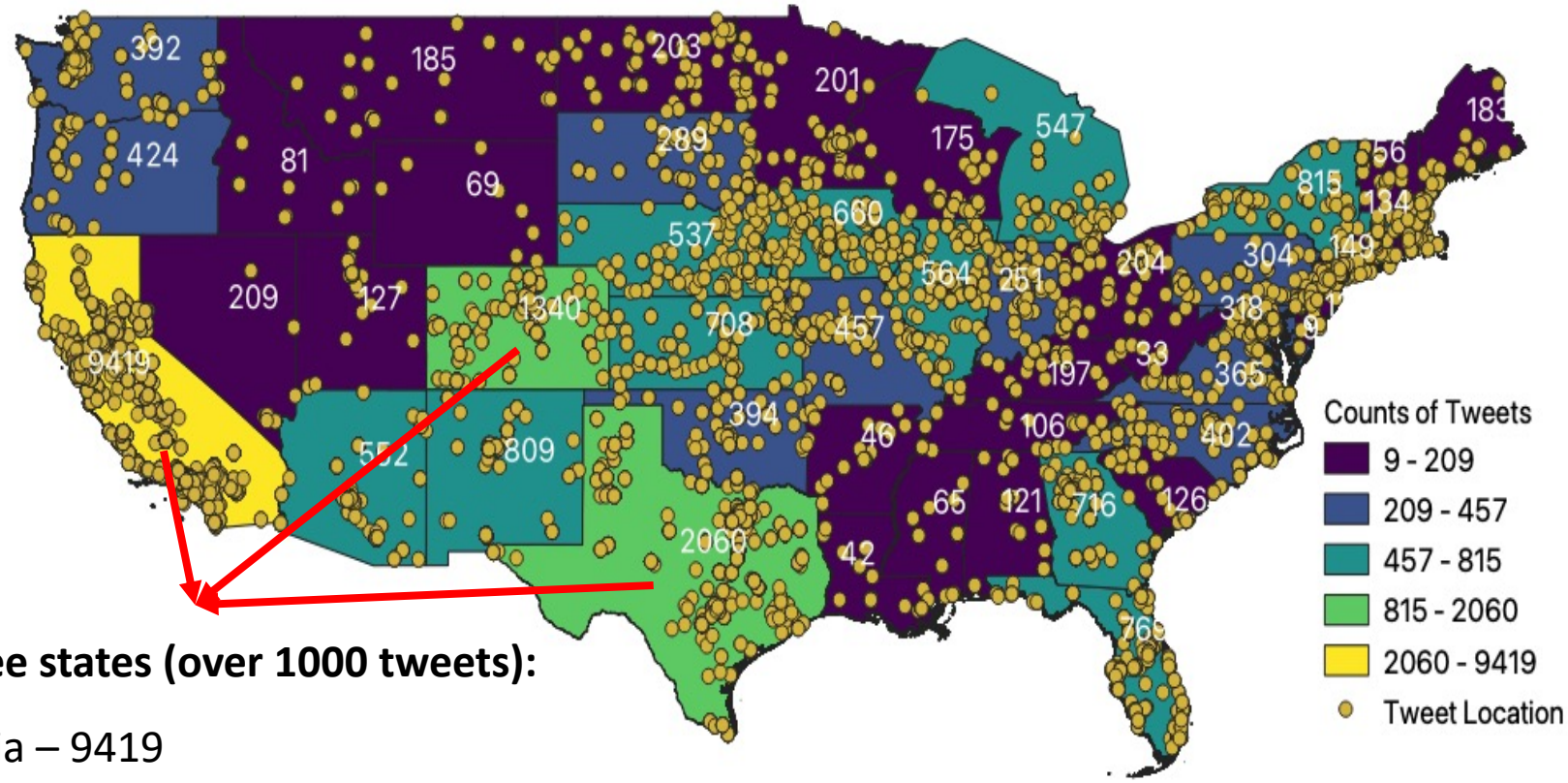
B.S. Major in **Geographic Information Science (GIS, RS, GPS)**
M.S. Major in **Natural Resource Sciences**
with a specialization in **Climate Assessment and Impacts**
Skill sets:

- Remote sensing (GEE, ERDAS, ENVI)
- GIS (QGIS, ArcGIS, GDAL, etc.)
- Statistical analysis (regression, spatial, time series, etc.)
- Machine Learning (ML) & Deep Learning (DL)

Topic of Ph.D. dissertation: apply **AI** techniques to drought monitoring and **impacts assessment**

Data Description – Tweets with Locations

- **26654** records
- January 9, **2017** – October 8, **2020**
- #drought, #droughtYYYY, #droughtYY, #droughtState (ca,tx)
- Excluded outliers such as bots and spammers, and professional users such as @DroughtCenter.



Top three states (over 1000 tweets):

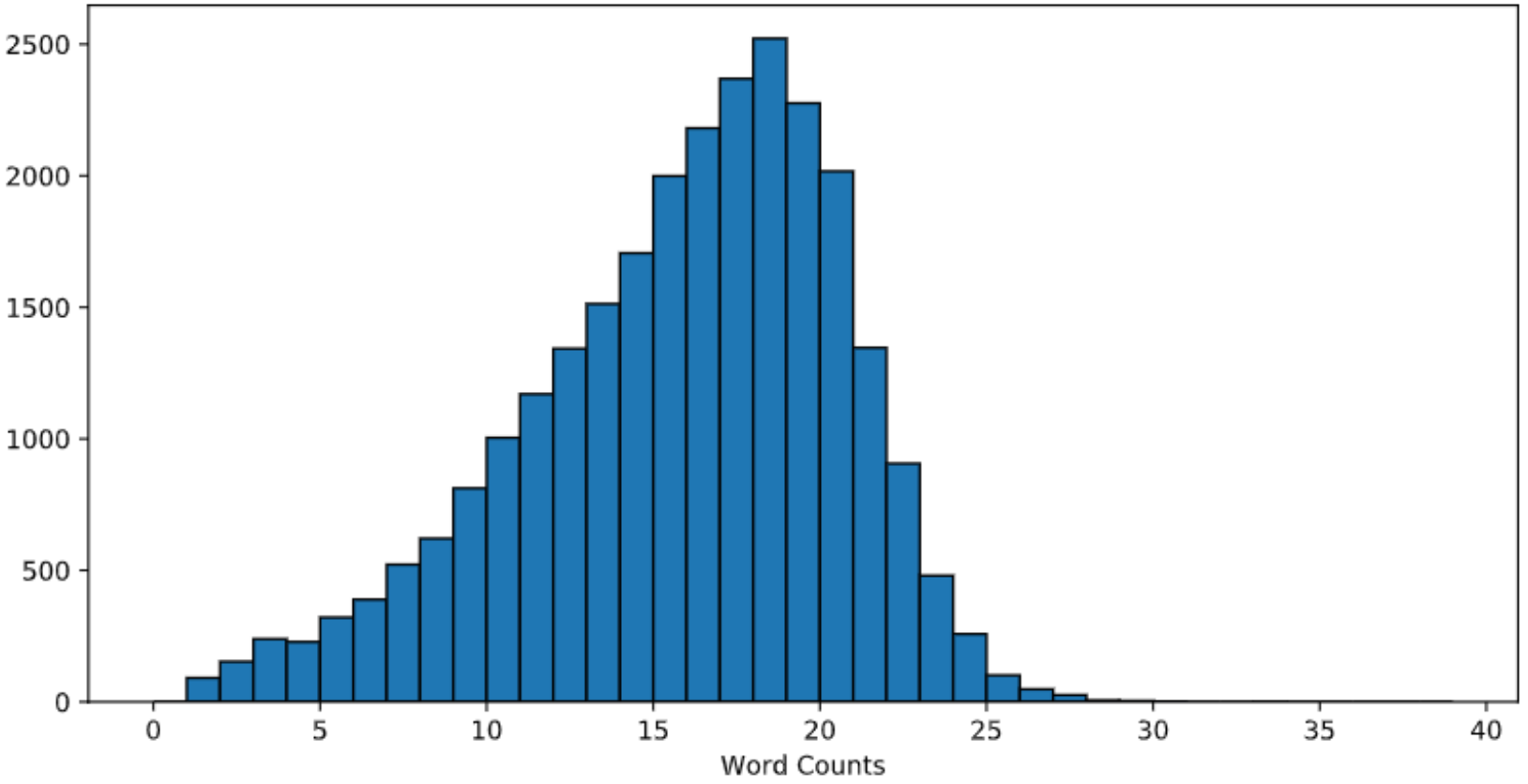
California – 9419

Texas – 2060

Colorado - 1340

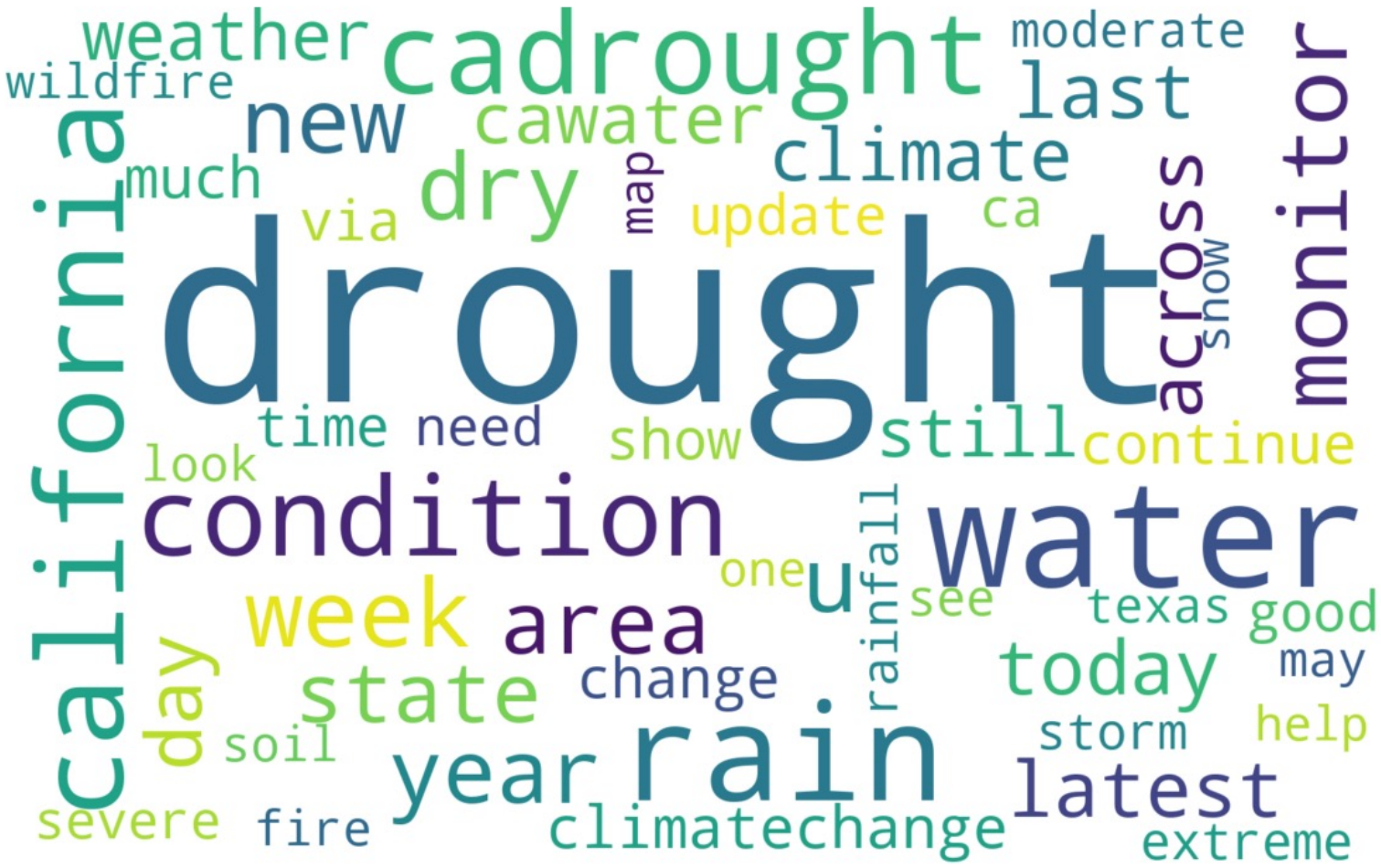
Data Description – Tweets with Locations

Word counts per Tweet (removed html tags and urls)

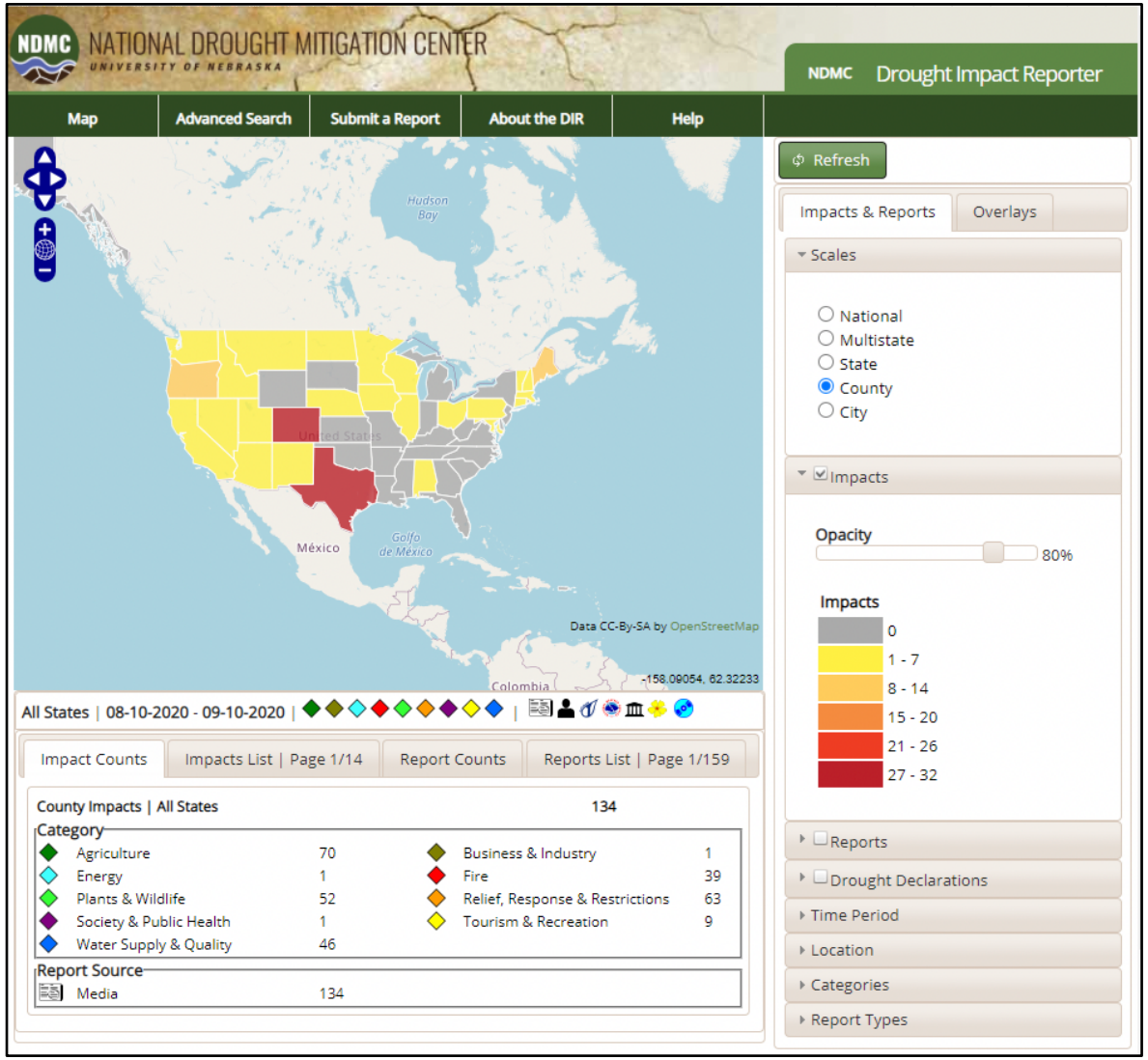


Data Description – Tweets with Locations

Word Cloud
(removed html tags, urls, special characters, stop words)



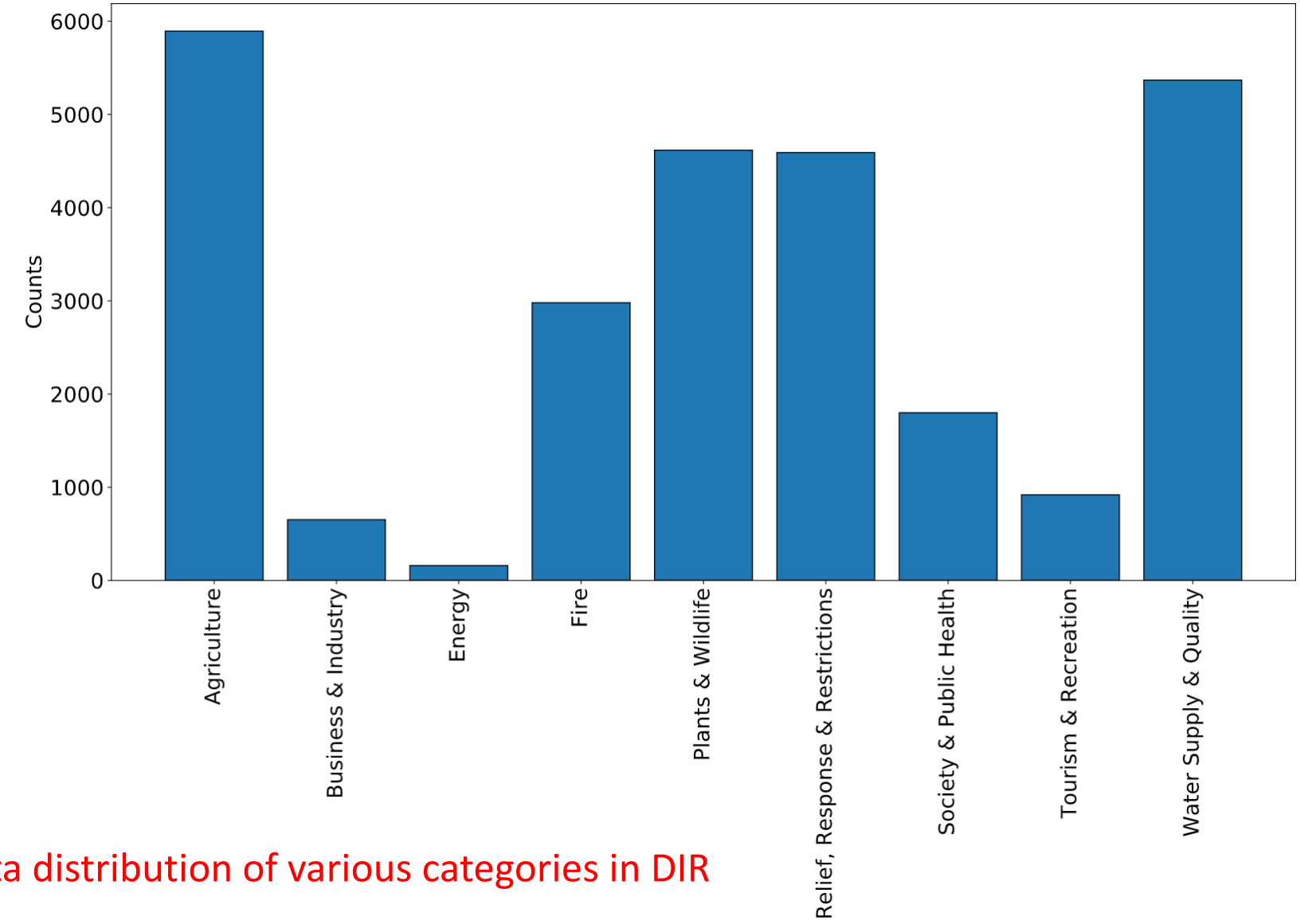
Data Description – Drought Impact Reporter (DIR)



https://droughtreporter.unl.edu/map/

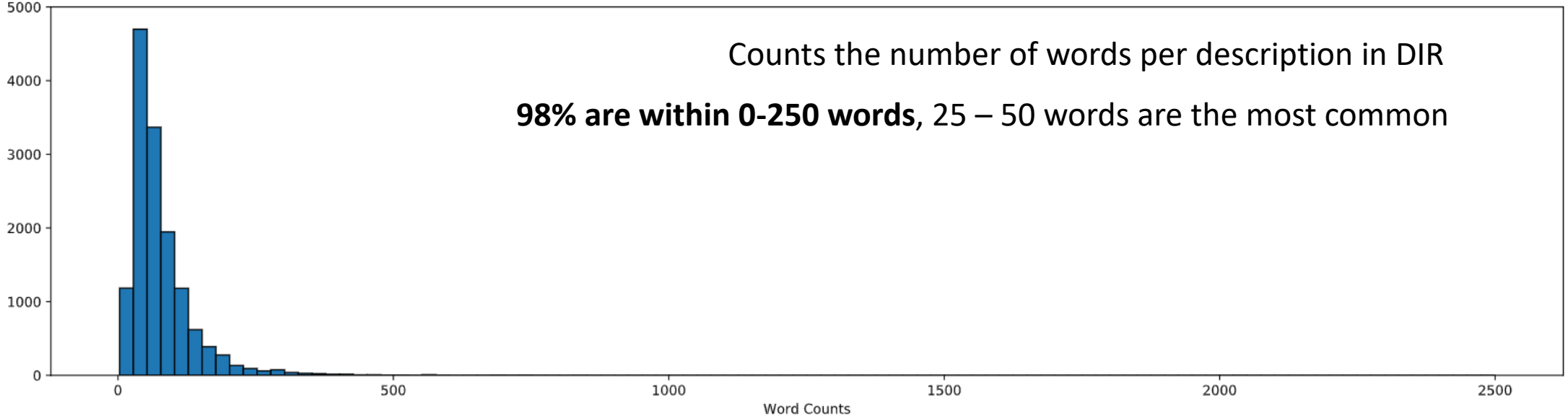
- The first national comprehensive drought database.
- Multiple reporting resources.
- Nine categories of drought impacts.
- Flexible spatial resolution and available historical records (2005 – current, updated in 2011).
- Date, title, description, locations, impacts (labels). **Multi-class text classification.**
- **2011 – 2020, state, county, and city-level impacts, 14178 records.**

Data Description – Drought Impact Reporter (DIR)



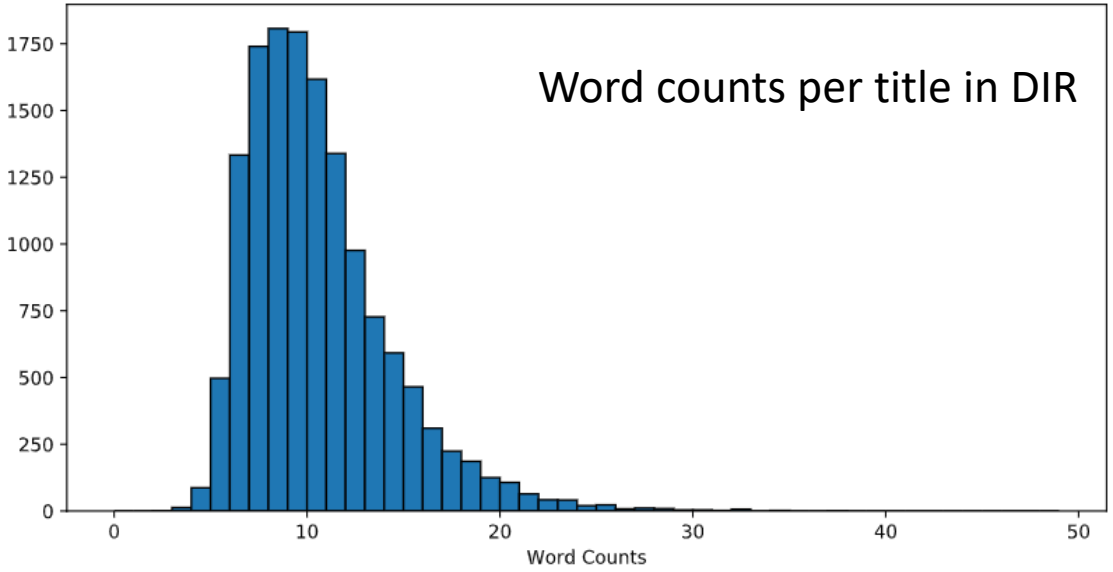
Imbalanced data distribution of various categories in DIR

Data Description – Drought Impact Reporter (DIR)

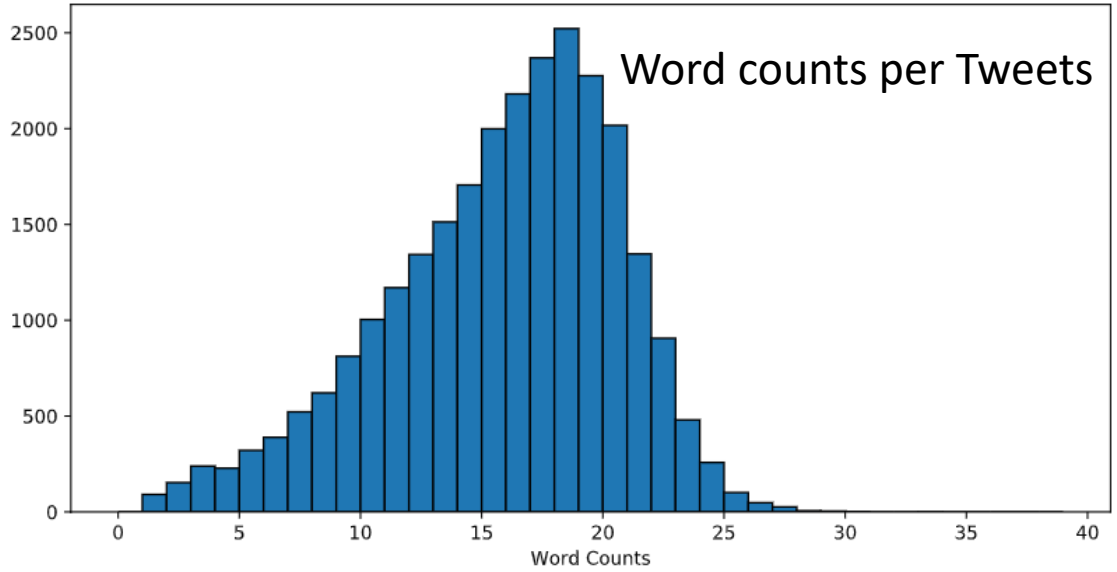


Counts the number of words per description in DIR

98% are within 0-250 words, 25 – 50 words are the most common



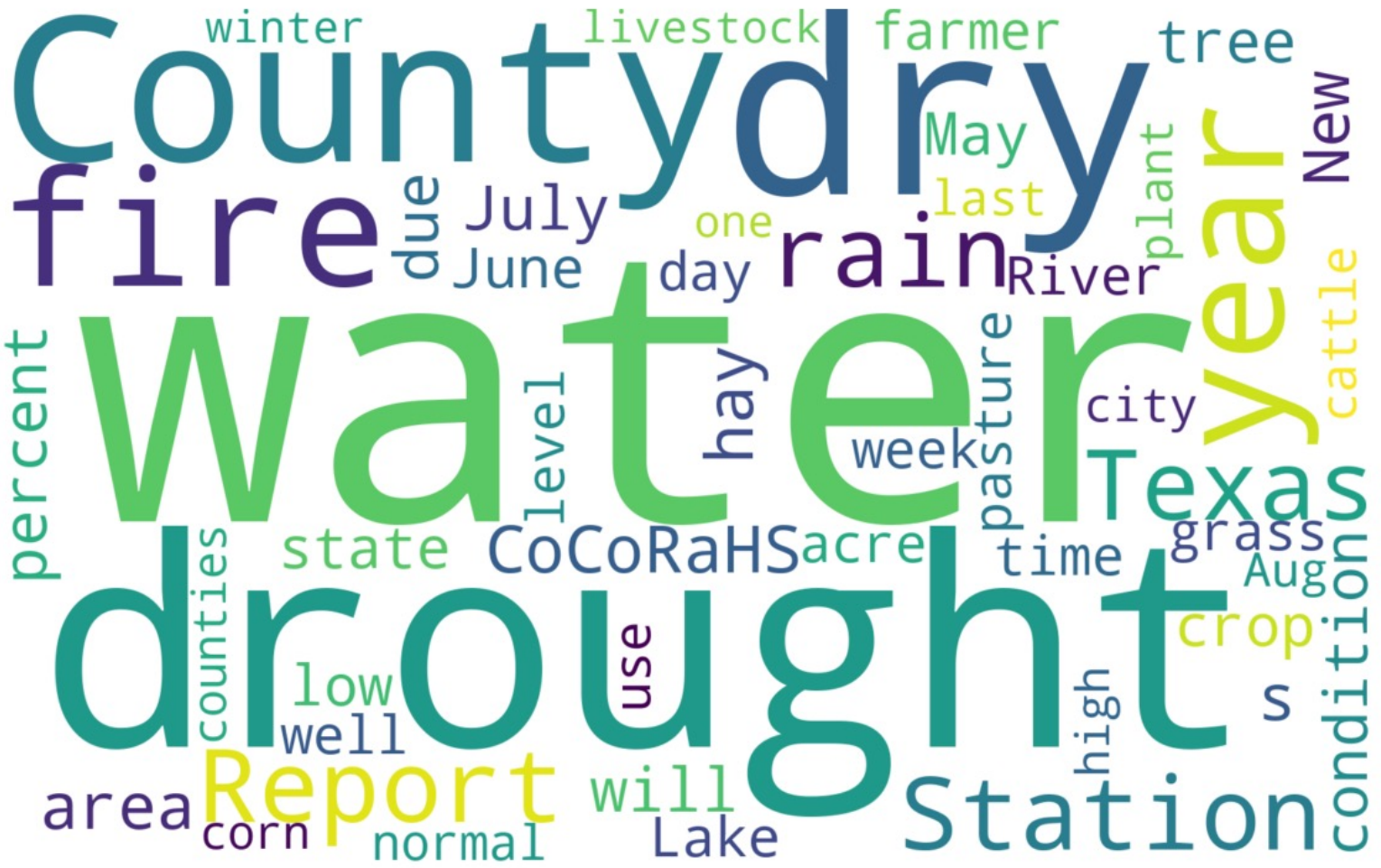
Word counts per title in DIR



Word counts per Tweets

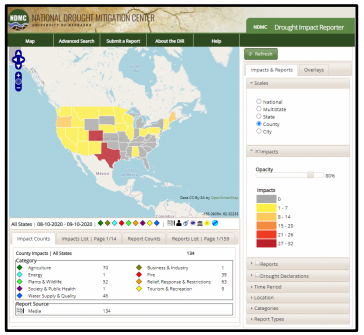
Data Description – Drought Impact Reporter (DIR)

Word Cloud



Research Ideas

DIR – Training Dataset (14178)



Pre-trained word-embedding models + RNN
or
Pretrained BERT-based models

Identify if Tweets indicate types of droughts impacts

Tweets – Test Dataset (26654)

Questions:

1. 9 multi-classes: too many for models to learn based on the size of dataset?
2. Study regions - the U.S. vs top states. Tweeting habits are different in different states.
3. Calibration – filter some Tweets to calibrate the results.
4. Innovation in DL/NLP models.

Gantt Plot

TASK TITLE	PCT OF TASK COMPLETE	May							
		Week1		Week2		Week3		Week4	
Identify research topics	0%	*	*						
Pre-process training and test sets	20%		*	*	*				
Build and test models	60%			*	*	*	*		
Compare and analyze results	80%						*	*	
Write and revise the conference paper	100%							*	*

Thank you!
Welcome to comments and questions!