Predicting drought

Machine Learning for a changing climate

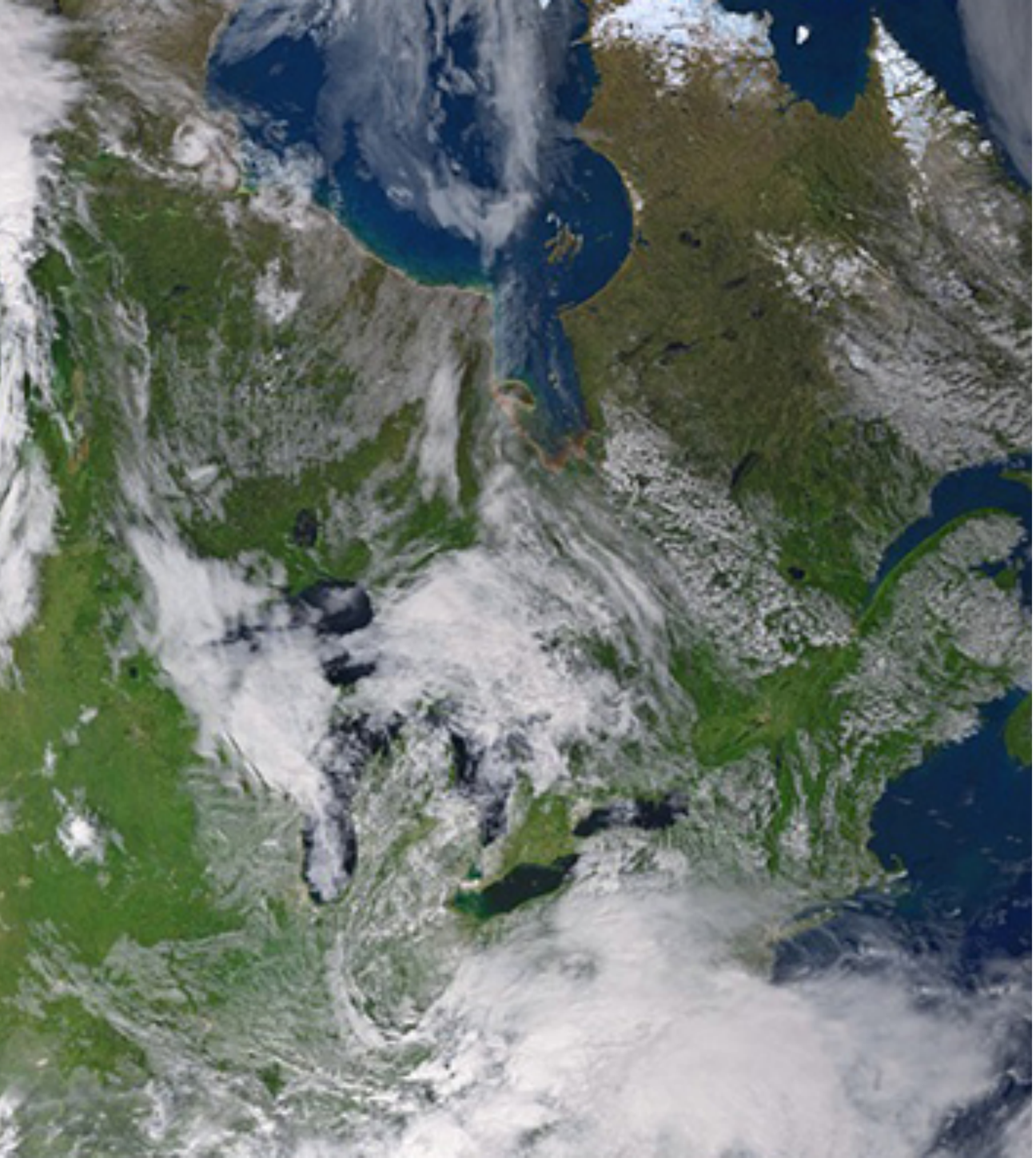
55 million

The amount of people affected by droughts annually

Source: World Health Organization

Droughts are linked to other disasters:

* Water & food scarcity
* Dangerously high temperatures
* Damage to ecosystems
* Wildfires
* ...

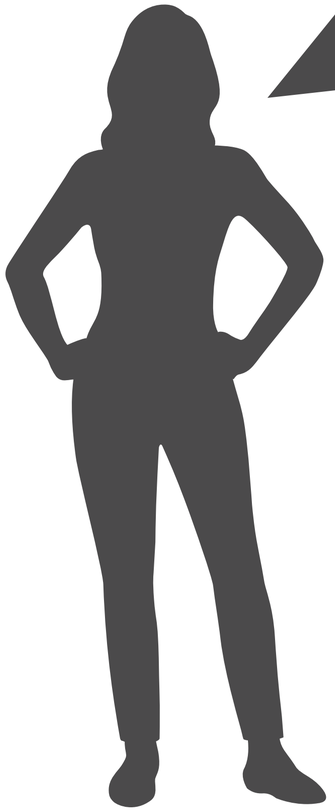


What is a drought?

From the dictionary:

“a prolonged period of abnormally low rainfall, leading to a shortage of water.”

Is it possible to create a Machine Learning model that can predict drought?



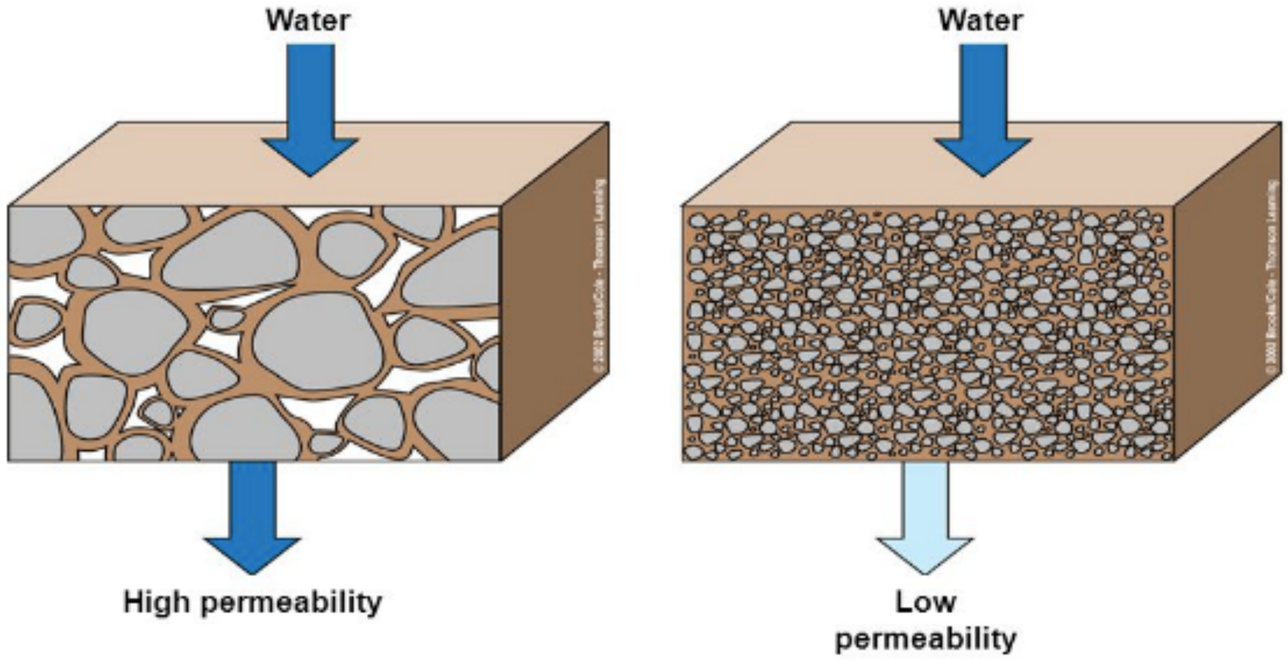
If so, what input does it require to get the best possible score?

Dataset info

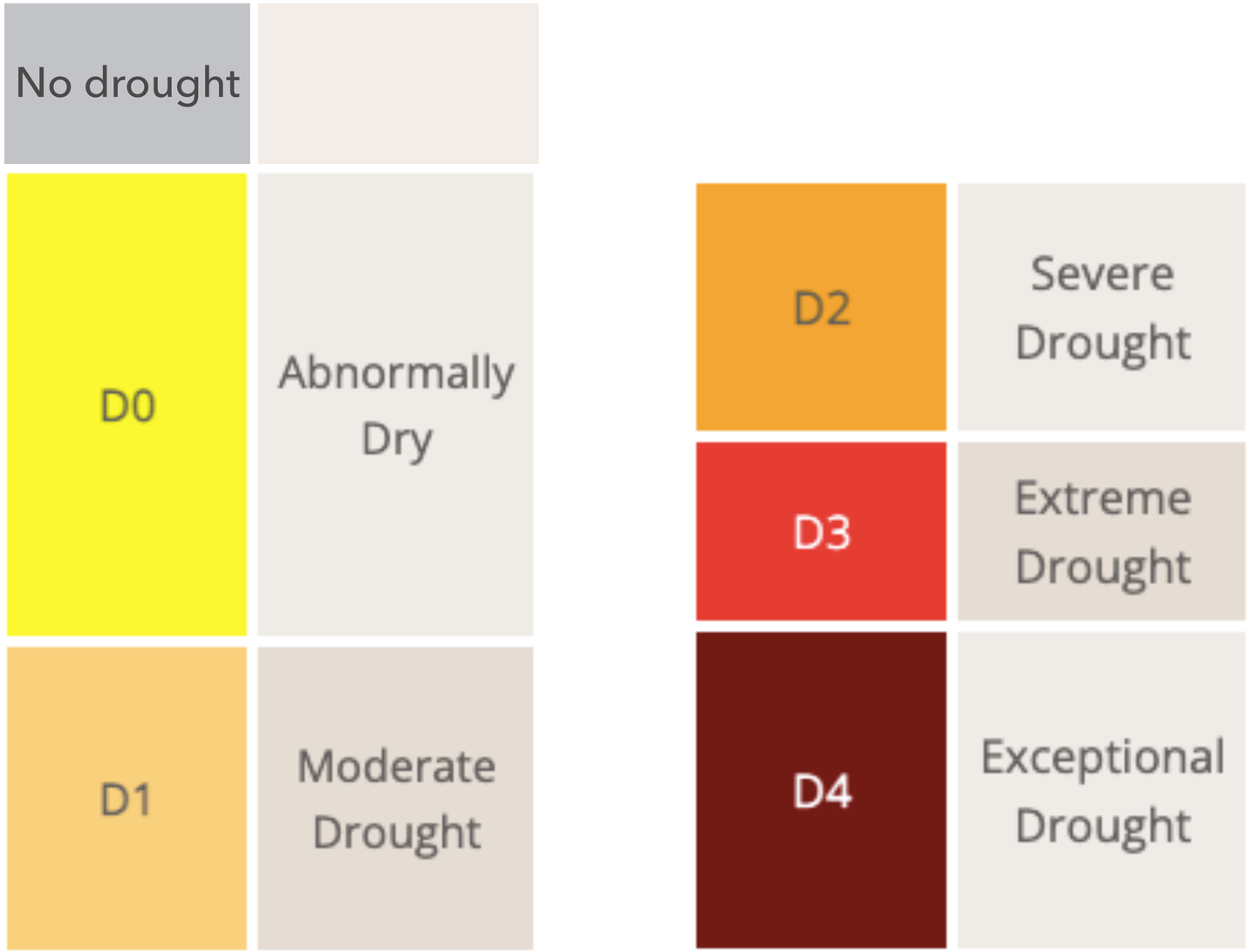
- Two datasets
  - Weather stats: year 2000-2017, USA
  - Soil stats

  –> The importance of soil stats on predicting drought!

    * Drought –> lack of nutrient uptake



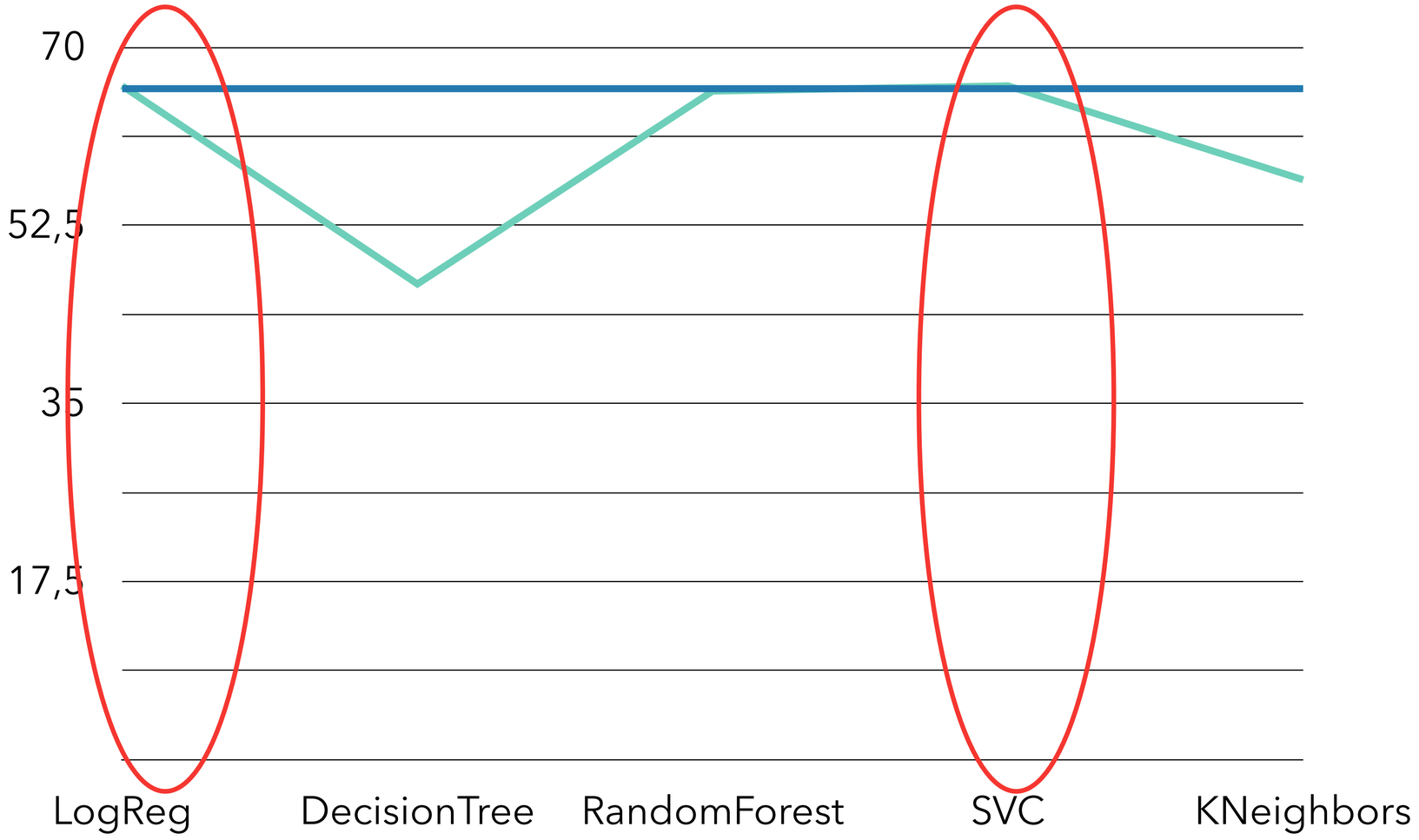
Drought classification



Model building

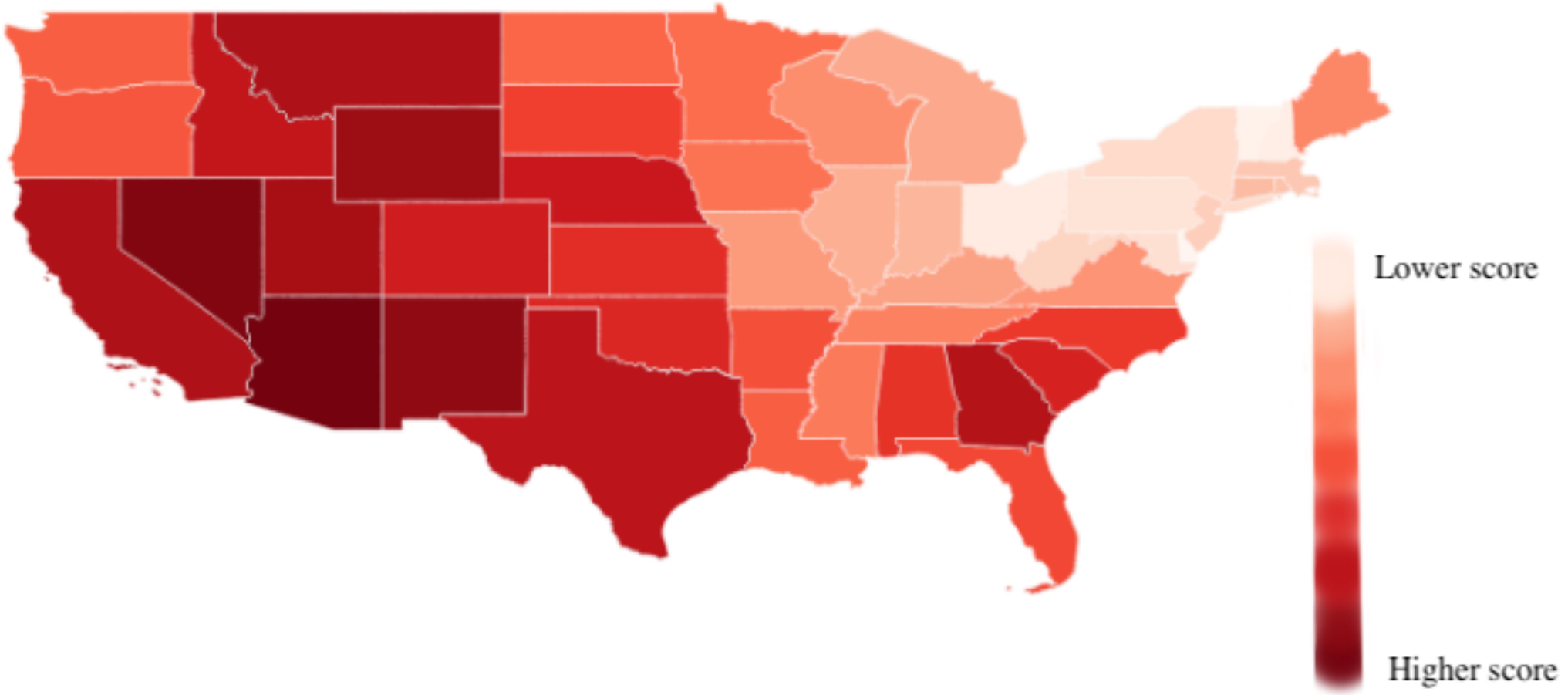
- Drawing a sample
  - Original df: ~ 20 000 000 rows
  - Sample: 100 000
- Elimination based on preexisting knowledge
  - X wind, slope, and more

Model building

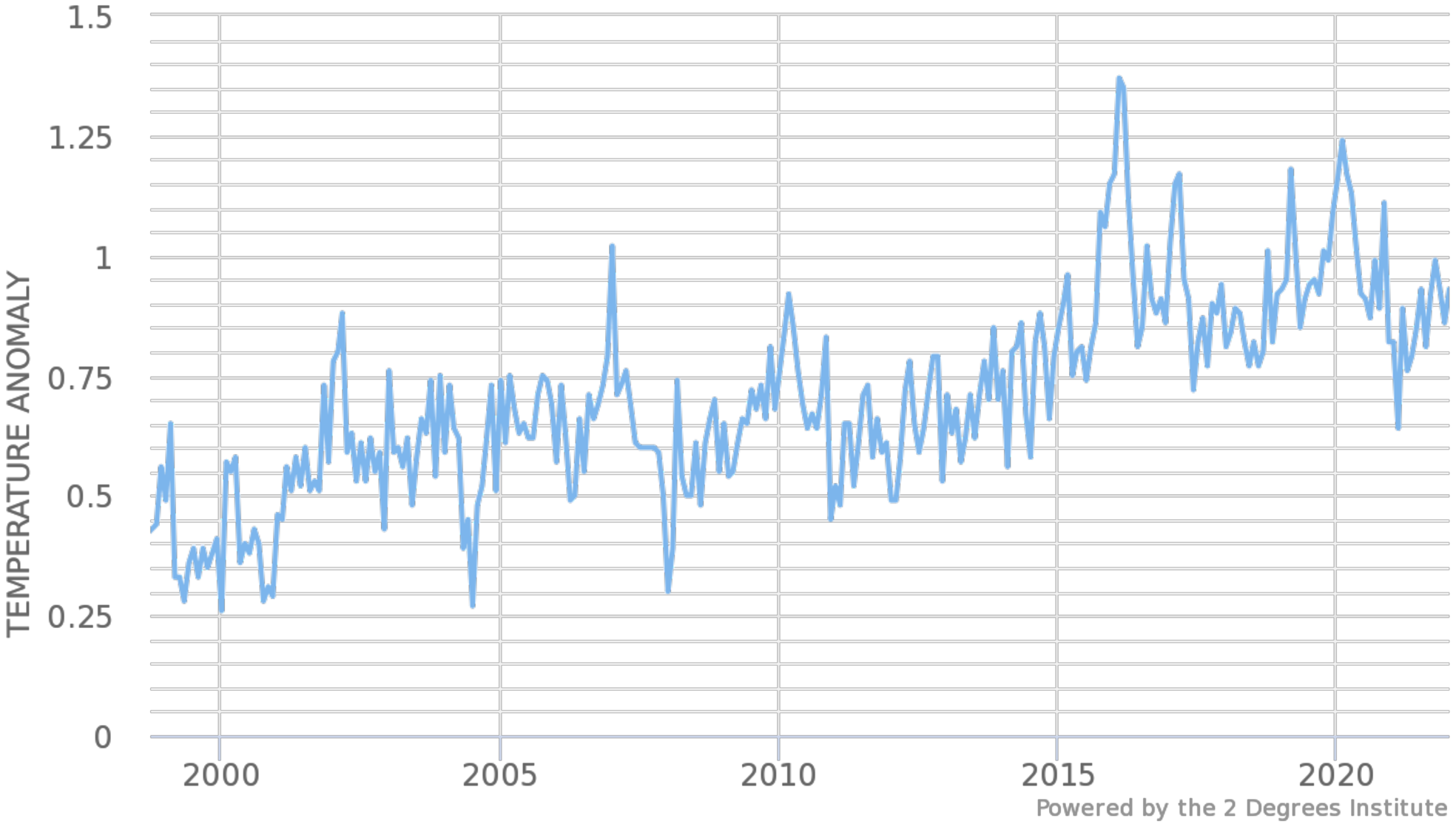


Results

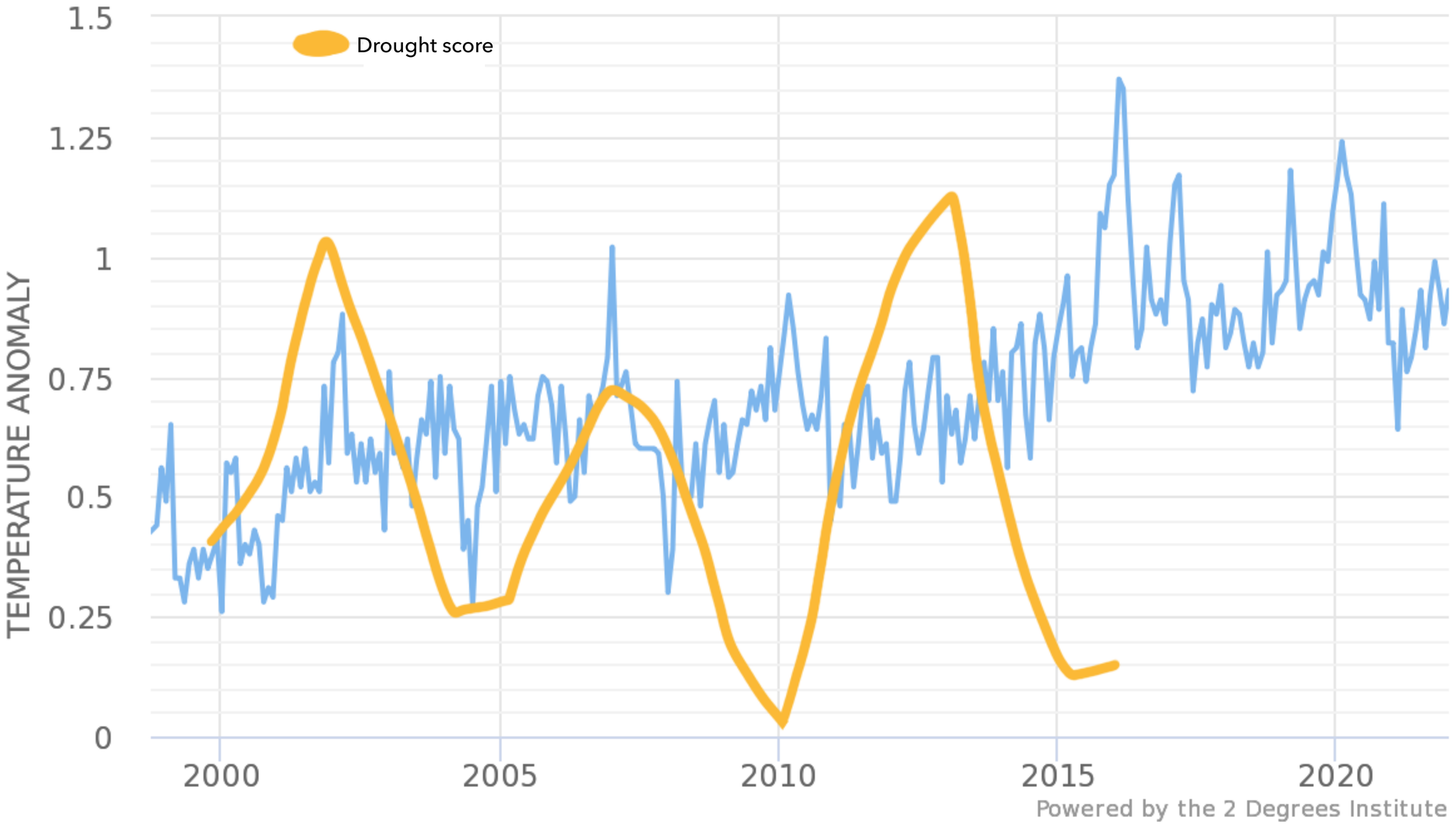
Drought score by state



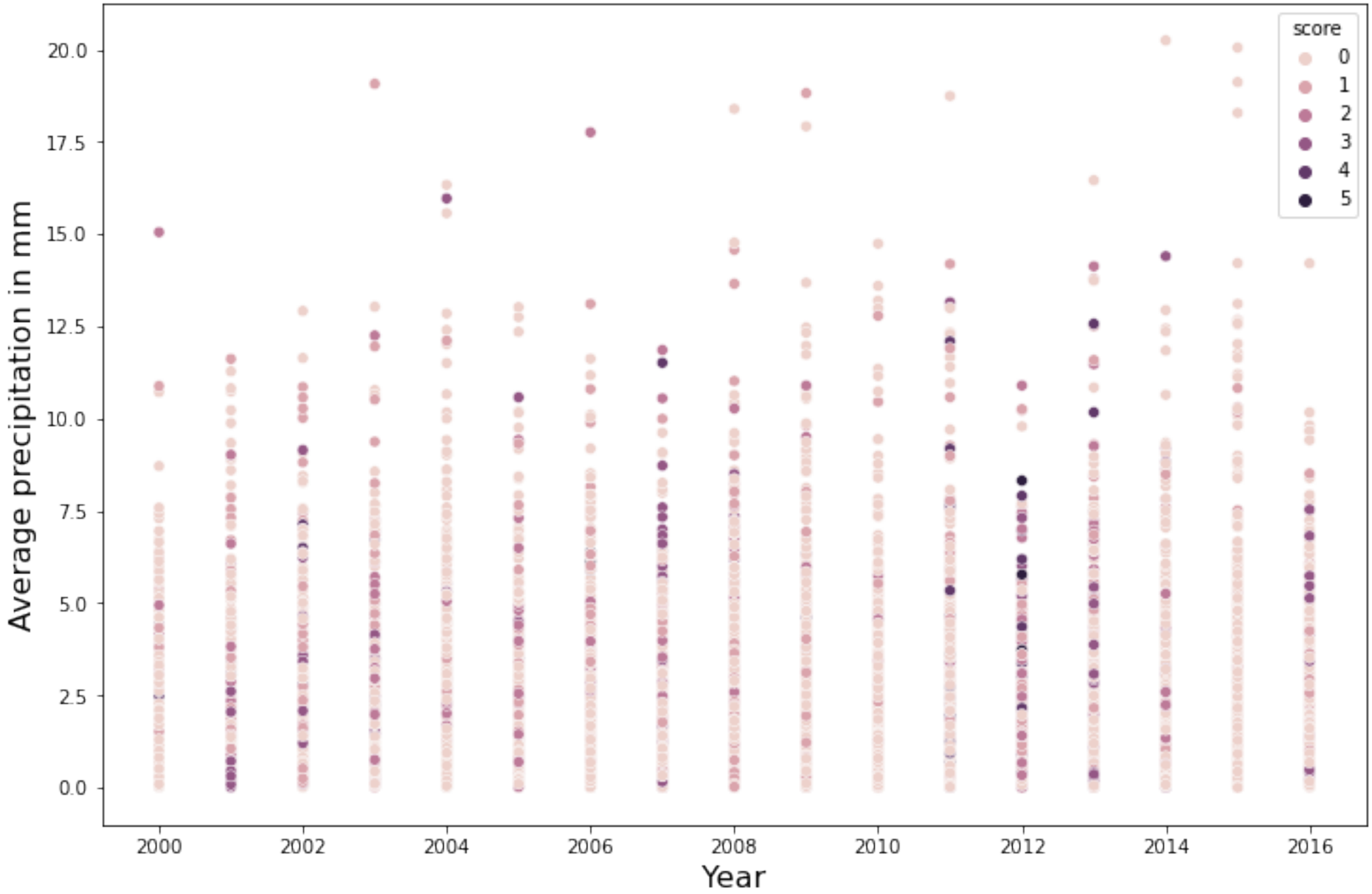
Yearly temperature change



Yearly temperature & drought score change



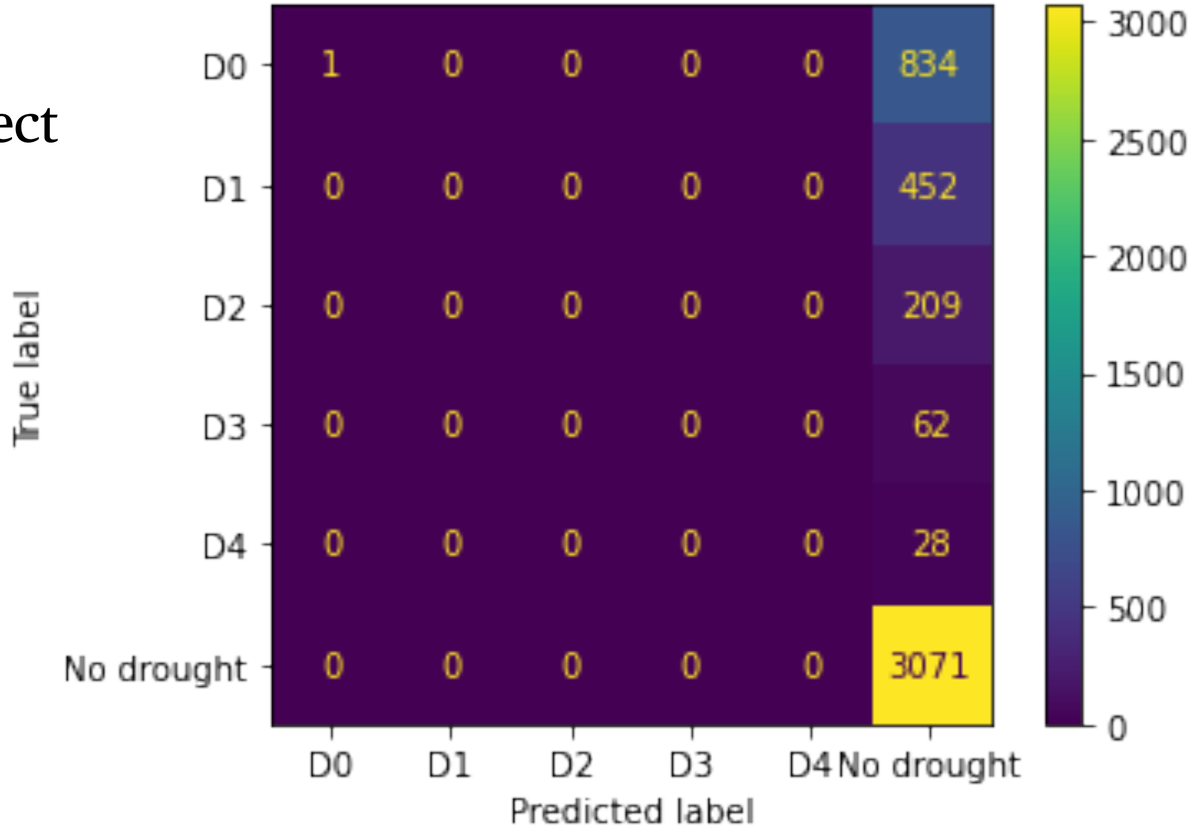
Precipitation in mm/year, by score



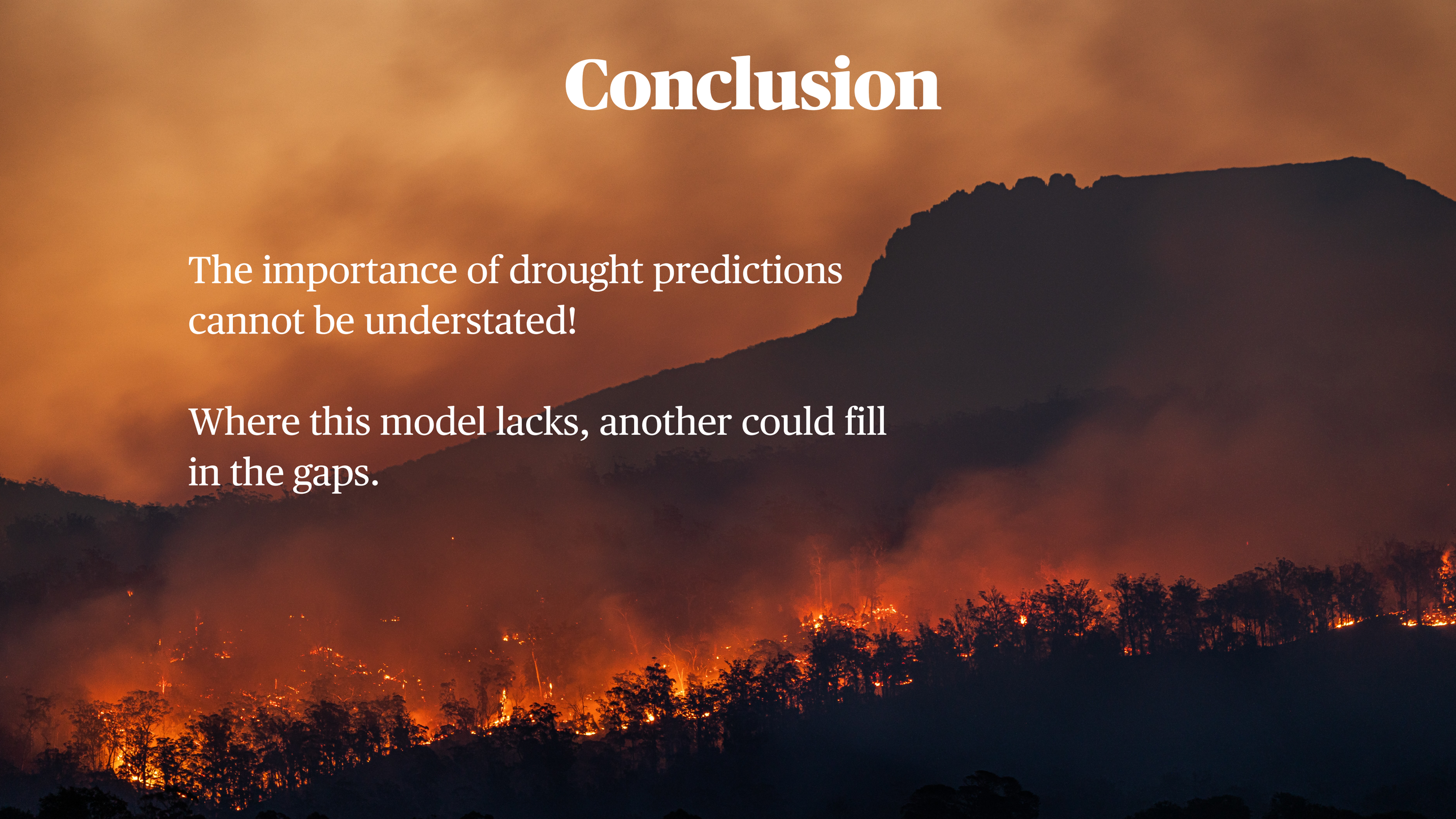
Model results

- Best accuracy score: 67% (on test data)
- Best recall & precision score: 65.95%
- Flaws: predicts (almost) all as No drought!

- Improvements:
  - More parameters affect drought than these!



Conclusion



The importance of drought predictions cannot be understated!

Where this model lacks, another could fill in the gaps.

Questions?