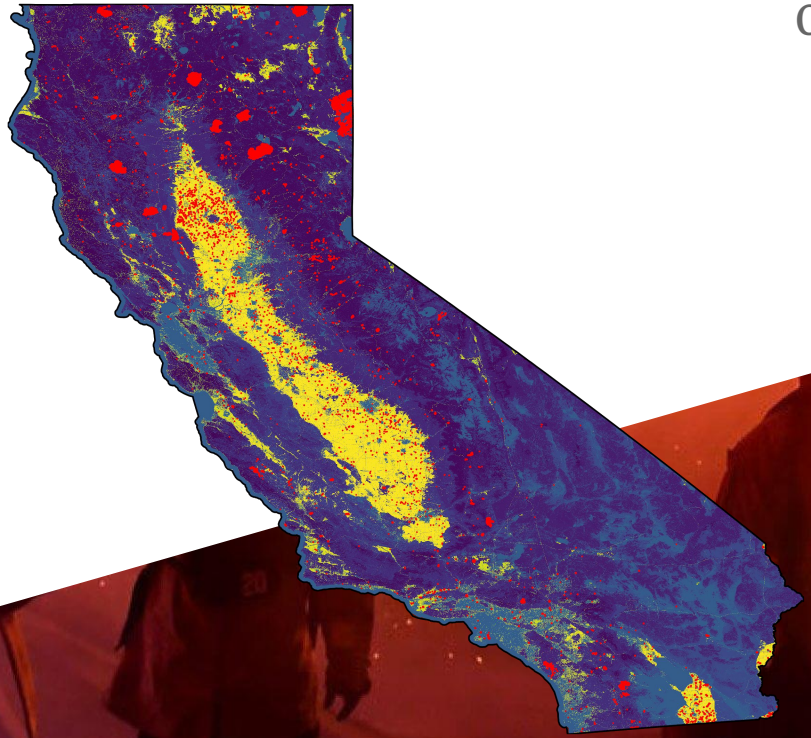
California Wildfires

05-15-2020

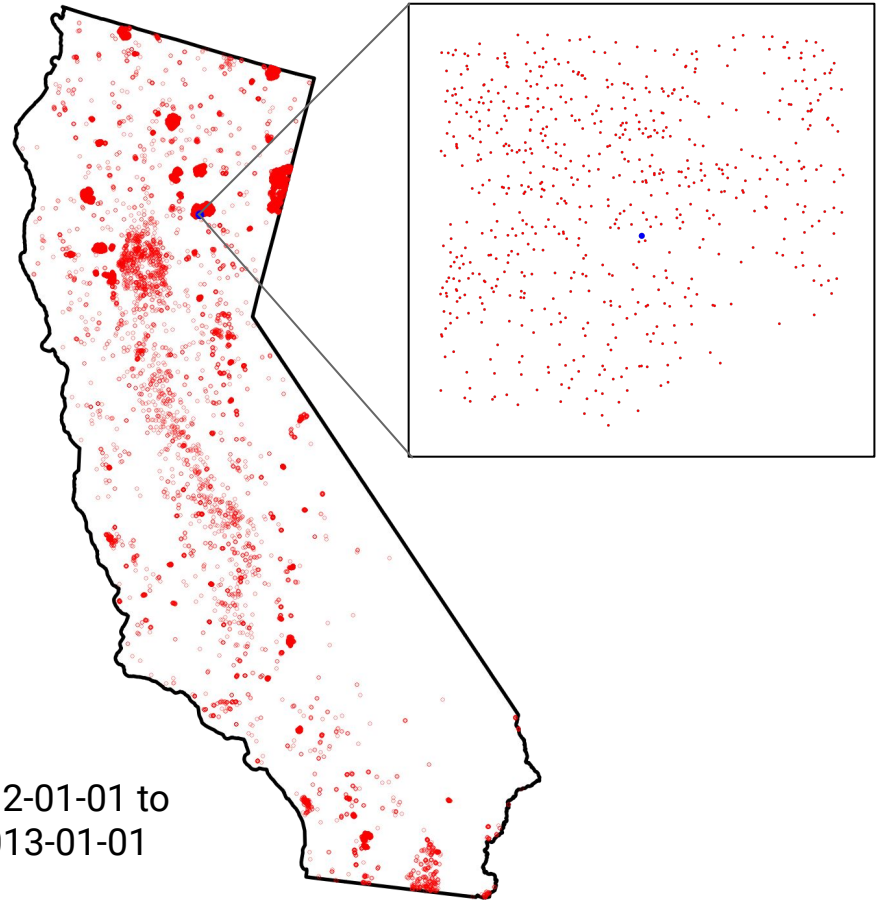


Motivating Question

Can we forecast the spread of wildfires using machine learning?

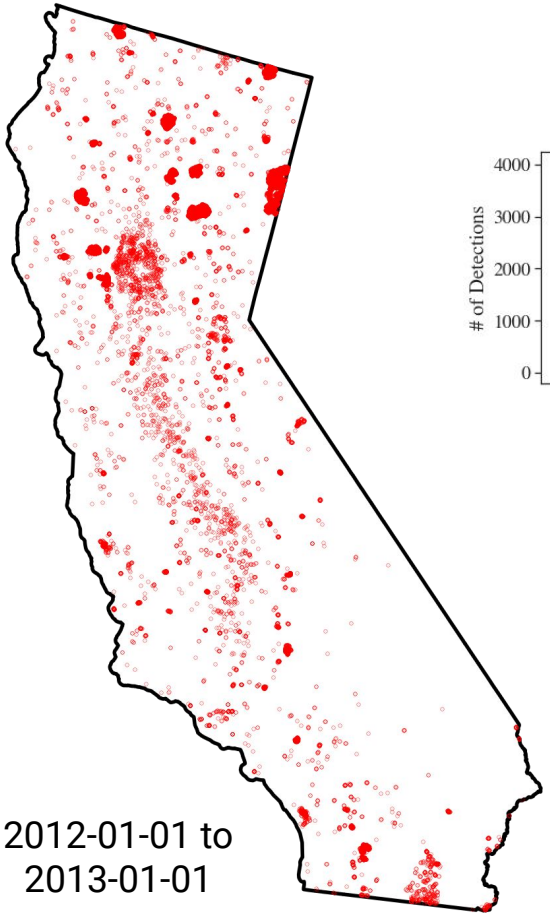
Where do we get the data about active fires?

VIIRS (Visible Infrared Imaging Radiometer Suite) - 375m

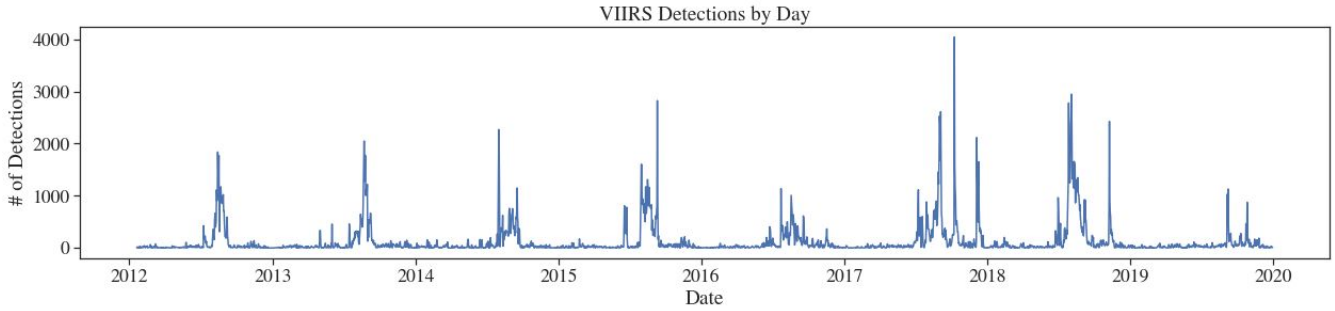


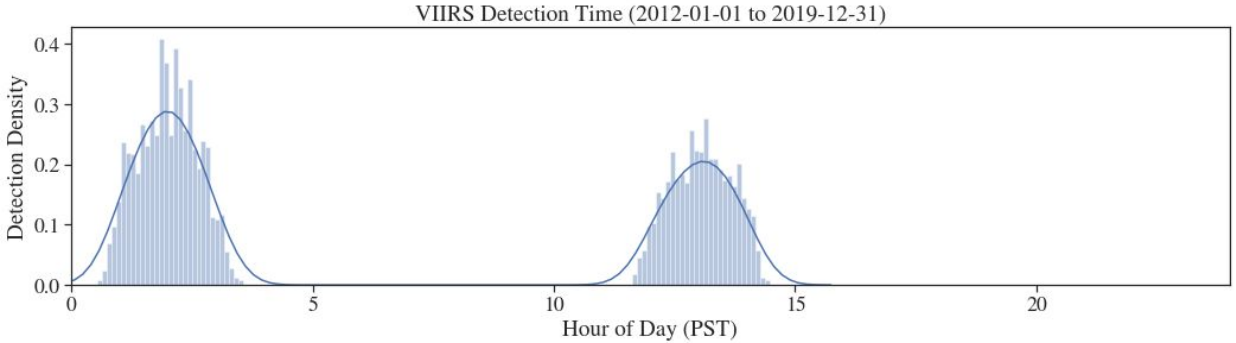
2012-01-01 to
2013-01-01

2012-09-01 to
2012-09-02



2012-01-01 to
2013-01-01

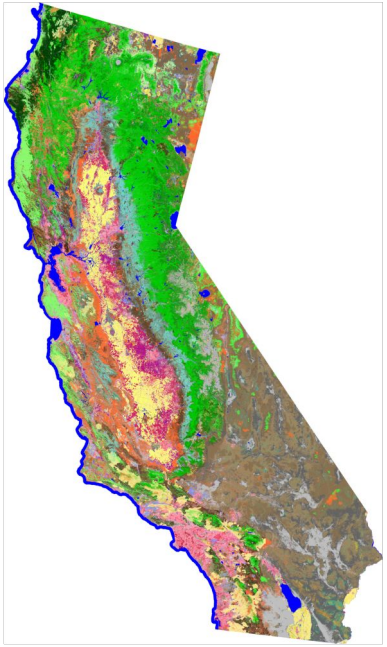




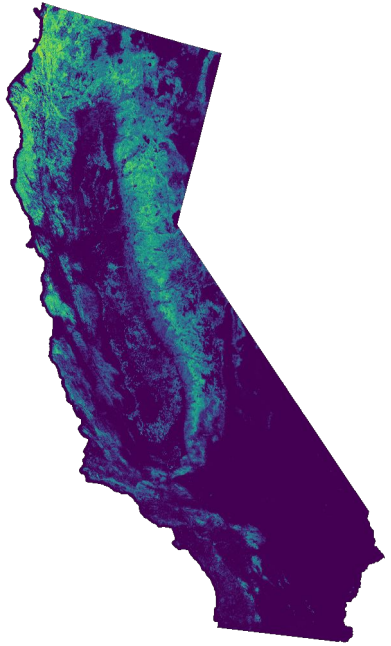
Land Cover (LANDFIRE) - 30m

Slope

Vegetation

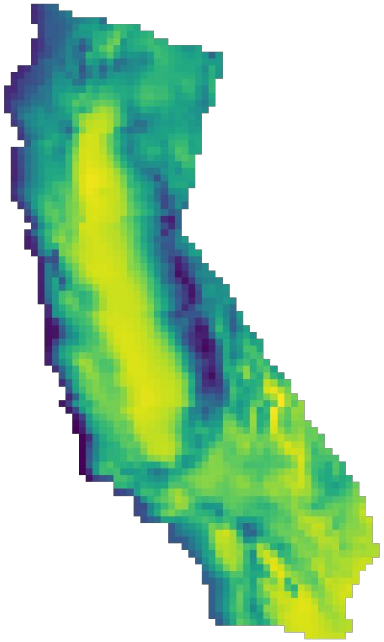


Fuel (Canopy Cover)

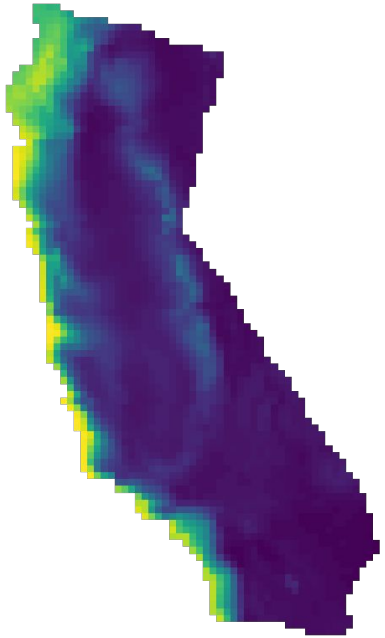


Meteorology (Rapid Refresh) - 13km

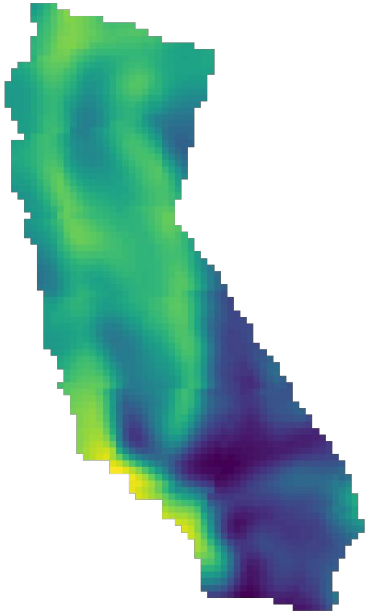
Temperature @ 2m



Rel. Humid. @ 2m

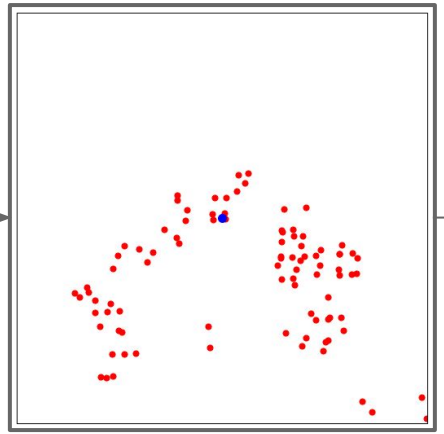


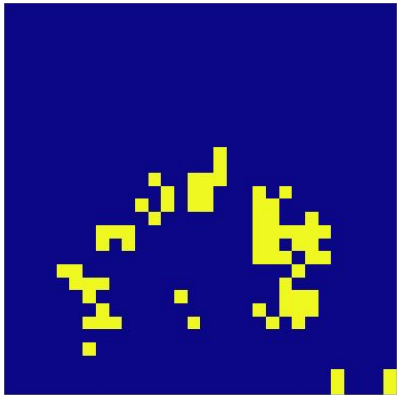
Wind @ 10m



VIIRS Discretization

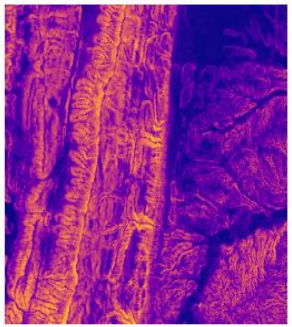
latitude	longitude	acq_date	acq_time
33.79433	-117.47333	2012-01-20	943
34.03597	-118.10446	2012-01-20	943
34.09379	-117.52689	2012-01-20	943
34.09520	-117.53533	2012-01-20	943
34.09449	-117.53112	2012-01-20	943
...	...	...	...



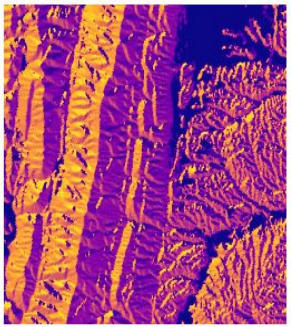


11.25 km x 11.25 km

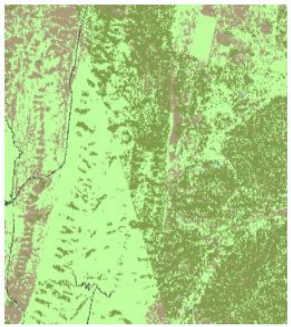
Landfire + Meteorology Cropping



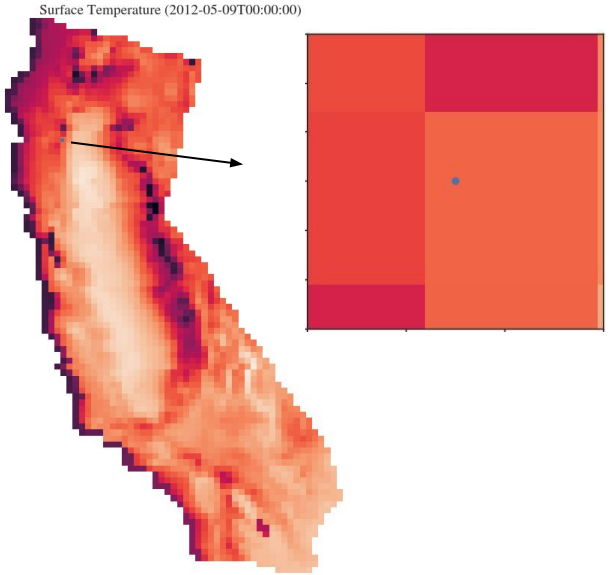
Slope



Aspect

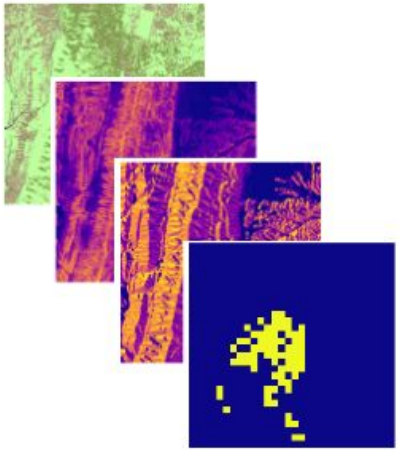


Vegetation

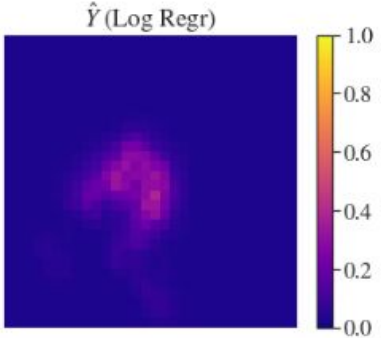


Task Setup

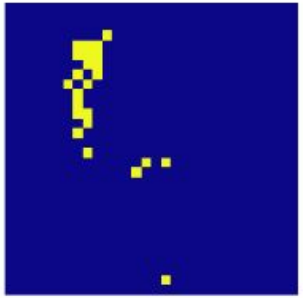
Input Data

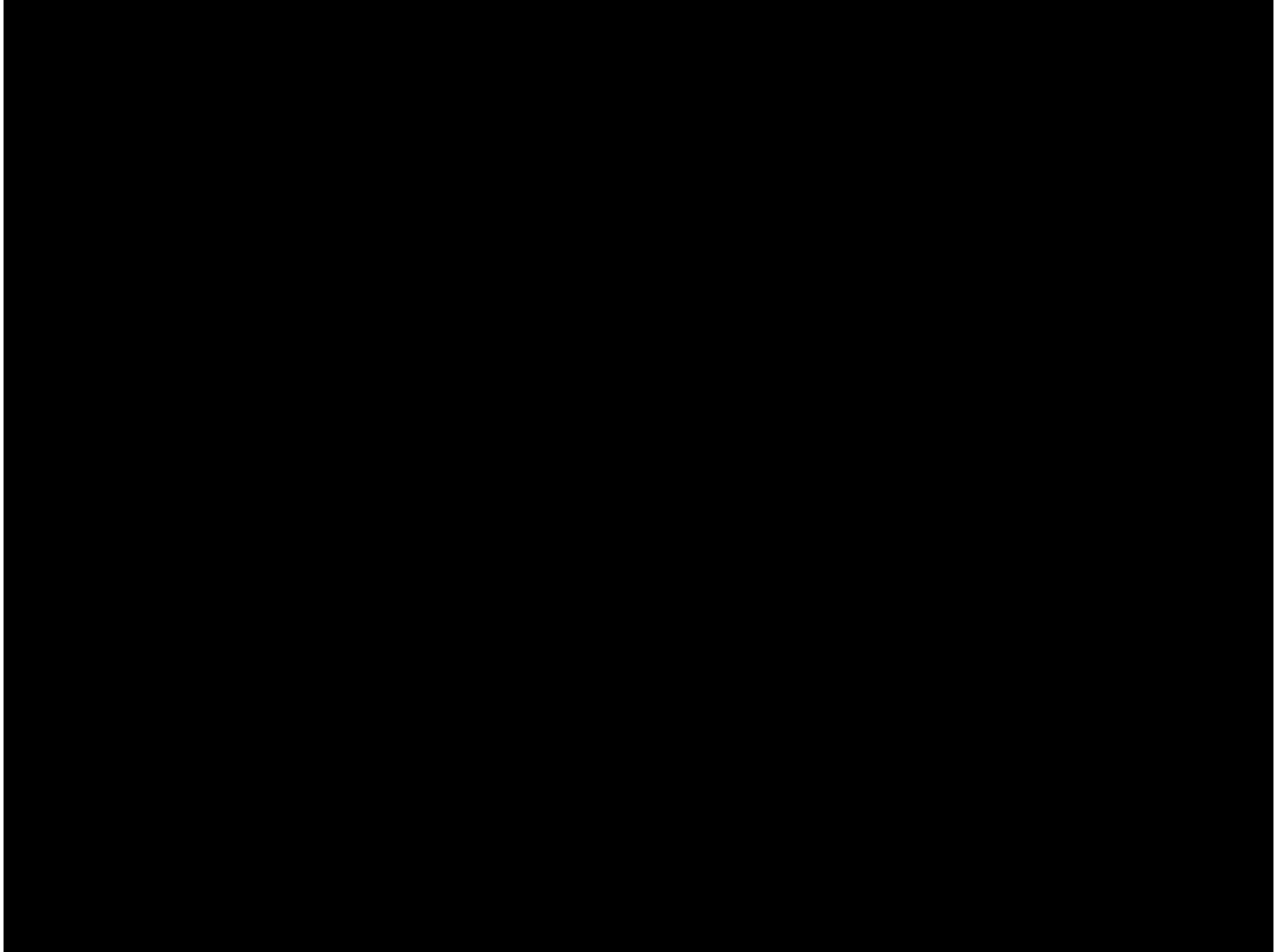


Example Model Prediction



Target





Challenge Data

- Training Data - 10k instances (~1.4 GB)
- Testing Data - 5k instances (~.7 GB)

- **Input** — 32 channel, 30 x 30 images
  - 5 VIIRS detections,
  - 17 Land Cover
  - 10 Meteorological
- **Target** — 30 x 30 binary images
  - +12 hour VIIRS detections
  - +24 hour VIIRS detections

More data available upon request.

Tasks / Areas to Explore

- Improve accuracy beyond baselines
- Comparing different evaluation metrics (MSE, IOU, etc.) and relating to qualitative performance
- Investigate importance / usefulness of different input layers
    - Integrate time of day and (possibly) latitude/longitude
- Explore efficacy of different model & architectures
    - E.g. Use a graphical model to learn a conditional joint distribution (over all spatial locations)
- Produce multiple forecasts for a given input (possible outcomes / trajectories)

Meteorology Processing