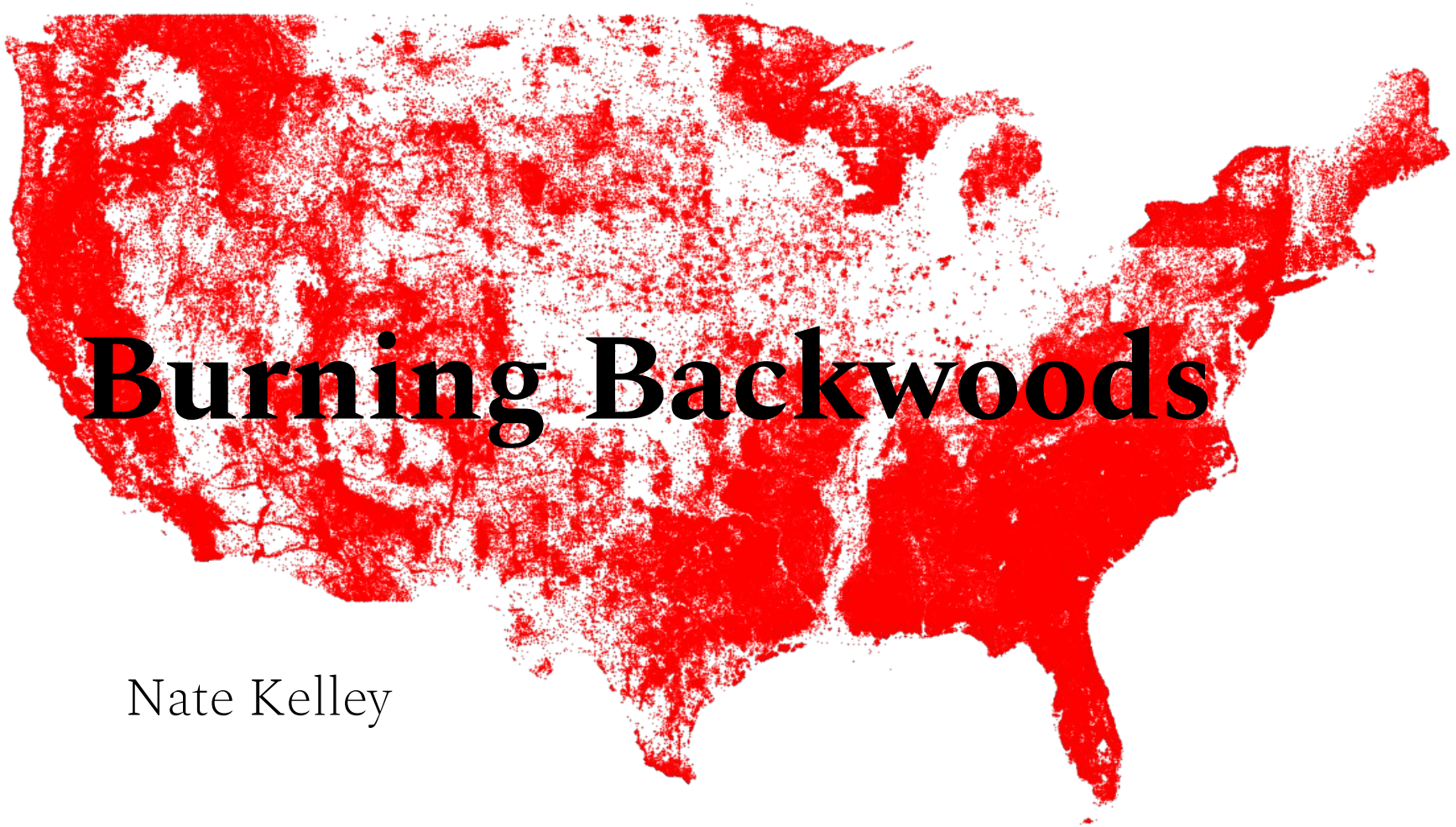
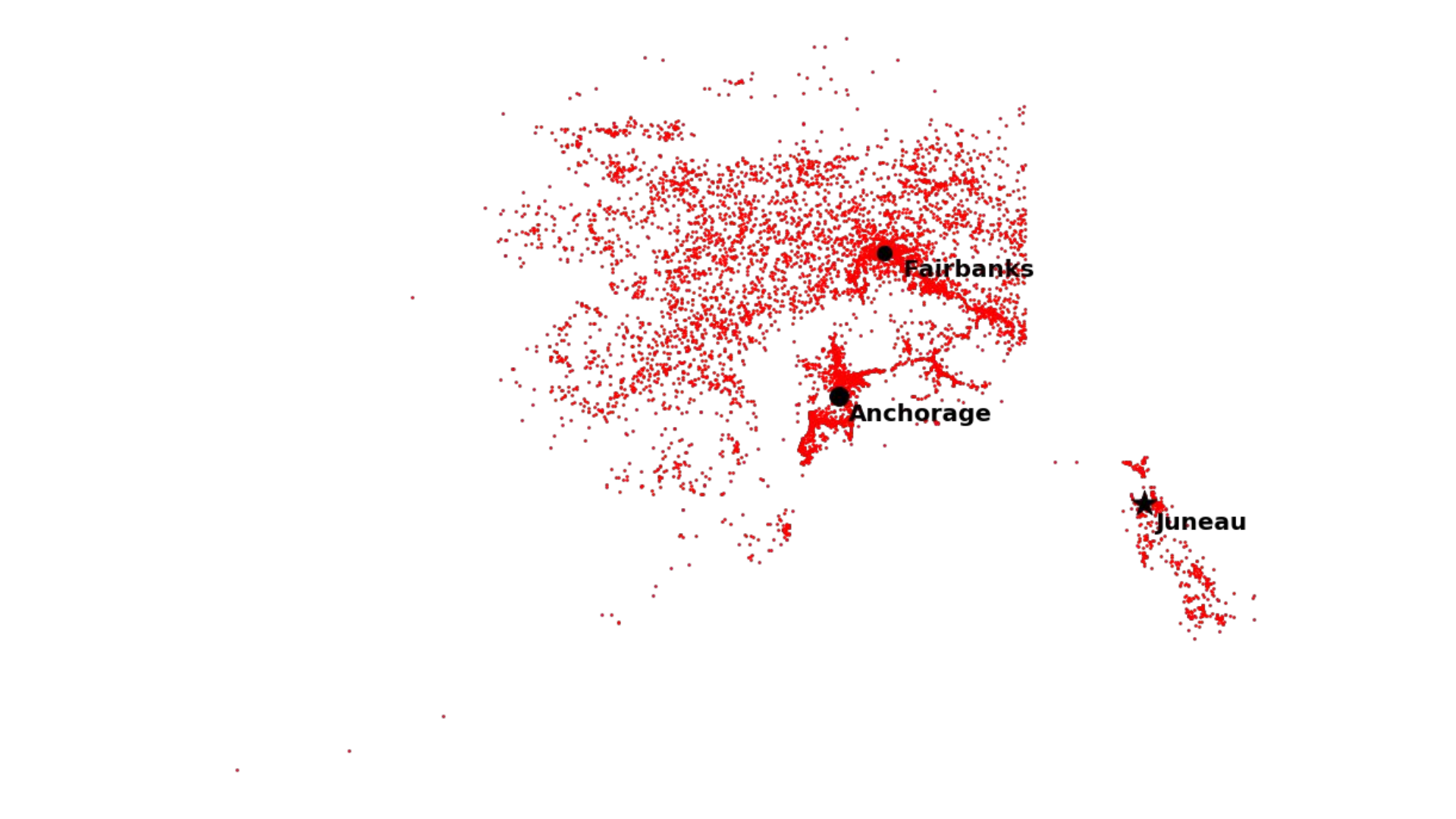
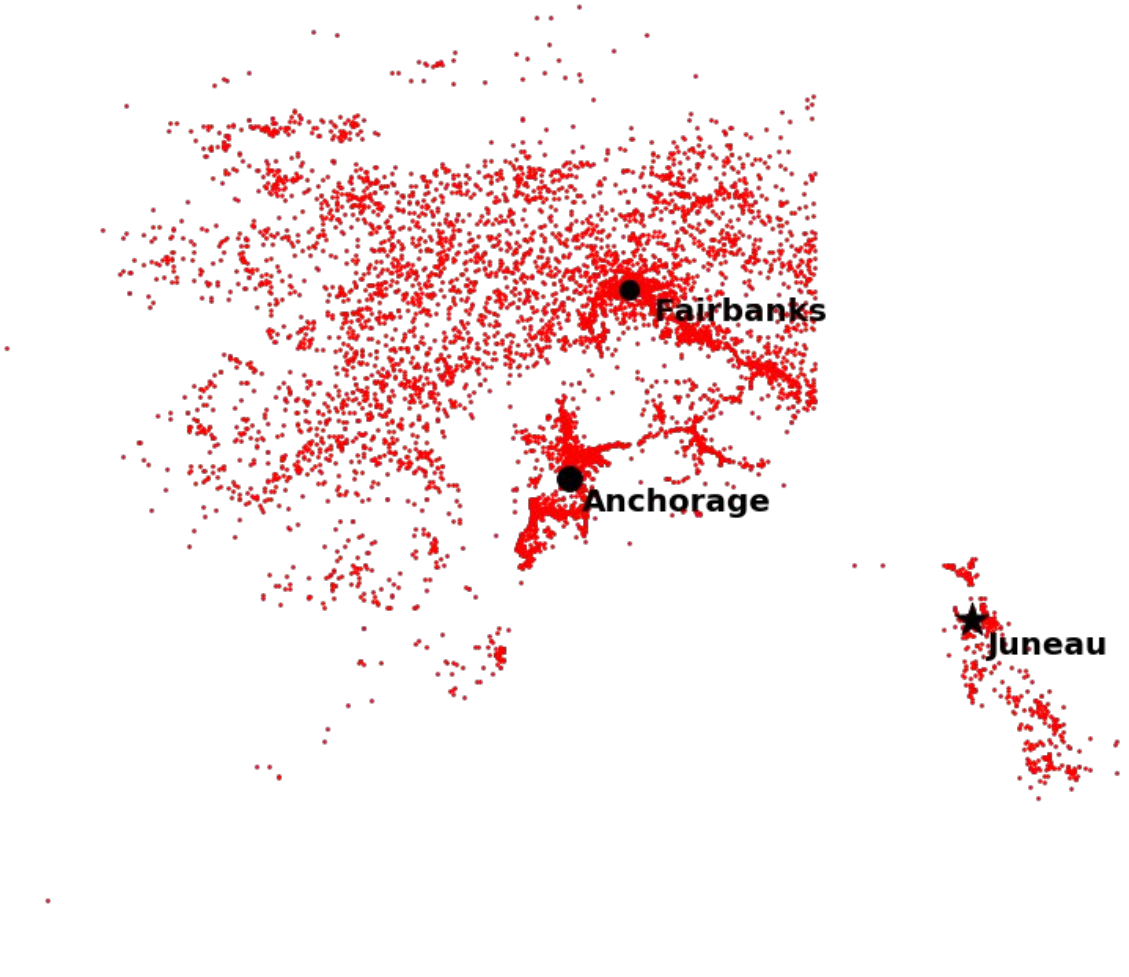


Burning Backwoods

Nate Kelley

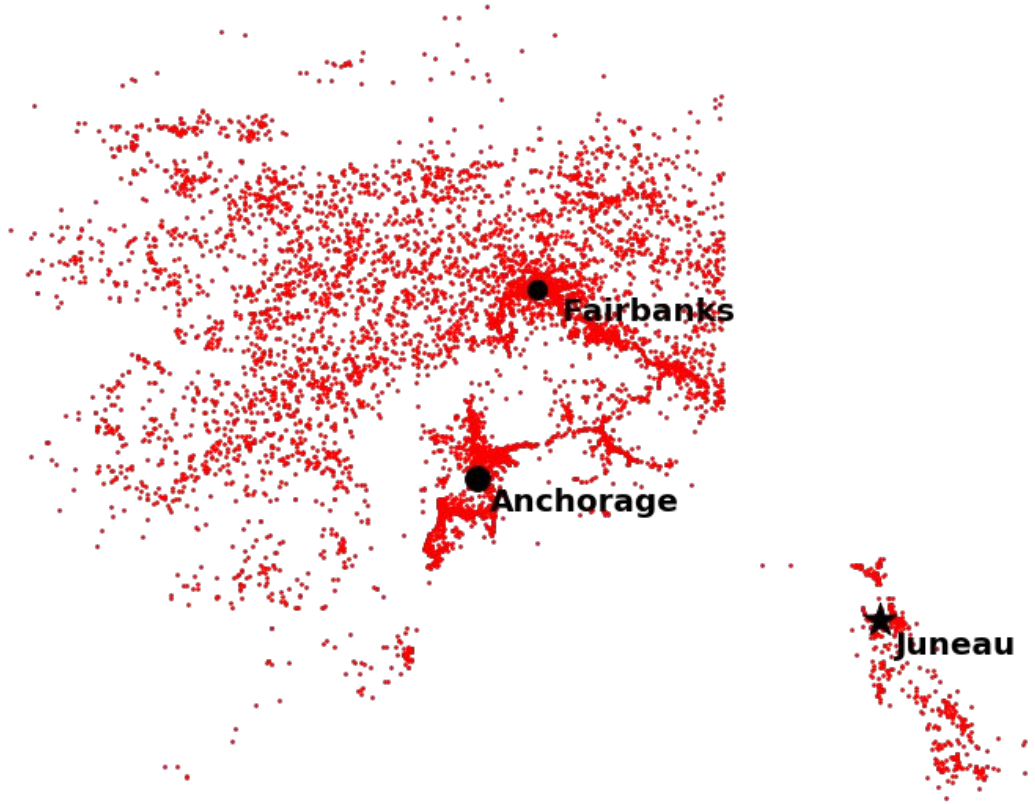

Fairbanks
Anchorage
Juneau

Into the Wild



Into the Wild

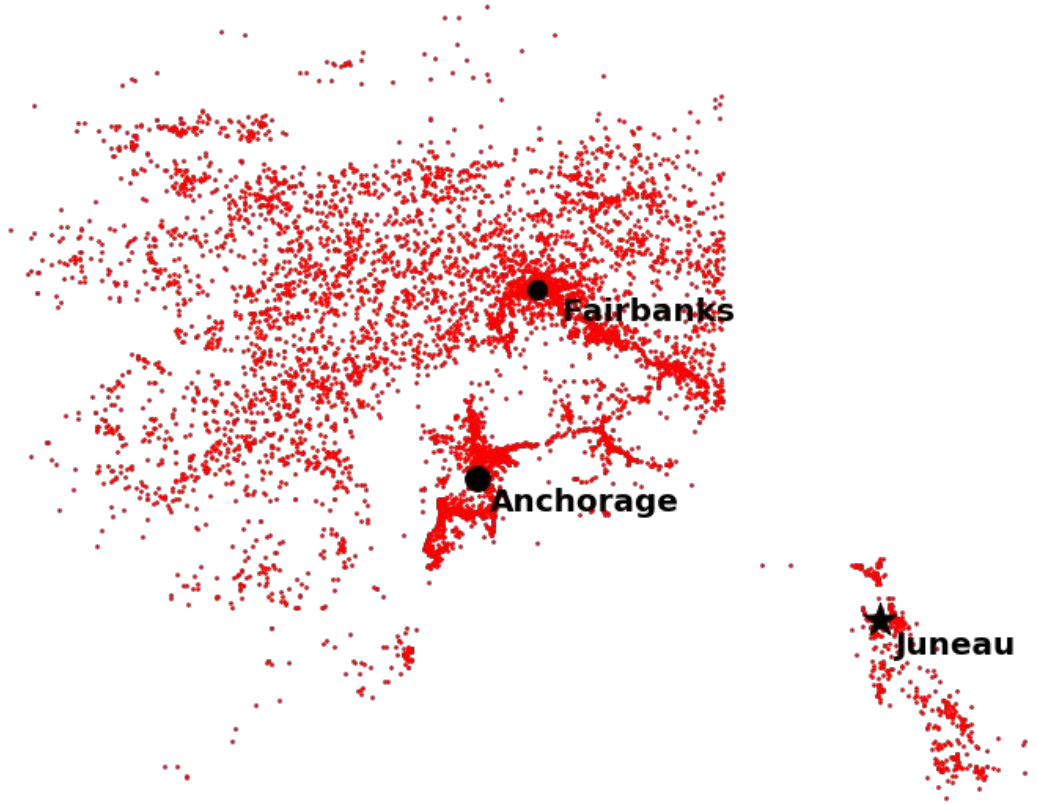
Less than **0.25%** of US population



Into the Wild

Less than 0.25% of US population

Less than **0.70%** of total wildfires

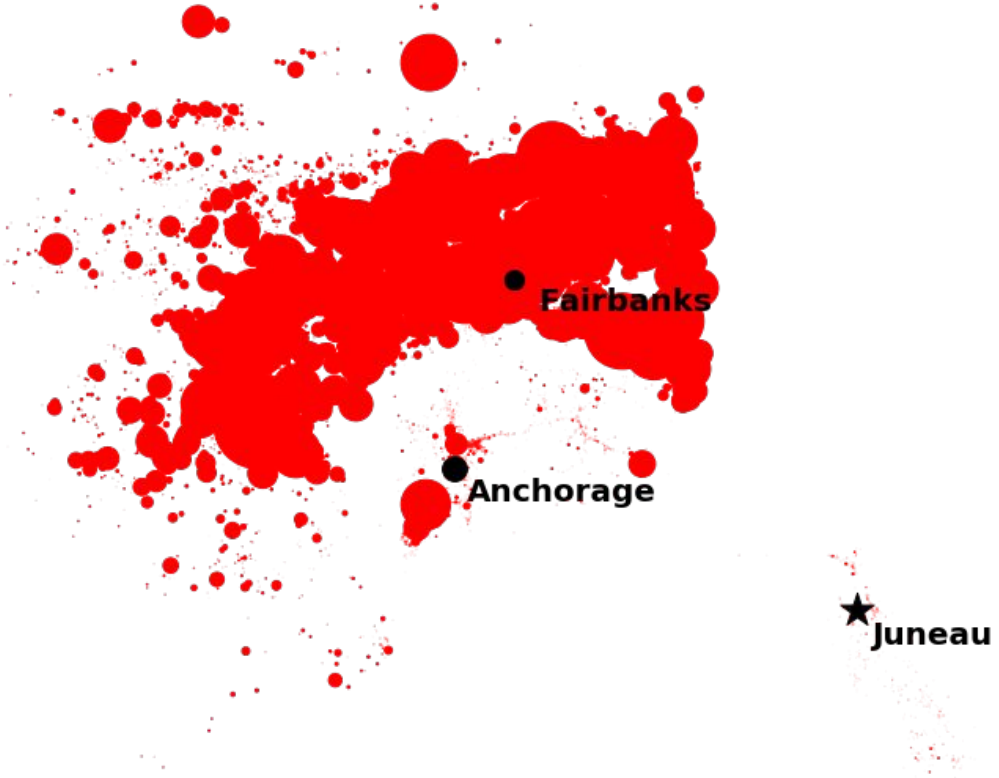


Into the Wild

Less than 0.25% of US population

Less than 0.70% of total wildfires

Over **23%** of total surface area destroyed

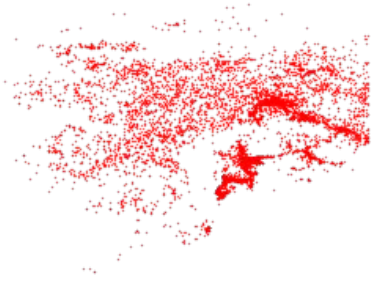


Objectives


Which fires will be outliers?

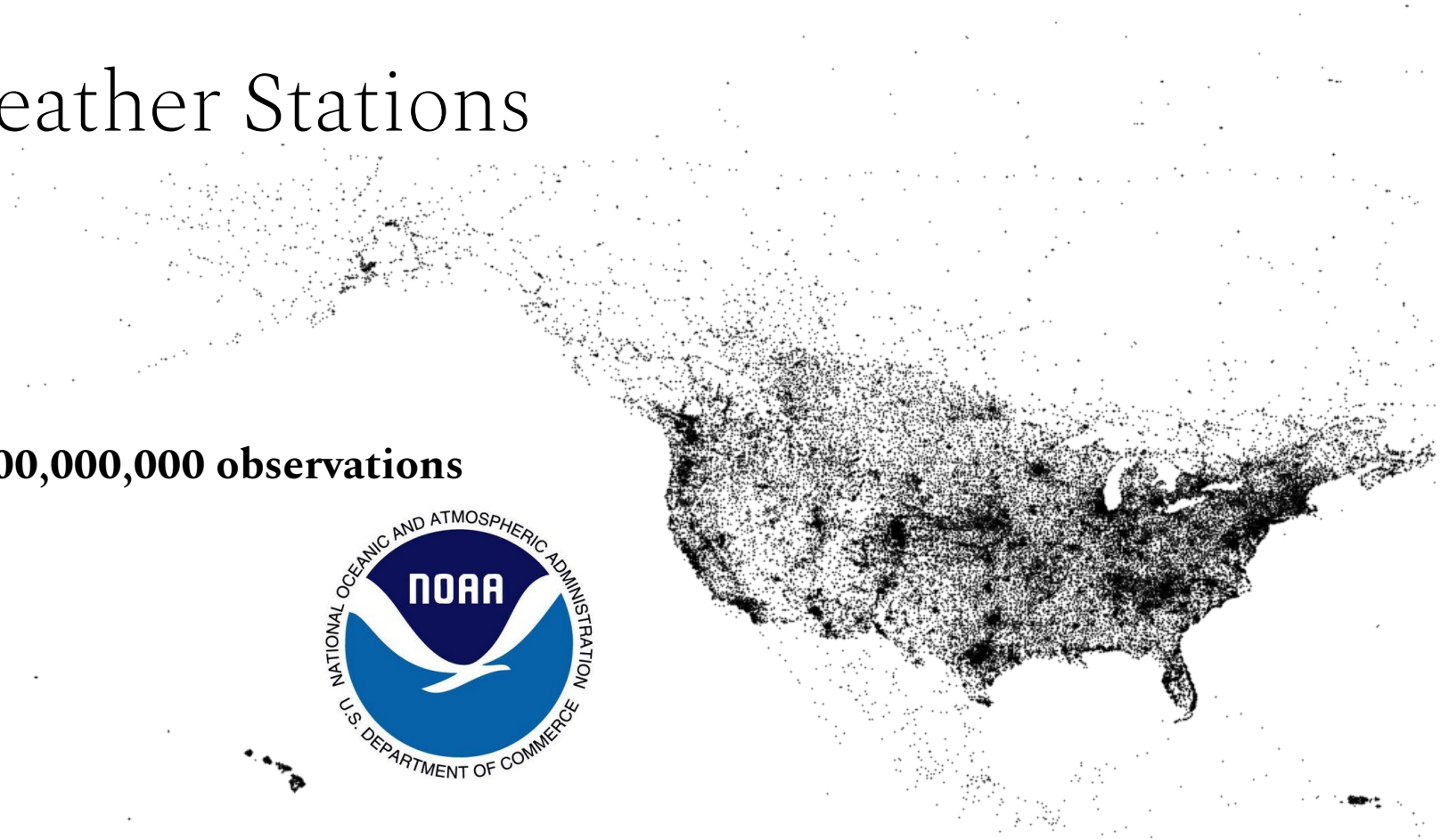

How big will they get?

Fires



1,880,465 wildfires
1992-2015

Weather Stations

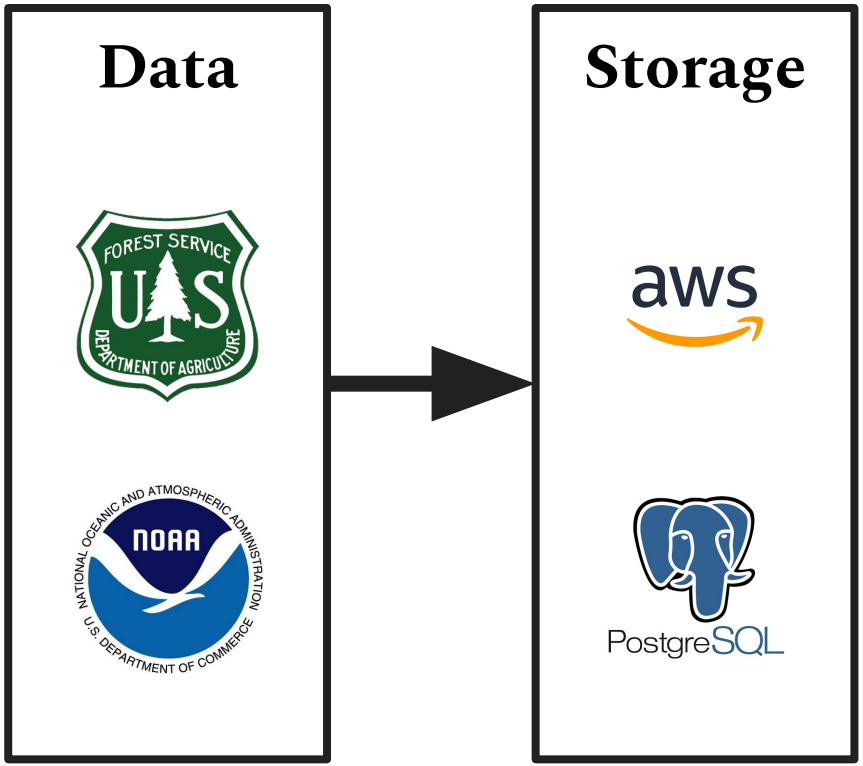


~800,000,000 observations

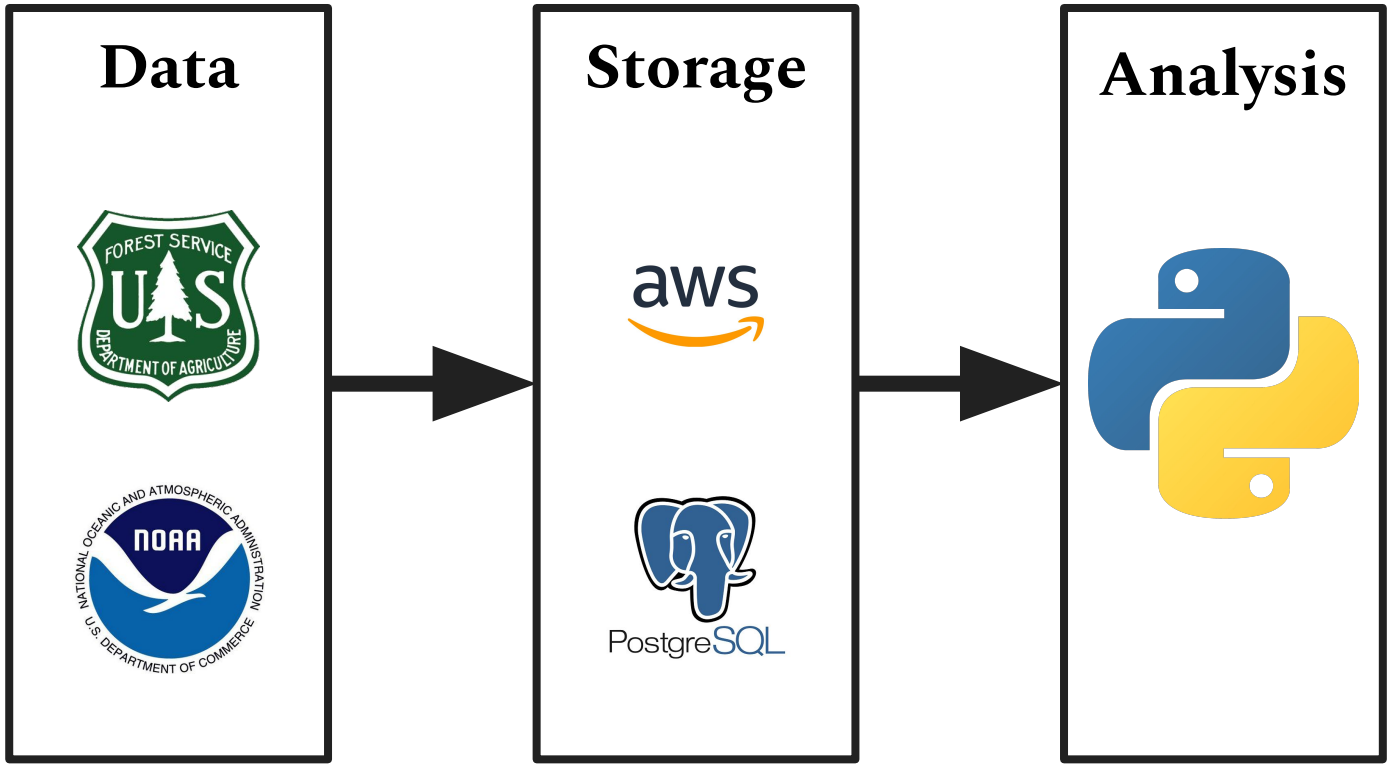
Process

Data

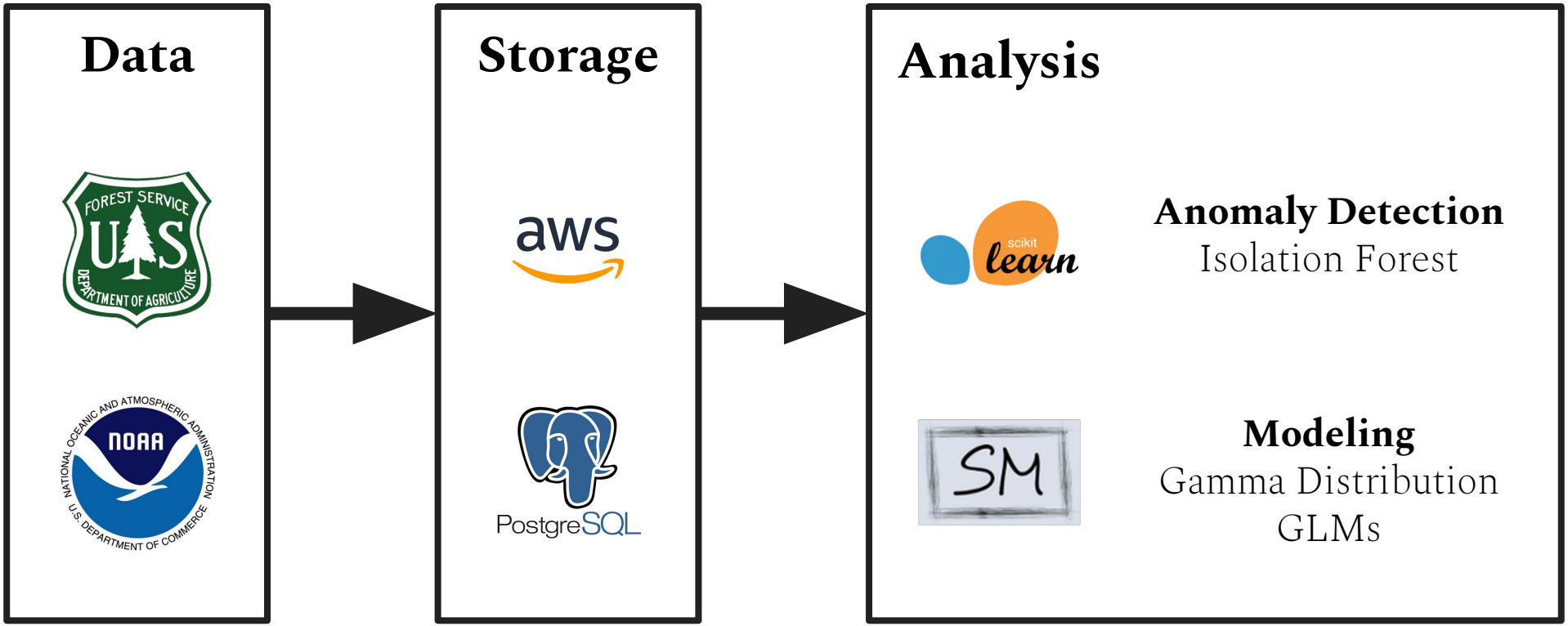
Process


Data
FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
Storage
aws
PostgreSQL

Process


Data
Storage
Analysis
FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
aws
PostgreSQL

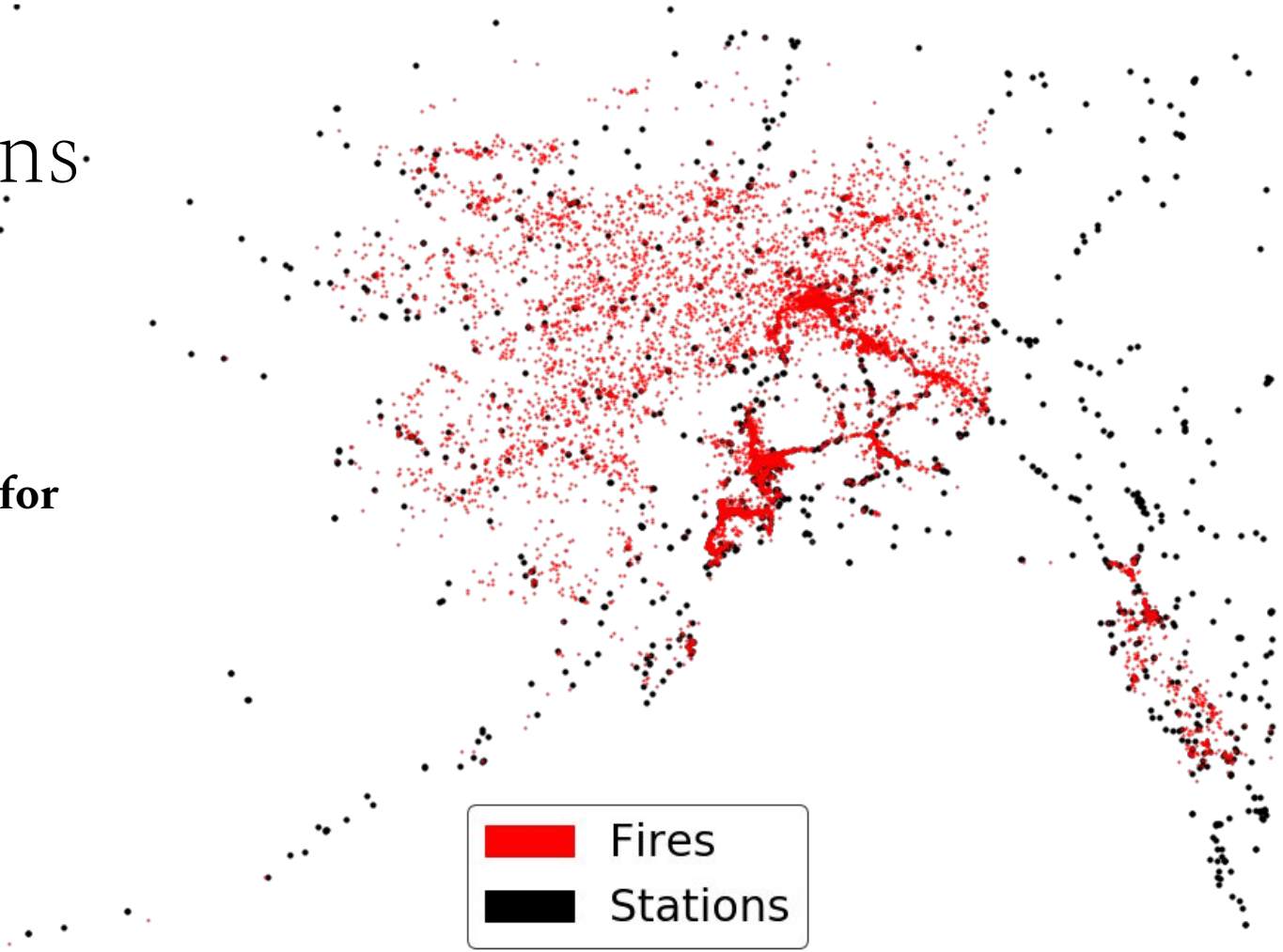
Process


Data
Storage
Analysis
FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
aws
PostgreSQL
scikit
learn
SM
Anomaly Detection
Isolation Forest
Modeling
Gamma Distribution
GLMs

Assumptions

Assumptions

Closest weather station acts a proxy for each fire



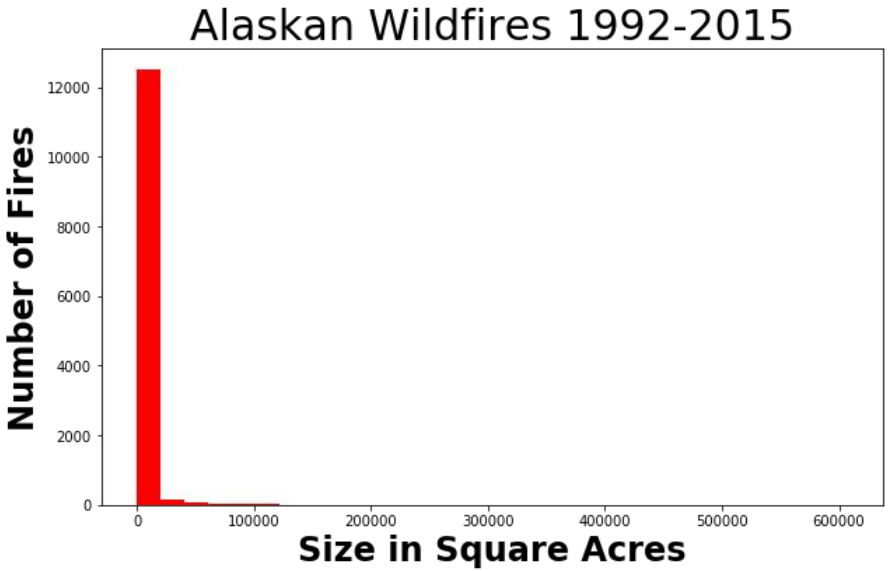
Assumptions

Above 50°C

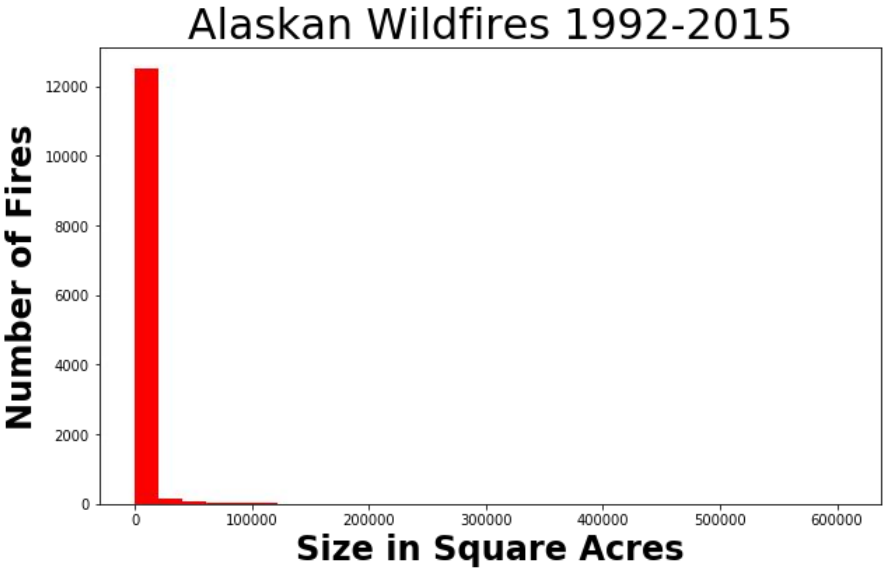
Under -100°C

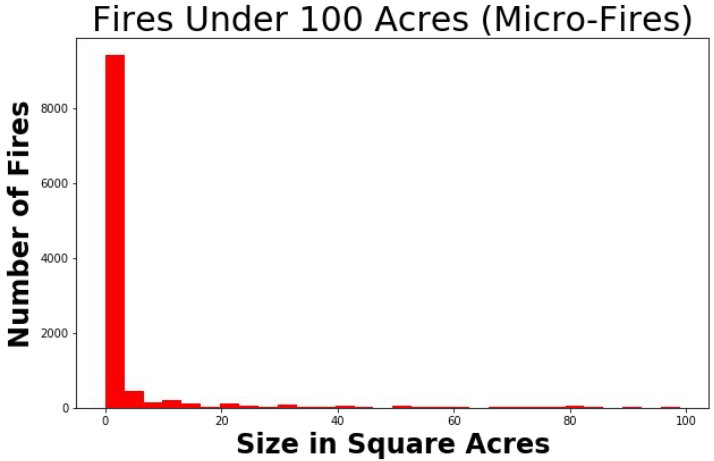
Analysis: Anomaly detection

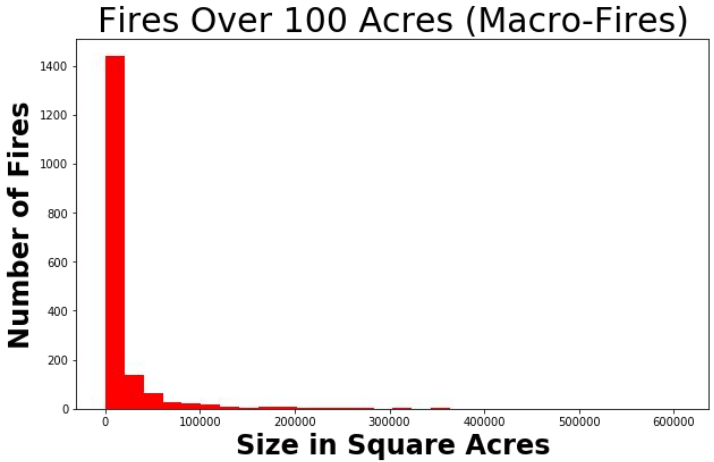
Analysis: Anomaly detection



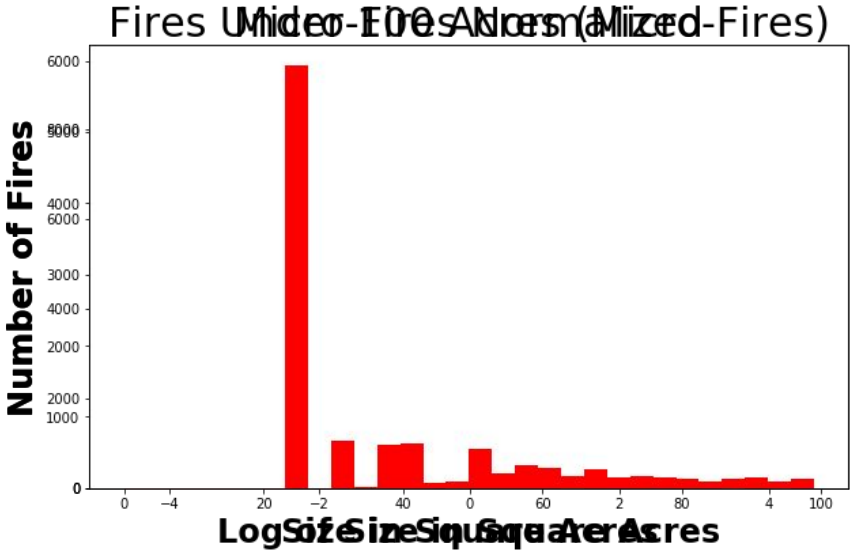
Analysis: Anomaly detection







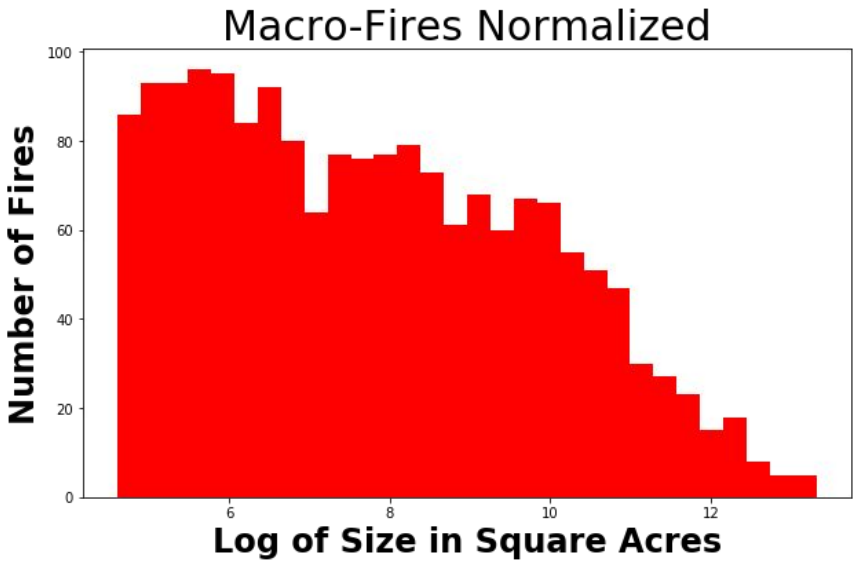
Analysis: Anomaly detection



Analysis: Anomaly detection

Macro-Fires:

13.79% of all fires

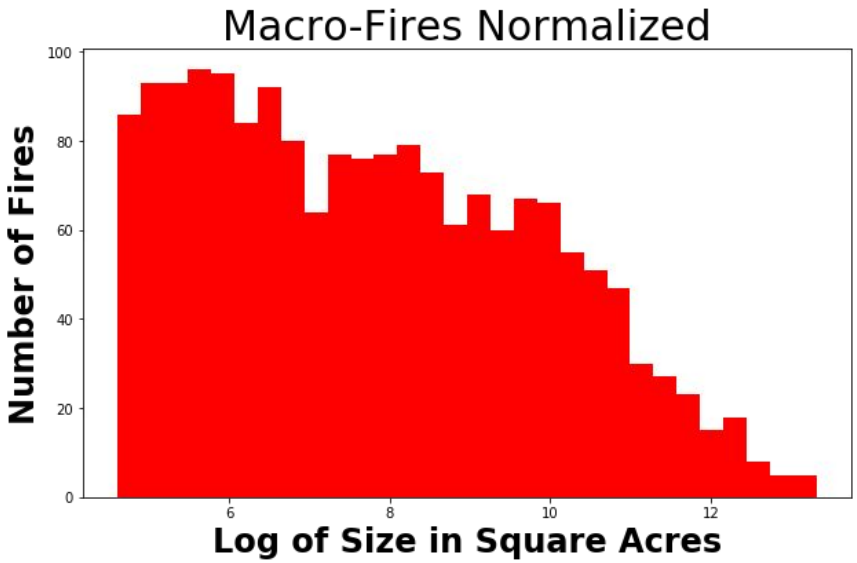


Analysis: Anomaly detection

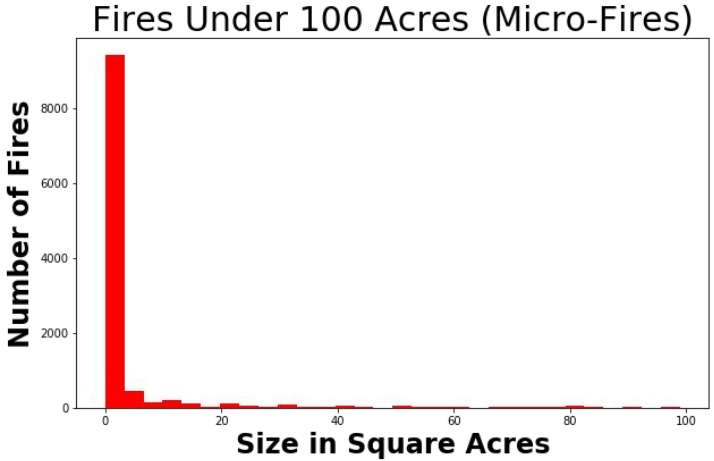
Macro-Fires:

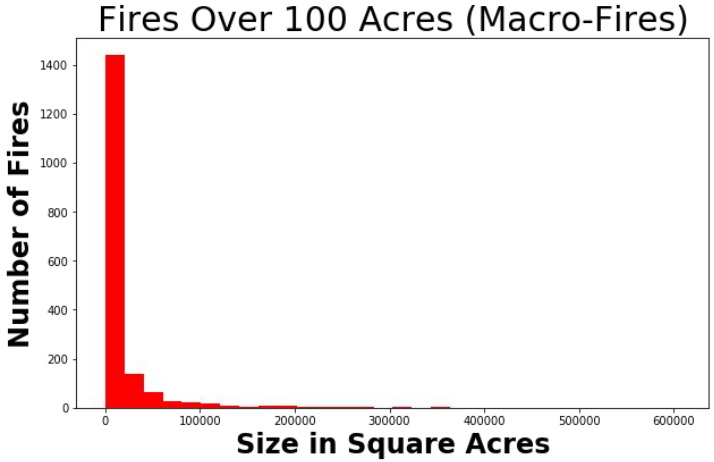
13.79% of all fires

99.86% of all damage



Modeling

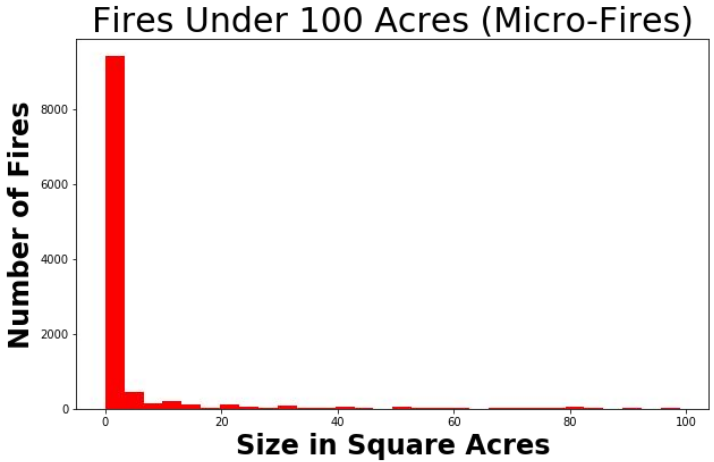

Fires Under 100 Acres (Micro-Fires)
Number of Fires
0
2000
4000
6000
8000
0
20
40
60
80
100
Size in Square Acres

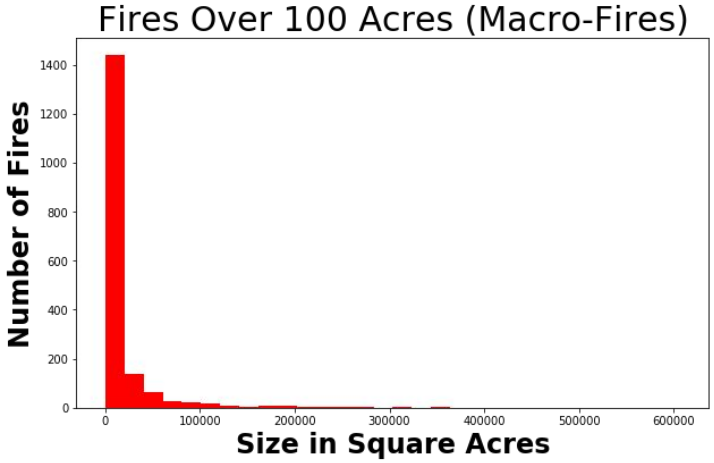

Fires Over 100 Acres (Macro-Fires)
Number of Fires
0
200
400
600
800
1000
1200
1400
0
100000
200000
300000
400000
500000
600000
Size in Square Acres

Modeling

Gamma distribution:

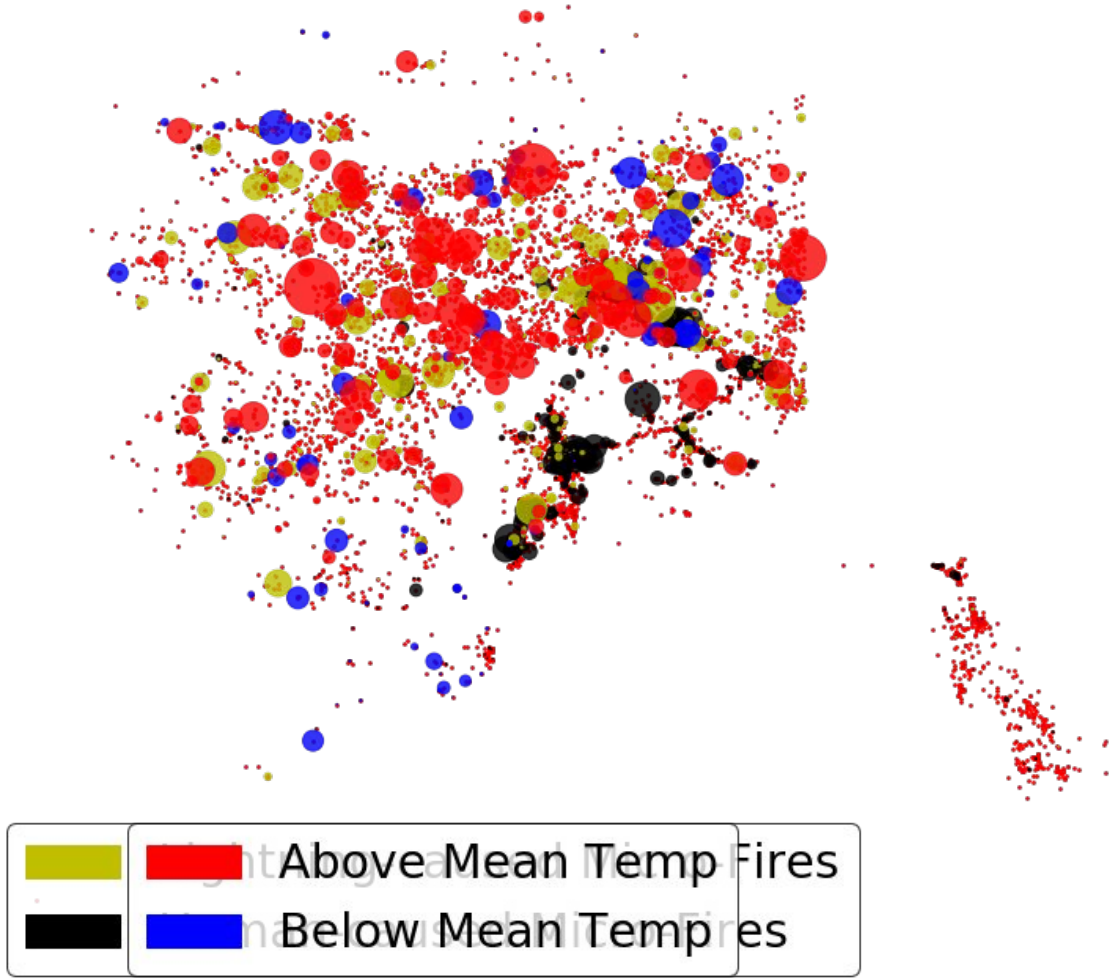
Good for heavily skewed observations





Key Takeaways

Macro-fires caused by human-ignitions tend to be larger



Other Applications

Catastrophe Modeling & Insurance Claims


Intrusion Detection
&
System Health Monitoring

Thank You!

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/n8pk

nathaniel.kelley92@gmail.com