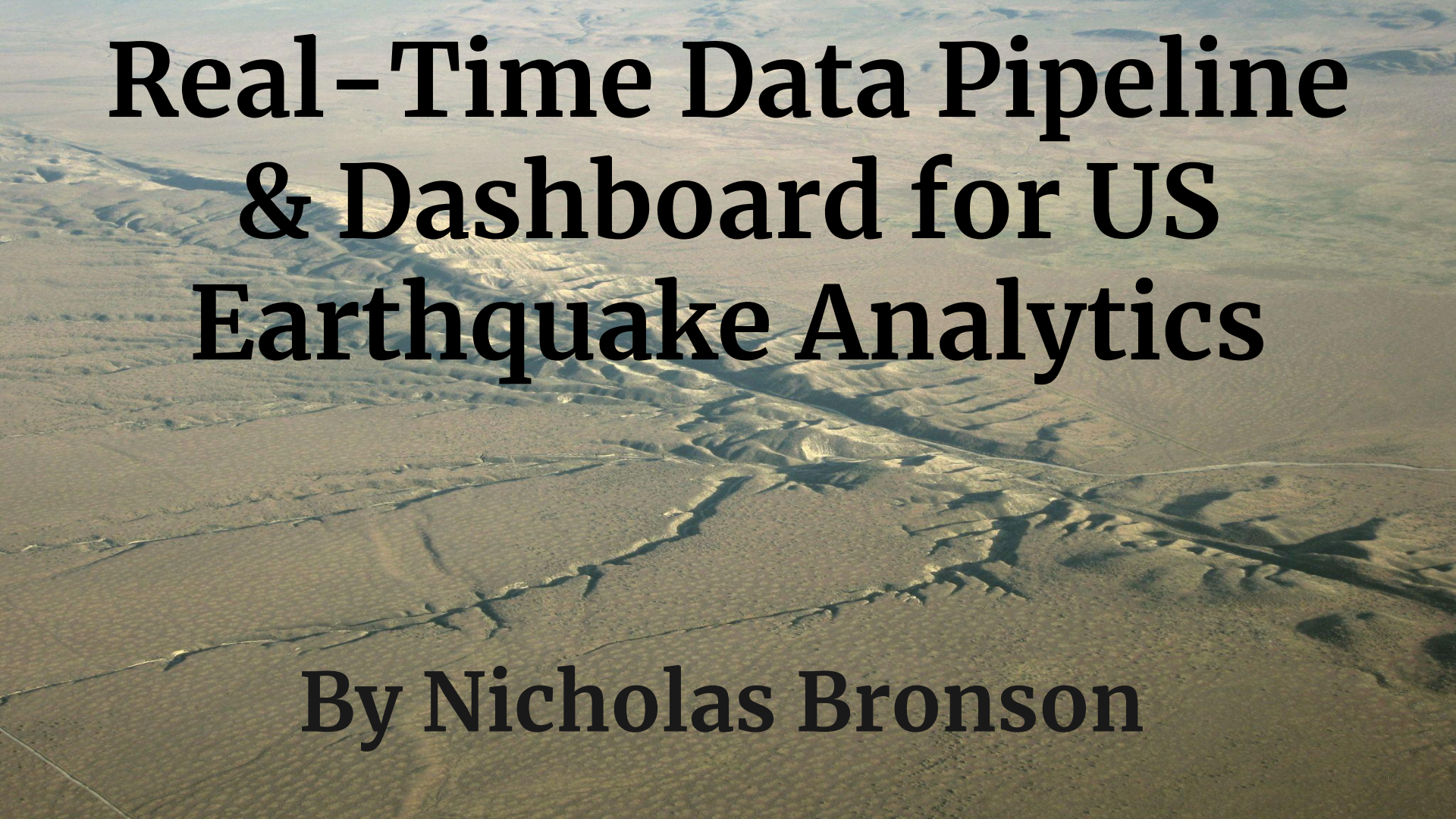


Real-Time Data Pipeline & Dashboard for US Earthquake Analytics

By Nicholas Bronson

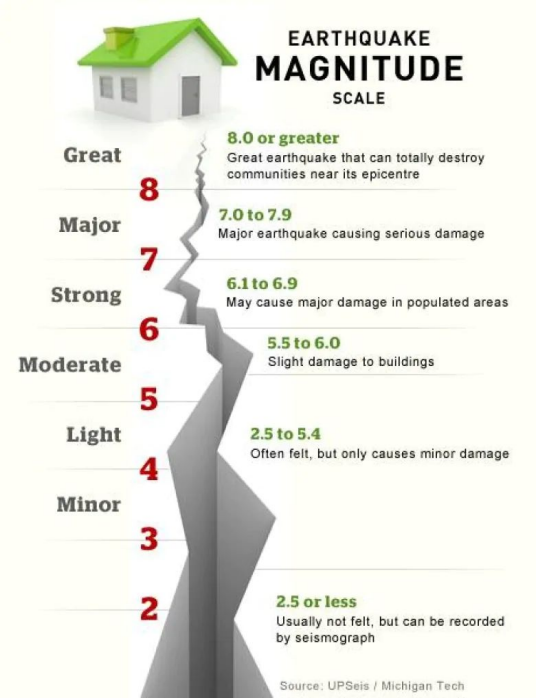
Agenda

1. Introduction & Problem
2. Data & Pipeline Setup
3. App Demonstration
4. Conclusions & Next Steps

1. Introduction & Problem

Introduction: Earthquake Basics

- Tectonic plates build tension and eventually slip past each other over an areas known as a fault line
- Earthquakes occur in waves, and vary drastically in strength, known as magnitude
- Earthquake magnitude is on a logarithmic scale, and an increase of 1 point can represent a dramatic difference in strength



Problem

Idea Catalyst: A CNN article asserted that the Blanco Fracture zone off the coast of Oregon has seen an uptick in earthquakes, some of which had a magnitude of 5.0+

Problem: Is the number of earthquakes in Oregon and off its coast increasing? Is there a way that we can easily investigate this?

2. Data & Pipeline Setup

Data

- 869141 rows of data with 22 features from US Geological Survey Quakes
  - Features include: magnitude, depth, magnitude error, latitude and longitude, depth, id, and depth error
- Data is pulled daily using an API, processed, and uploaded

Pipeline Setup

Data Pulled from USGS using API

Data ingested into DB Browser SQL database

Data preprocessing and analysis using pySpark

PySpark

Further preprocessing using Pandas

Real- time data acquired using API, processed with one-click

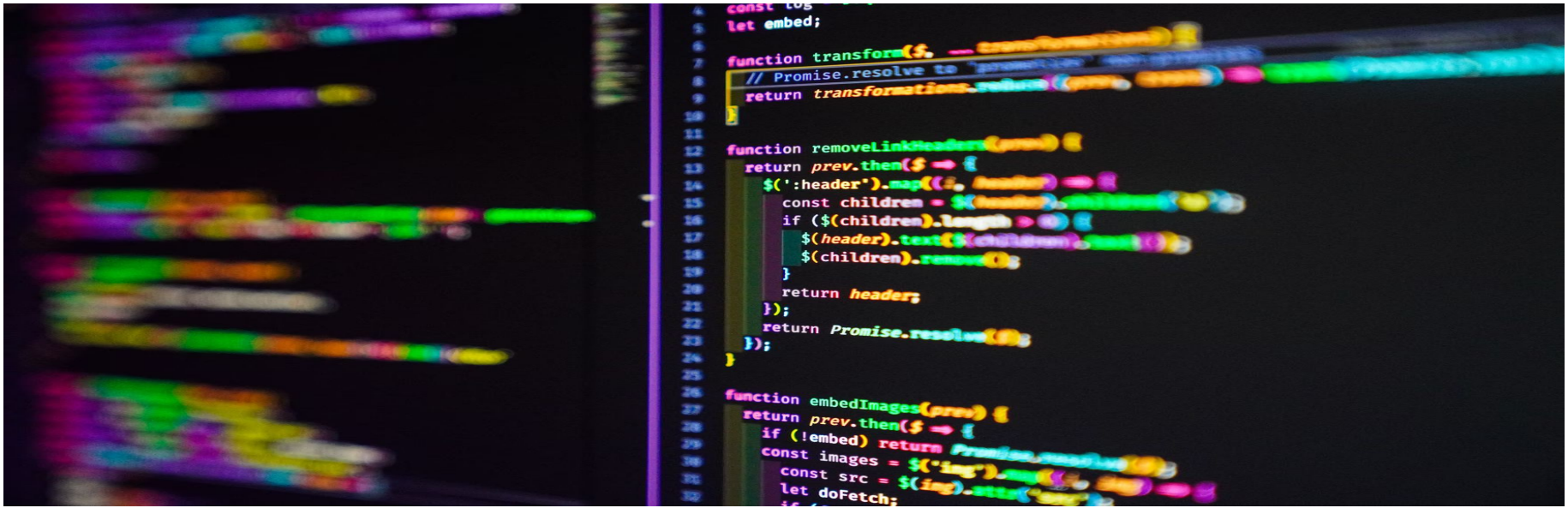
Data exported uploaded to GitHub and SQL

Streamlit Share page deployed, using data from GitHub

Streamlit

3. App Demonstration

https://share.streamlit.io/bronsonnh/streamlit_repo/main/nick-app.py



4. Conclusions & Next Steps

Conclusions

- There has been a **massive increase** in number earthquakes off the coast of Oregon. While this **does not appear to have caused any significant damage**, perhaps this trend is worth analyzing if it continues in subsequent years

- The vast majority of earthquakes in the database were **under the detectable level**, while it is interesting to notice these, it seems that studying trends around earthquakes of magnitude of 2.5+ may be more impactful

Next Steps

- Shift storage from local machine to the cloud
- Increase level of automation
- Build additional features, improve aesthetics of web page
- Build a model that can predict number of earthquakes and strength of earthquakes in a given month


Thank you!