

# Smokehouse Creek: Mapping the 2<sup>nd</sup> Largest Wildfire in Texas History

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## OBJECTIVES

The objective of this study is to perform a change detection of the Smokehouse Creek Wildfire and examine spatial relationships in the total area burnt, classification of wildfire severity, and comparison of vegetation cover before and after the fire. Due to the size of the fire, only the Smokehouse Creek wildfire will be investigated, which began approximately on February 25<sup>th</sup> and ended approximately March 16<sup>th</sup>. This will be accomplished utilizing Google Earth Engine to create Normalized Burn Ratio Indices for pre-fire and post-fire median image collections. Supporting vector data such as population and county boundaries will be used to perform spatial analysis using a POSTGIS enabled Postgres database. There is also the opportunity to enable a cloud-based spatial database to work in harmony with the analysis conducted in Google Earth Engine.

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## ASSIGNMENTS

Complete the following assignments. Deliverables will include pushing to your public GitHub and updating the README at every step.

### Project Proposal

1. Fill in the highlighted portions of this prompt. Utilize the Group Prompts for inspiration.
  - Propose at least 5 vector datasets and 2 raster images that will address your topic.
  - What relationships will you analyze? Propose at least 3 spatial queries.
2. Create a new Final Project repository and invite Jon & Kunal to collaborate on GitHub.

**Due Friday, April 5 @ 5 pm (10 Points)**

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### Assignment 1 – Data Acquisition, Processing, & Database Setup

#### 2. Find and Process Geospatial Data

- Acquire data for at least 5 vector layers & 2 rasters:
  - **Vector Data**
    1. [Texas County Boundaries \(Texas DOT\)](#)
    2. [Texas TIGER/Line Shapefile Census Tract \(US Census Bureau\) \(Population\)](#)
    3. [2021 CONUS Landcover Raster \(Polygonized in QGIS\)](#)
  - **Raster Data**
    1. [Harmonized Sentinel-2 MSI: MultiSpectral Instrument, Level-2A](#)
      1. Prefire Normalized Burn Ratio in GEE
      2. Postfire Normalized Burn Ratio in GEE
      3. Difference NBR raster in GEE
      4. Enhanced Vegetation Index raster in GEE
- Be sure to provide sources, descriptions, and visualizations in your README.

#### 3. Set Up Database Schema

- Create schema for your chosen topic.
- What attributes should you be mindful of?

#### 4. Pre-process the Data

- Process the data to align different datasets temporally and spatially.
- Be sure to capture the details in your README.

**Due Friday, April 12 @ 5 pm (10 Points)**

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**Assignment 2 – Import Spatial Data & Normalize Tables**

1. Import your data into PostgreSQL tables/schema created in Assignment 1.
2. Normalize your tables (1NF up to possibly 4NF, depending on your data) and explain the logic in your README.
  - Even if normalization is not required, explain why in your README.

**Due Friday, April 19 @ 5 pm (20 Points)**

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**Assignment 3 - Spatial Queries & Presentation**

**Perform spatial analyses to determine:**

- What is the total area of each burn class severity?
- Which counties have been affected the most by the fires (avg area burned, vegetation loss by county)?
- How does the type of landcover affect the spatial distribution of fire damage?
- How has vegetation cover (EVI) changed during the time period in which the fire took place?

**Spatial Analysis & Presentation are Due Thursday, April 25 @ 10:15 am (40 Points)**

**Final GitHub Repo & README are Due Friday, May 3 @ 5 pm (30 Points)**

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**Total: 110 Points**

**NO LATE SUBMISSIONS ACCEPTED AFTER MAY 3 -- Plan accordingly.**