Final Project Proposal

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November 28, 2023

1 Introduction / Question

Can we predict wildfire risk zones using historical wildfire, vegetation, and climate data in the califorina region?

2 Data

The data for this study will be collated from the following sources (At the current moment. Subject to change.):

1. Historical Wildfire Data: `https://modis.gsfc.nasa.gov/data/dataprod/mod14.php`

2. Vegetation Data: `https://www.usgs.gov/core-science-systems/science-analytics-and-synthesigap/science/land-cover-data-download?qt-science_center_objects=0#qt-science_center_objects`

3. Climate Data: `https://www.ncdc.noaa.gov/cdo-web/`

3 Project Outline

3.1 Objective

identifying high-risk wildfire zones using historical data.

To approach this problem, an autoencoder will be used to extract key features from complex data, and a CNN will analyze spatial correlations from the satellite imagery. Finally, we can use the LSTM to take into account the temporal climate instances to predict wildfire risk zones.

3.2 Data Visualization

Data will be visualized to directly support the modeling process, using Python libraries to:

1. Display extracted features from the autoencoder.

2. Visualize patterns identified by the CNN and present the predictions.

3. Visualize the LSTM predictions given the historical climate data.

3.3   Modeling

3.3.1   Autoencoder

The autoencoder will be used to extract key features from complex data, such as satellite imagery, to reduce noise and improve model performance.

3.3.2   CNN

The CNN will then analyze these features to identify spatial patterns that will be key for predicting wildfire risk zones.

3.4   LSTM

The LSTM will be used to take into account the temporal climate instances which will give the model more context to predict wildfire risk zones.

3.5   Visualization of Results

Results will be presented in a simple format, such as risk zone maps based on the CNN analysis.

4   Conclusion

This project will yield:

1. An autoencoder-CNN-LSTM integrated model for wildfire risk prediction.

2. Clear visualizations that illustrate the model's predictive capabilities.