The Impact of Terrain and Other Factors on Wild Fires

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The fire data set I worked with was the MOD14A1.006 Terra Thermal Anomalies & Fire data set, which was at a scale of 1000 meters per pixel. Originally, the data came in a collection of images, or raster objects, with an image for each day for the last 19 years. The first thing I did with this data was to filter the data down to one year, specifically 2012, and assign the day of the year it was created as a value in the data itself. This, then, allowed me to reduce all 365 images for the year into one image which recorded the last day that a fire was detected in a location. (Fig. 1) Next, I used Google Earth Engine’s canny edge detector on this maximum image to find the terminal edges of each fire, which would work as a simple present or not present class for the classifiers.

The road data was available only as a set of lines describing each road in the United States. Using conversion tools available in Earth Engine, I converted this set into a single image detailing every local, secondary, and primary road, as identified by the US Census Bureau. To facilitate the use of this data in a classifier, I used this image to create a new image that described each pixel’s minimum distance from a piece of road.

Next, I obtained an image for elevation and used the terrain tools in Google Earth Engine to easily obtain a slope image as well.

With this data now available, I semi-randomly selected three fires of various sizes with which I could train the classifiers. Once trained, I had each classifier generate a confusion matrix, from which I could get the accuracy of the classifiers, and in turn, deduce how useful elevation, slope, and roads are for predicting the terminal edges of wild fires.