**fire\_index\_mapping.py**

**Reduction in map to reduce computation time:**

Area State of California: 163,696 mi²; execution time 2500 seconds

Area County of Los Angeles: 4,753 mi²; estimated execution time 72.6 seconds

actual execution time 384 seconds

**Explanation:**

1. **Correct create\_fire\_index\_map():**
   * The function now takes both california\_geojson and la\_county\_polygon as arguments.
   * It uses la\_county\_polygon to check if a point is within LA County using la\_county\_polygon.contains(point).
   * It adds the LA County boundary to the map by finding the "Los Angeles" feature within the California GeoJSON.
2. **Robust LA County Polygon Extraction:**
   * create\_fire\_index\_map() Simplified: This function is now much simpler. It just takes grid\_data and index\_type and plots the points. It doesn't need to deal with GeoJSON or boundary checks.
   * LA County Boundary Check in Main Loop: The main execution block now directly uses the min\_lat, max\_lat, min\_lon, and max\_lon values to filter the la\_county\_grid points. Only points within these latitude and longitude bounds are processed and added to grid\_data.
   * Includes error handling in case LA County is not found in the GeoJSON.
3. **Fire Boundaries:**

* The code now fetches the California GeoJSON data using the provided function.
* The create\_fire\_index\_map() function filters the GeoJSON features to only include those that intersect with the LA County bounding box, defined by min\_lat, max\_lat, min\_lon, and max\_lon.
* Directly Appending to fire\_perimeters: The if a\_county\_bbox.intersects(polygon) block now directly appends the polygon object (which is either a Polygon or a MultiPolygon) to the fire\_perimeters list.
* Creating a MultiPolygon: The folium.GeoJson() call creates a shapely.geometry.MultiPolygon(fire\_perimeters) object from the list of Polygon/MultiPolygon objects in fire\_perimeters, ensuring that every intersecting fire perimeter is treated as a single geometry for the GeoJSON layer.
* The filtered fire perimeters are added as a separate layer to the map.

1. **Grid Spacing:**
   * grid\_spacing is set to 0.1 to create a denser grid of points within LA County, resulting in a more detailed map.
2. **Main Execution Block:**
   * Calls get\_california\_geojson\_from\_cnra\_api() to get the GeoJSON data.
   * Passes the california\_geojson and the LA County boundary coordinates to create\_fire\_index\_map().
3. **Error Handling:**
   * The try...except block in the main loop handles potential errors gracefully, preventing the script from crashing if there are issues with weather data for specific locations.
4. **Clear Comments:**
   * The code includes comments explaining the purpose of each section and any important considerations.