EXERCISE 8
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Geospatial and Temporal Visualization

Motivation

West Nile virus has recently been more common in North America. It is spread through the bite of an infected mosquito. Experts believe that it is a seasonal epidemic in North America. They believe that it is more prevalent in the summer and continues through fall. In California, the first reported incident of WNV was in 2002. By 2004, WNV was identified in all 58 California counties. This data visualization explores West Nile Virus across California counties. The data is from 2006 to 2015. The aim is to easily recognize which counties are WNV hotspots, and which year and weeks have seen more incidents.

Tasks

1. Identify all the counties included in the dataset with a marker.
2. Quickly identify the counties where WNV is prevalent.
3. Find which week and year has the most number of positive cases per county.

Visualization

The main tool used for this activity is LeafletJS, which is a javascript library for creating interactive maps. It contains many of the mapping features necessary for this type of project. It is simple to use and is able to create aesthetically pleasing graphs. With LeafletJS, one can create layers on top of the main map layer.

The main layer is a map of Mapbox Streets which uses OpenStreetMap as a data source. Mapbox Streets is a tileset that is available to all Mapbox users. OpenStreetMap is updated continuously, so it always contains up-to-date features. For this visualization, the map's initial zoom level is at 5.5, which is just enough to see the entirety of California state right away, which is our region of interest.

The next layer is the circle markers. The locations of the markers are the counties where positive cases of WNV were identified. The fill color is red, which is closely affiliated to mosquito bites, with black as border to show delineation. The size of the markers are a function of the number of positive cases of WNV per county per week per year. In Figure 1, we can see right away that counties in southern California have more incidents of WNV, with Los Angeles showing the largest number of reported positive cases.
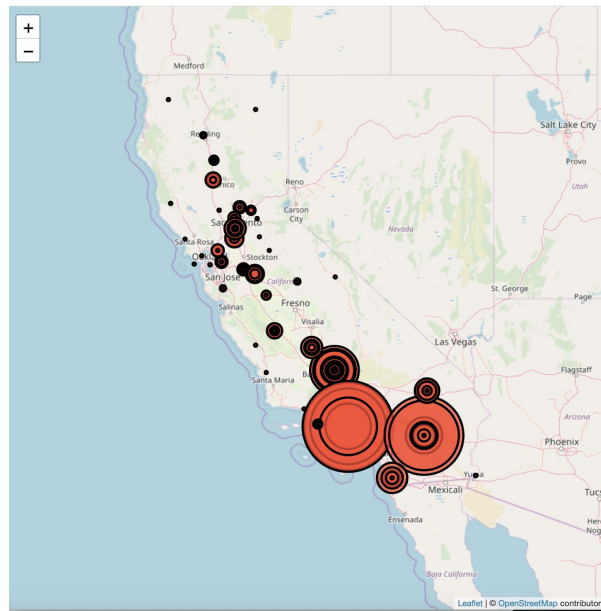
Figure 1. Mapbox Streets layer with Circle Marker, showing where and the relative number positive cases of West Nile Virus.
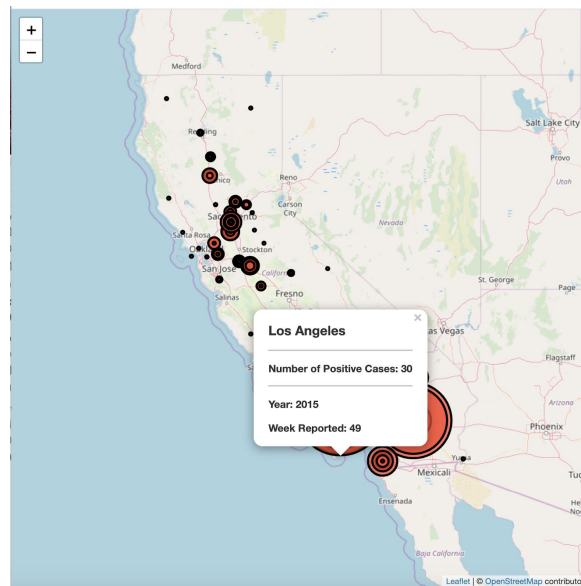

Figure 2. Interactive popup showing details regarding West Nile Virus data on a particular location.

The circle markers are interactive. When clicked on, there is a popup that shows some details about the markers: the county, the exact number of positive cases, the year and the week it was reported (See Figure 2).

Findings

With these details from the markers and the popups, we can infer that 2015 was the year when WNV was the most prevalent. Since the data is from 2006 to 2015, one can infer that either the number of WNV is increasing over the years, or the incidents are being reported more than the previous years (due to increasing awareness, perhaps). As next steps, a visualization that looks at the trend over the years would helpful to gain insight regarding this.

One surprising find from this activity is that the weeks during fall and winter are showing more cases of WNV than the expected weeks during the summer. With further contemplation, this shows that California is an exception to the belief that WNV is an epidemic during the summer to fall months. California, particularly southern California, experiences warm temperatures during the fall and early winter weeks compared to other states, and hence, is still able to harbor mosquitoes during these months.