

# Final Project: Farmers Markets Information Via Interactive Google Maps

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## Focus and Motivation

The motivation of this task is to explore how graphics and visualizations can assistance statistical analyses, and the focus of this project is to explore and combine different packages in R to create interactive web applications.

## Data

This dataset, *Geographic Coordinates for U.S. Farmers Markets*, was taken from [www.data.gov](http://www.data.gov) via the USDA National Farmers Market Directory, and it provides information about farmers markets in the US. Particularly, this dataset has 7864 observations that are self-reported to the AMS by market managers. It gives the location of the markets (including the longitudes, latitudes, and name of locations), the markets IDs, and the list of products that are sold at those markets. Given the longitude and latitudes, we can first take a look at the spread of farmers markets on a static Google Maps (see Figure 1).

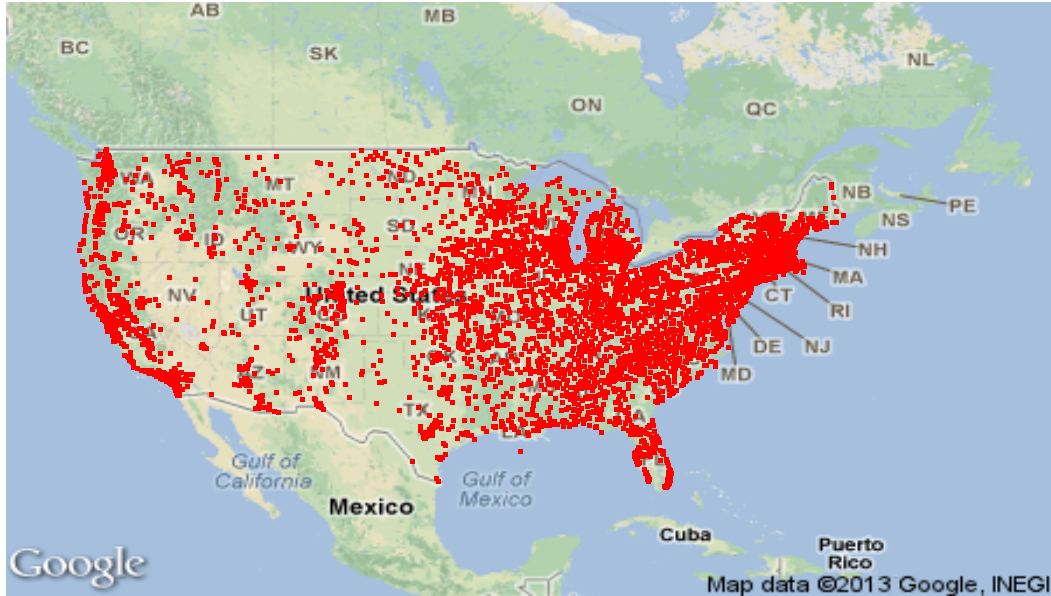


Figure 1: Farmers Markets Locations

## Methodology

We will mainly use the packages RgoogleMaps, googleVis, and shiny to create interactive maps that provide specific information about each market. The RgoogleMaps package provides static maps in R and allows users to plot on top of them. Similarly, googleVis also provides nice maps; in addition to that, it also allows users to visualize data stored in R data frames with the Google Chart Tools without uploading the data to Google. Most importantly, googleVis can link with the shiny package to allow R users to report analyses in interactive web applications.

The RgoogleMaps package is challenging to use because it is uneasy to get the best size of the map. The functions in this package require a zoom for the requested images, but they must be integer zooms, so it is impossible to get sizes in between numbers. Therefore, it is more efficient to use the googleVis package.

## Data Analyses

By taking a brief look at the data, we can check the count of farmers markets in each state by color coding the US map. The darker the color indicates the higher the counts in the corresponding states. Users can point to a state, and the map will show a tag that gives the information of interest (see Figure 2).

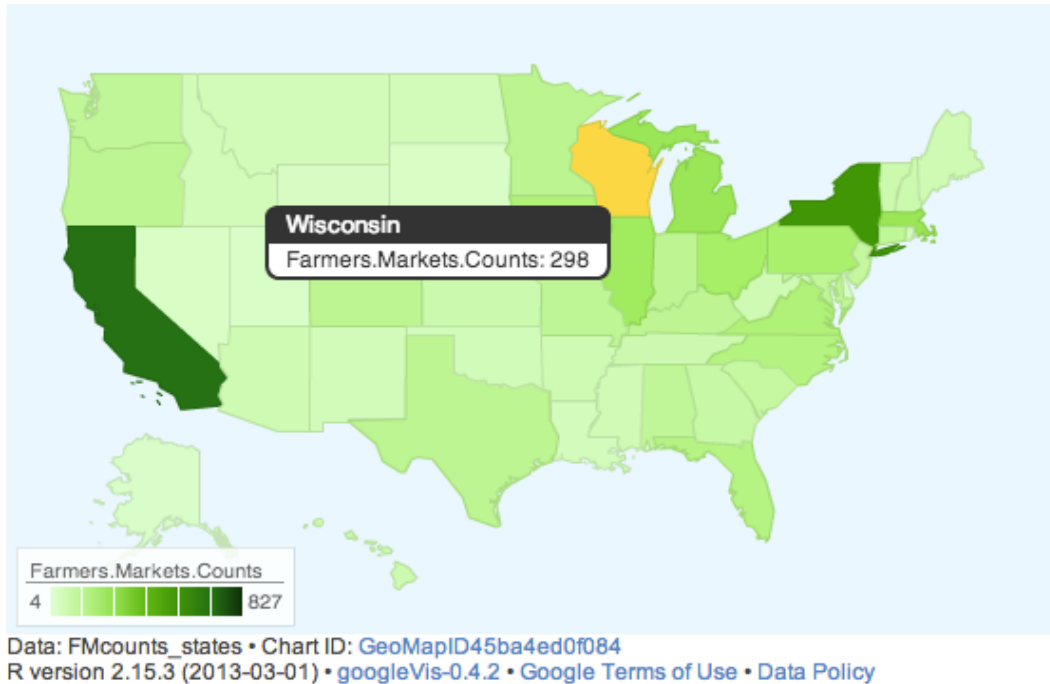


Figure 2: Farmers Markets Counts

Furthermore, we can take a look at the markets by the products they sell. Here we used the shiny package to create an interactive web application. We will create a ui.R and a server.R files in our directory, where ui.R is responsible for rendering webpage inferences, and server.R manages the calculation in R.

The dataset gives a binary subset that indicates whether a market sells a certain product. Therefore, in the shiny web application, we can create a side bar that gives users options of products that markets sell, and we will create a map on the side that shows the markets that sells the selected product. Below is the layout of this application:

## Market Products

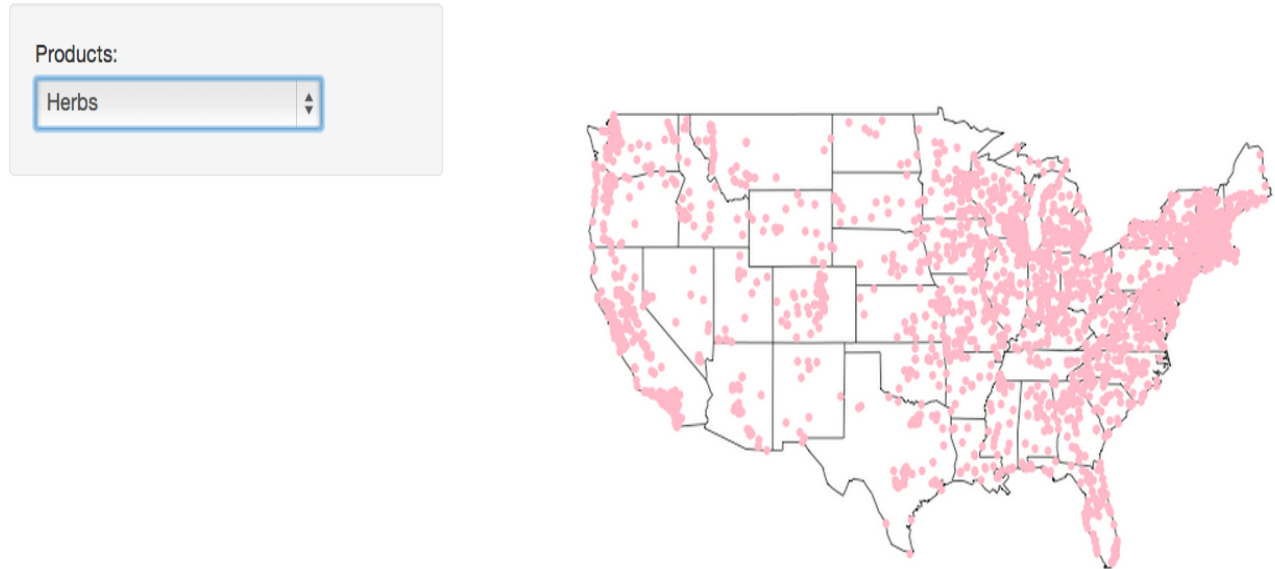


Figure 3: Farmers Markets by Products

In addition to the simple map in the application, we can combine the googleVis and shiny to bring in satellite maps and more functions. In this application, we will subset data by states, and we will plot those data on a satellite map. When users click on a placemark on the map, a tag will pop up and provide the users with furthermore information about that specific farmers market. Below is the layout of this application:

## Farmers Markets by States

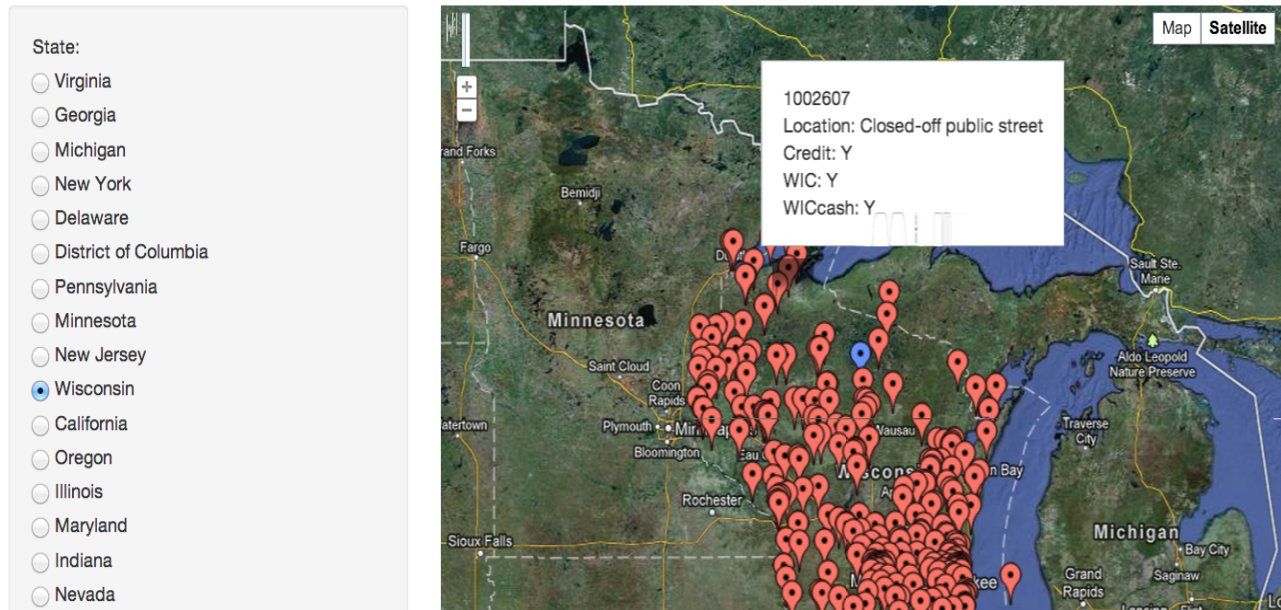


Figure 4: Farmers Markets by States

## Conclusion

These applications provide users an interactive environment; in other words, these applications creates more than two dimensional data analyses. In the future, we can try combining even more graphics or tables to the applications to answer even more questions for users.