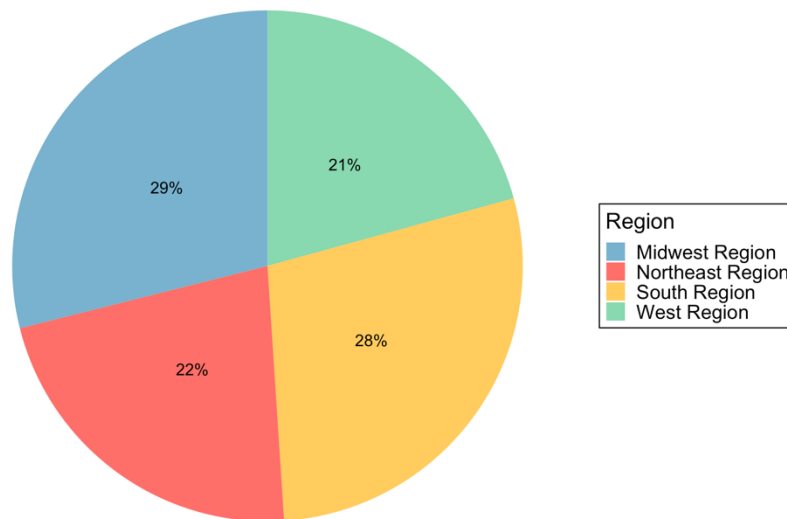1. For this problem you need not depend on map-based visualizations. You can come up with innovative visualization techniques (city or county or state based) that gives geography-based insights about the farmers market.

Distribution of markets geographically

Region	States
Northeast region	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, Pennsylvania
Midwest region	Illinois, Indiana, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota
South region	Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, District of Columbia, West Virginia, Arkansas, Louisiana, Oklahoma, Texas, Alabama, Kentucky, Mississippi, Puerto Rico, Virgin Islands, Tennessee
West region	Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, Alaska, California, Hawaii, Oregon, Washington

- Farmers markets are distributed all across the United States. If we split U.S. geographically into four separate regions, i.e.- Northeast region, Midwest region, South region and West region, we can find that the majority of these markets (29%), are located in Midwest region. The pie chart clearly represents the distribution of markets according to different regions.

- Midwest region has the greatest number of markets, with 29% of all the markets being located in Midwest region, followed by South, Northeast and West regions with 28%, 22% and 21% of all the markets being located in respective regions.

Distribution of markets geographically

Region
- Midwest Region
- Northeast Region
- South Region
- West Region
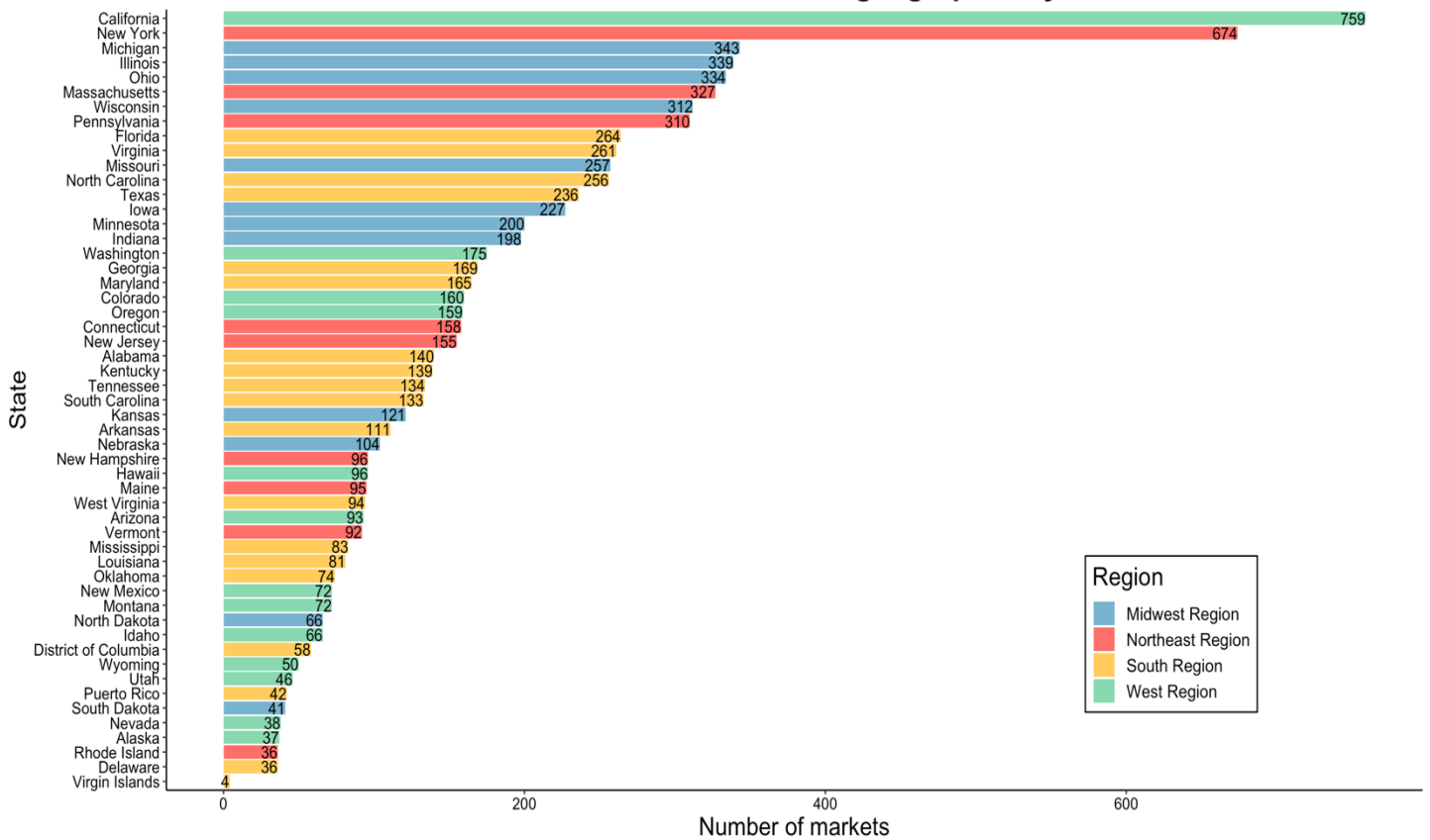
If we dig further, we can observe that the distribution of the farmers markets in a particular region is not uniform and this can be clearly observed from the bar plot.

- The markets in west region has very non uniform distribution; among all the markets that are located in the west region, California itself has 759 markets, while none of the other states in the west region have more than 200 markets located in them individually. In northeast region, there are 674 markets located in New York while there are only 36 markets in Rhode Island. Even in south region the distribution of markets is non-uniform; Florida has 264 markets, while Virgin Islands have only 4 markets.

- Furthermore, if we compare state wise, California ranks first in number of markets with 759 markets, followed by New York, Michigan, Illinois and Ohio with 674, 343, 339 and 334 markets.

2. Give time-based insights (trends) that show the evolution of farmers market.

Evolution of markets
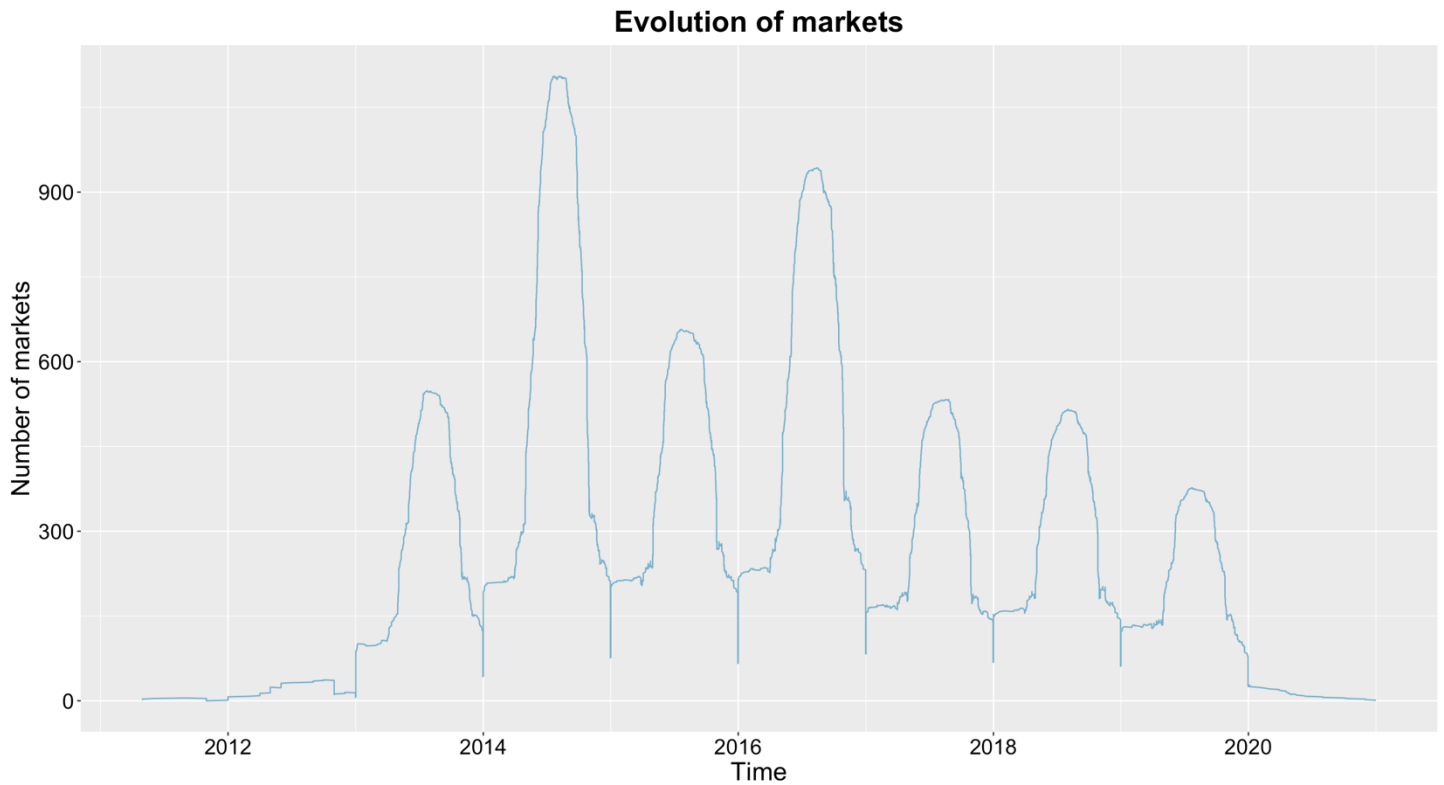
- The number of farmers markets in the U.S. hadn't been always the same over the period of time, and we can observe that from the time series plot. The highest number of markets in U.S. were in the mid of the year 2014, with approximately 1,100 markets, followed by mid of the year 2016, with approximately 950 markets.

- Since the year 2016, there has been decrease in number of markets. There was a drastic decrease in number of markets in the year 2017 as compared to the year 2016, and then after, there has been a gradual decrease in the number.
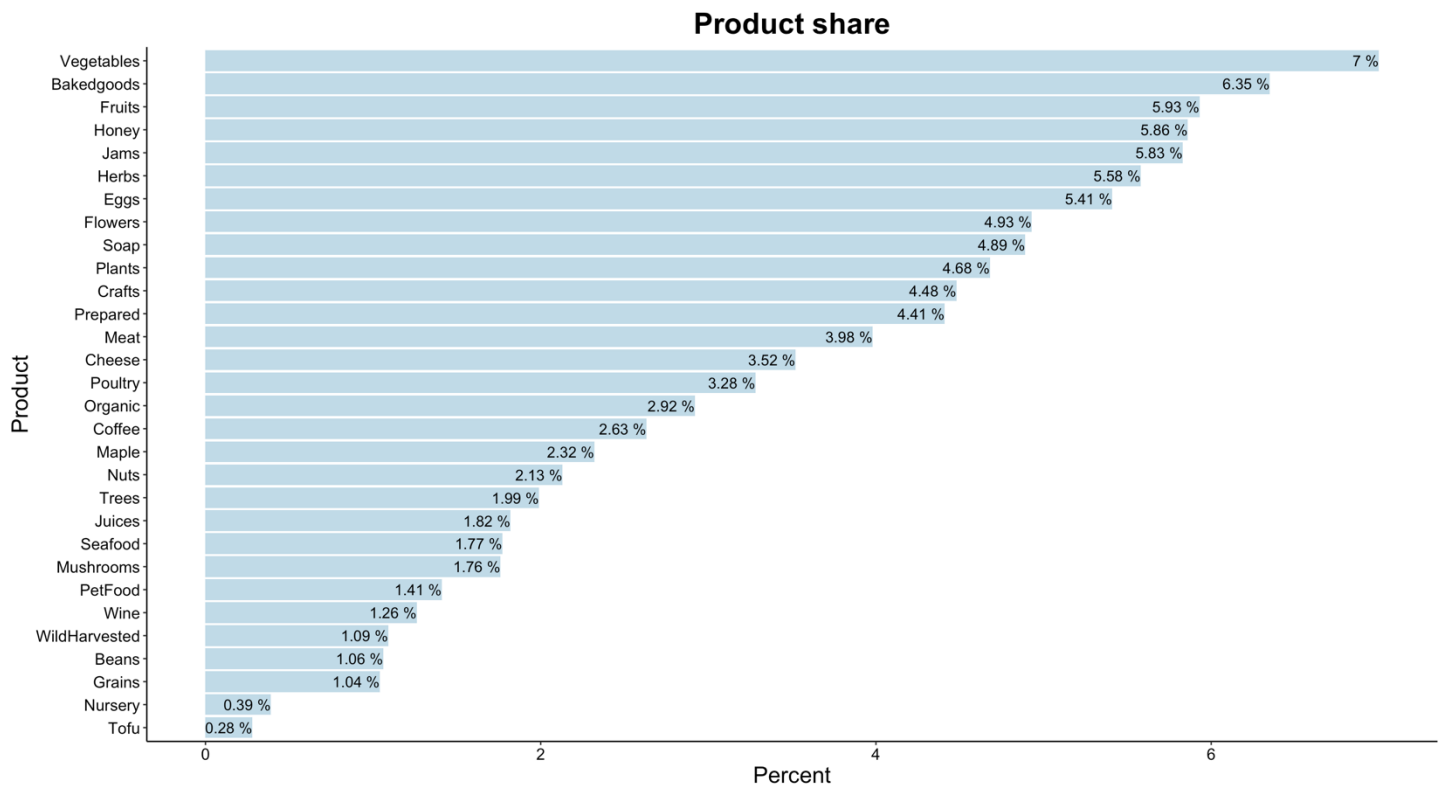
Duration of markets
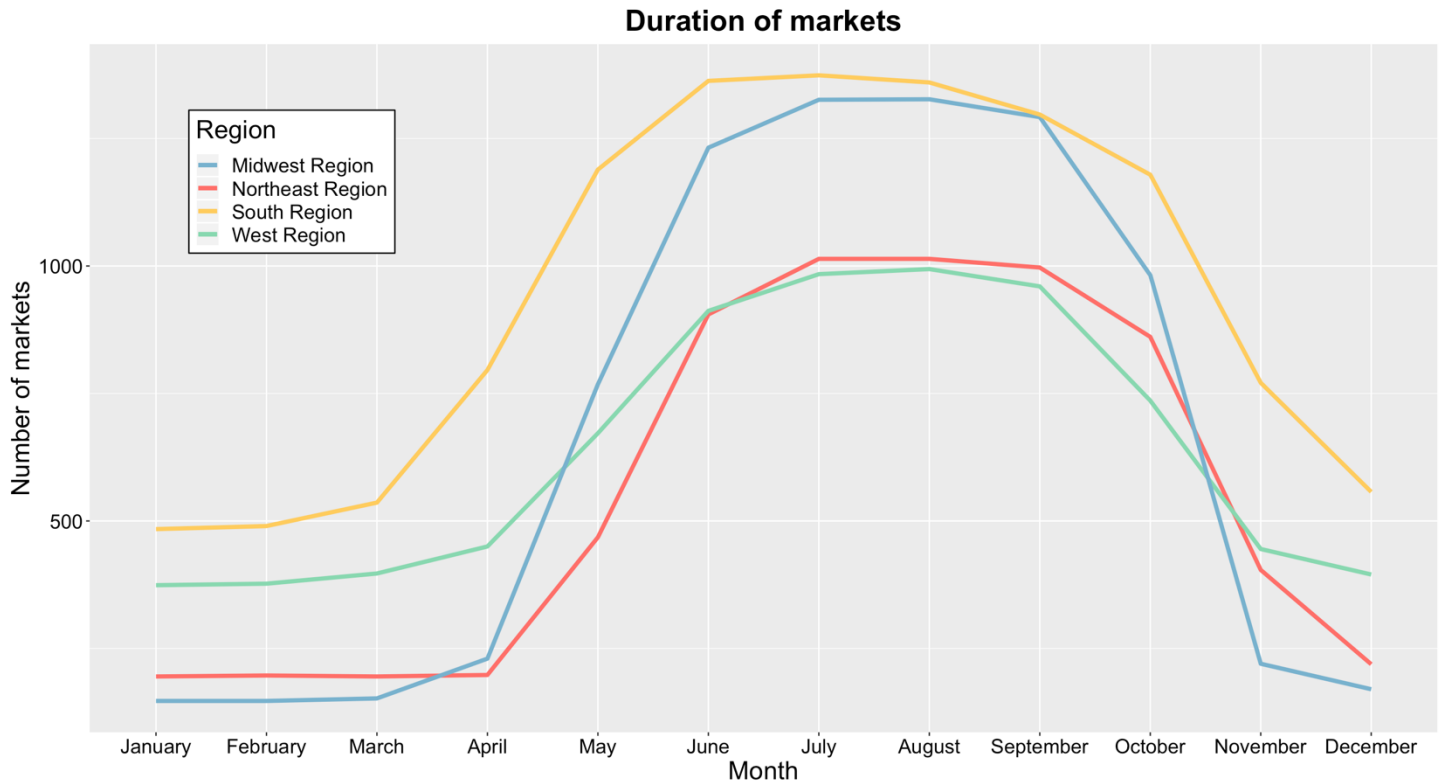
- Furthermore, the markets open and close yearly, i.e.- for a particular year, the markets are not open for the whole year. They open, remain open for some time and then close down. Opening and closing of markets follows a cyclic trend and is evident from the time series plot.

- The reason why the time series plot shows a drastic upward trend from April and then gradually goes downwards from the month of September is because majority of the markets open in mid of March and then close in the month of September. Although, as we can see that there are a few markets that open between January and March and close between November to December. This trend of opening and closing is same irrespective of the region.

3. Give product-based insights that helps the client to understand the type of products or product mix in farmers market across the country.

Products offered in farmers market
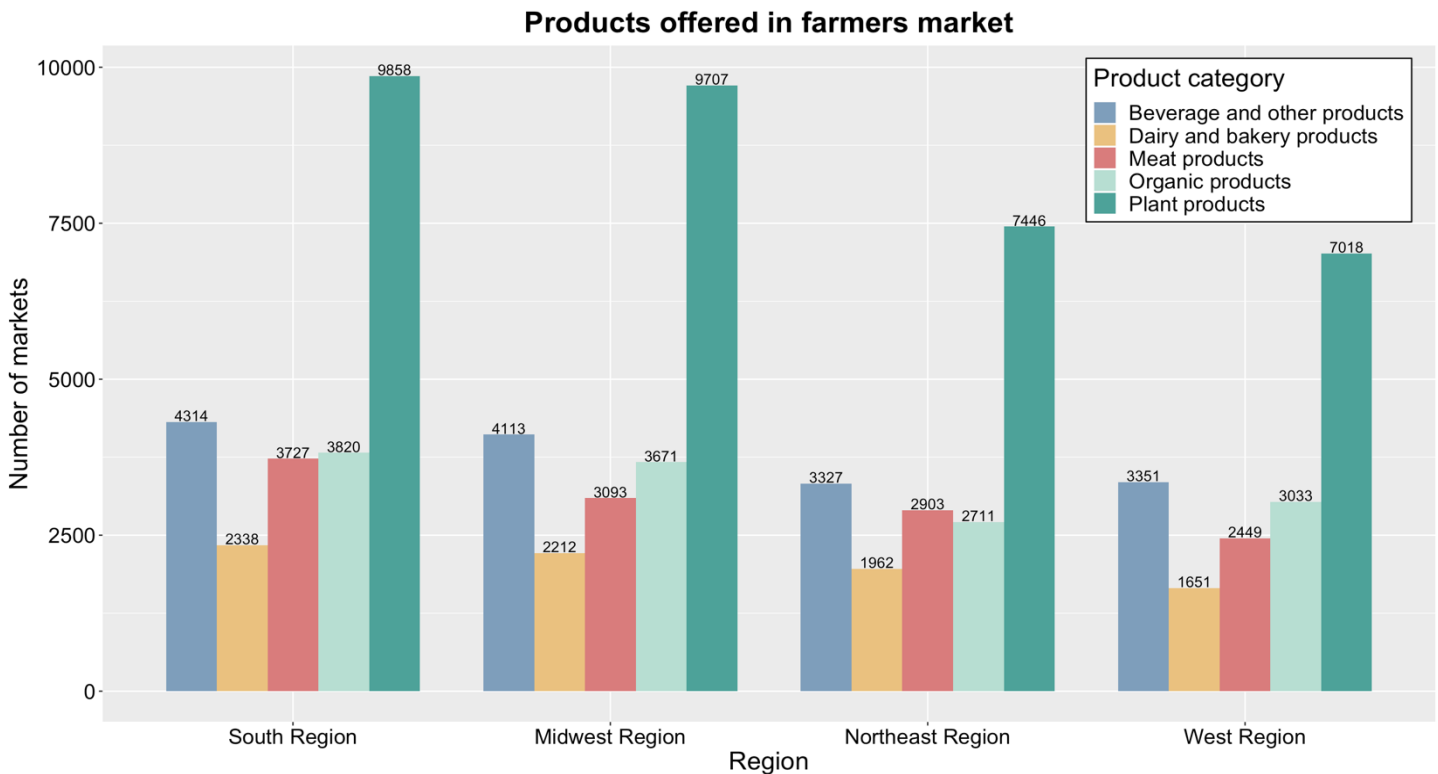
Category	Item
Dairy and bakery products	Baked goods, Cheese
Meat products	Eggs, Seafood, Meat, Poultry
Plant products	Herbs, Vegetables, Honey, Jams, Maple, Nuts, Beans, Fruits, Grains, Mushrooms, Coffee
Organic products	Organic, Wild Harvested, Trees, Plants, Flowers, Nursery, Tofu
Beverage and other products	Prepared, Soap, Pet Food, Wine, Juices, Crafts

- There are variety of products that are available at farmers markets ranging from fruits to pet food. These products can be categorized into 5 categories, namely, plant products, meat products, dairy and bakery products, organic products and beverage and other products. The number of markets selling these categories of products can be seen in the grouped bar plot.

- Overall the trend can be found to be almost same for all regions, i.e.- plant based products are available in greatest number of markets, while dairy and bakery products are available in least number of markets.

- In South region, there are 9858 markets those have plant-based products, 4314 those have beverage and other products, 3727 those have meat products, 3820 those have organic products and 2338 those have dairy and bakery products. In Midwest region, there are 9707 markets those have plant-based products, 4113 those have beverage and other products, 3093 those have meat products, 3671 those have organic products and 2212 those have dairy and bakery products. Similarly, for Northeast and West regions.

Product share

| Product	Percent
Vegetables	7 %
Bakedgoods	6.35 %
Fruits	5.93 %
Honey	5.86 %
Jams	5.83 %
Herbs	5.58 %
Eggs	5.41 %
Flowers	4.93 %
Soap	4.89 %
Plants	4.68 %
Crafts	4.48 %
Prepared	4.41 %
Meat	3.98 %
Cheese	3.52 %
Poultry	3.28 %
Organic	2.92 %
Coffee	2.63 %
Maple	2.32 %
Nuts	2.13 %
Trees	1.99 %
Juices	1.82 %
Seafood	1.77 %
Mushrooms	1.76 %
PetFood	1.41 %
Wine	1.26 %
WildHarvested	1.09 %
Beans	1.06 %
Grains	1.04 %
Nursery	0.39 %
Tofu	0.28 %

- The bar plot helps us understand shares of different products in the market. Among all the 30 products that are available in the market how many percent are dedicated to one specific product.

- Among all the products that are available in the farmers market, vegetables are the most easily available product followed by baked goods and then fruits. 7% of all the products that are available in these markets comprises of vegetables, 6.35% are baked goods and 5.93% are fruits. While, of all the products that are available in these markets, Tofu is available only in 0.28%

4. Give insights on payment modes used by the farmers market.

Payment methods accepted in markets
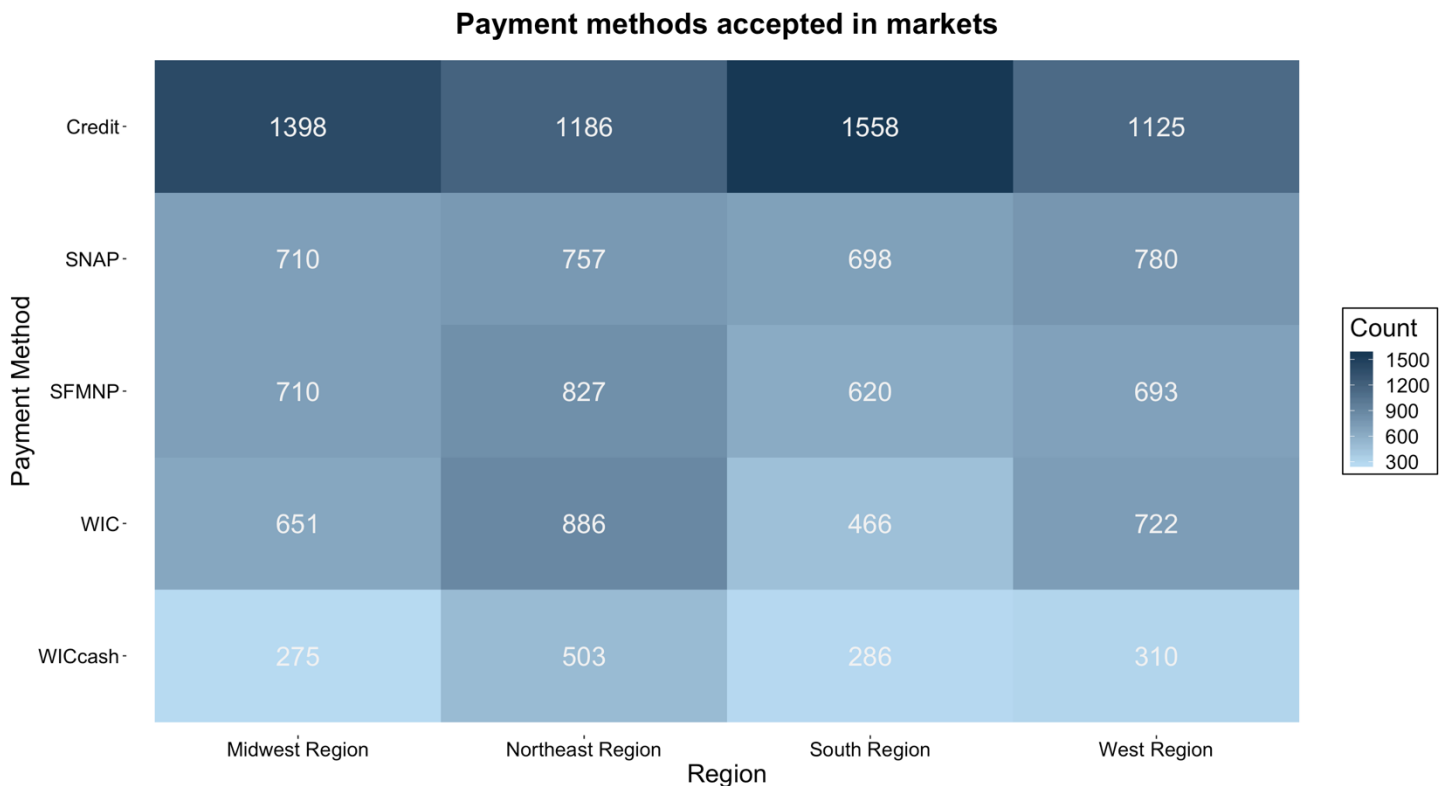
- Farmers market accept 5 methods of payment, namely- Credit, SNAP, SFMNP, WIC and WIC cash. The plot helps us understand "on an average, how many markets in a specific region accept a particular payment method?". The darker shades represent that the particular payment method is more familiar and is widely accepted, while a lighter shade represents less familiarity of that method and very less markets accept that payment method.

- Overall the credit is the most accepted mode of payment in all the regions, while the WIC cash is the least accepted payment method in all the regions. Credit is accepted in 1398 markets in Midwest region, 1186 markets in Northeast region, 1558 markets in South region and 1125 markets in West region.

- In Midwest region, 1398 markets accept credit mode of payment, 710 accept SNAP payment method, 710 accept SFMNP method, 651 accept WIC, while only 275 accept WIC cash. In Norteast region, 1186 markets accept credit mode of payment, 757 accept SNAP payment method, 827 accept SFMNP method, 886 accept WIC, while only 503 accept WIC cash. And so on for South and West region.

Evolution of payment methods in farmers market
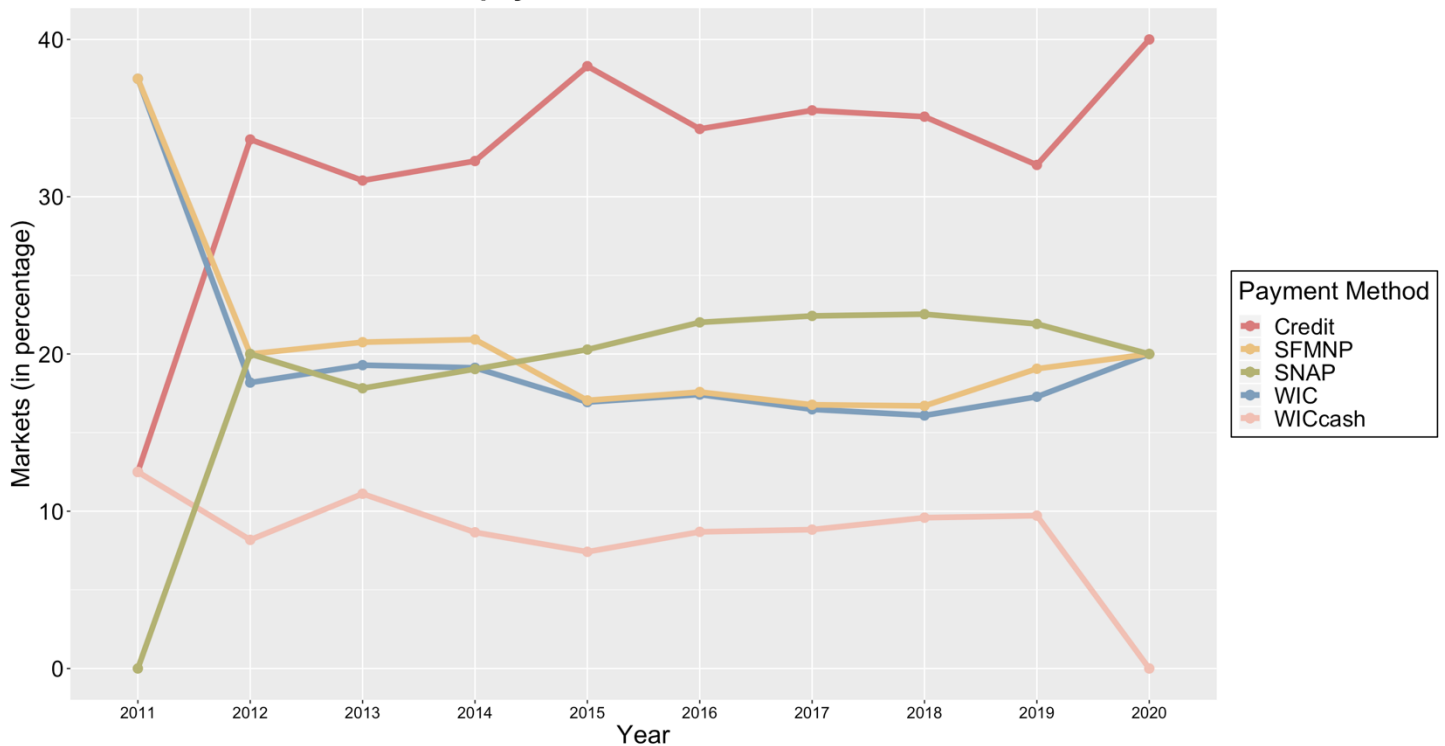
- This plot helps us get insights on "how the percent of markets accepting a particular mode of payment has changed over the period of time?". It is evident from the plot that more and more percent of markets have started to accept credit payment method, and on the other hand, fewer and fewer markets are accepting WIC cash.

- The percent of markets accepting credit payment method has gone up from 12% in the year 2011 to 40% in the year 2020. In contrast to that, percent of markets accepting WIC cash payment method has gone down from 12% in the year 2011 to 0% in the year 2020. While the percent of markets accepting other payment methods such as SFMNP, SNAP and WIC have almost remained constant after the year 2012, i.e.- around 15% to 25%, over the period of time.

5. Give insights that are derived from the combination of above four question
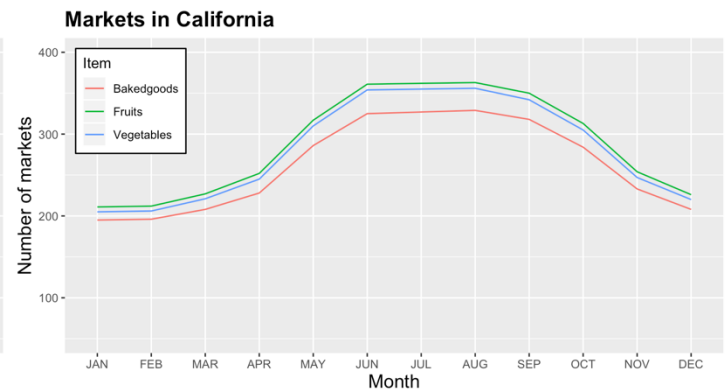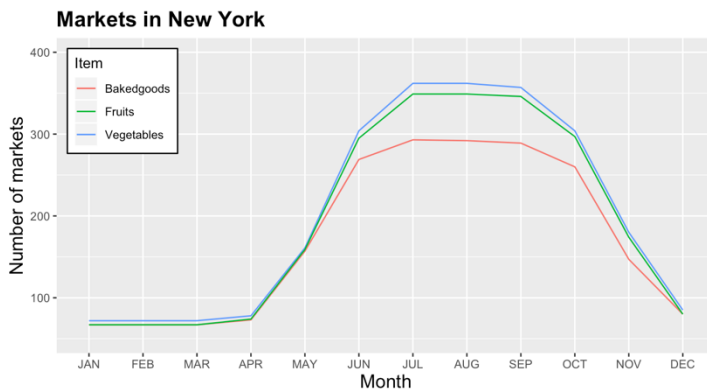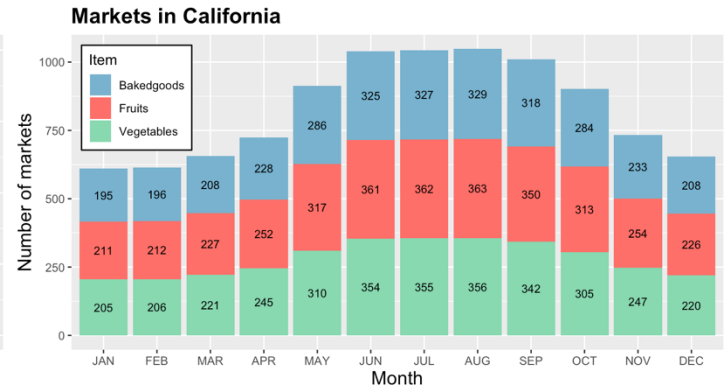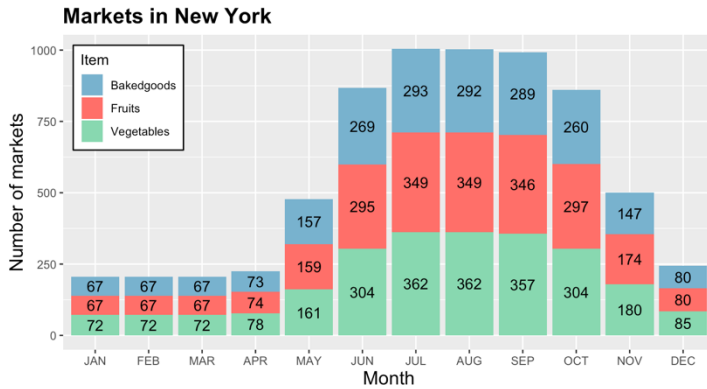
To get some more insights on the farmers market, I took the states with maximum number of markets (California and New York) and the products that are available in maximum number of markets (vegetables, baked goods and fruits), and plotted the average number of markets per month for each of the three products.

- From the plots, we can observe that the average number of markets for the products in any month are always more in California than in New York. Even the curve of average number of markets per month is somewhat flat or we can say the curve is evenly spread out in California as compared to New York. In New York there is drastic increase in number of markets for the three products from the month of April to June and then again drastic decrease in the number from September to December. Comparatively, in California, the number of markets for the three products increases gradually from April to June and then again decreases gradually from September.

- On the national level the number of markets providing vegetables is highest, followed by baked goods and then fruits, but the pattern is different when it comes to these two states. In New York, there are a greater number of markets for vegetables, just like on national level, but after vegetables, there are more number of markets for fruits and then baked goods. And in California, greatest number of markets are for fruits, followed by vegetables and then baked goods. So, the number of markets for specific product changes from state to state. Although the number of markets for vegetables is greatest in US, if look state wise, the pattern may not be the same.