

## **Computation and Visualization for Analytics**

### **Exploratory Data Analysis of Farmer's Market in the US**

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## Objective

To create insights to know about farmer’s market which located in United State.

## Client: ABC Farmers Market

**Target location:** Massachusetts

**Time:** Flexible

**Rank in type of product:**

- 1. Seafood
- 2. Meats
- 3. Vegetables
- 4. Fruits
- 5. Whole Grains

## Dataset

We are using a dataset that contains location, time, latitude, longitude, products, and payment mode, collected couples of years.

(<https://www.ams.usda.gov/local-food-directories/farmersmarkets>)

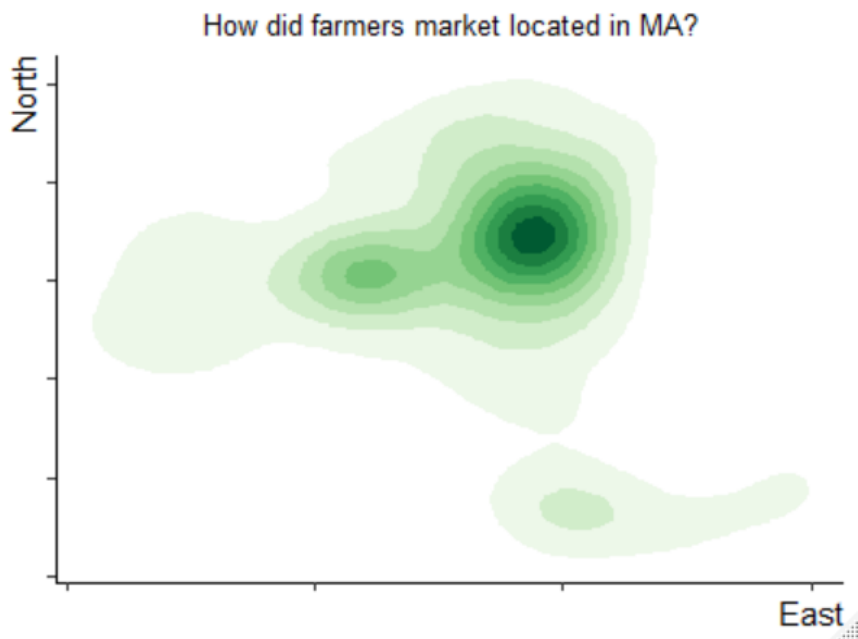
## Variables

The original dataset has 8778 registered farmer’s market with 59 variables. Here is some important variables that used in these insights.

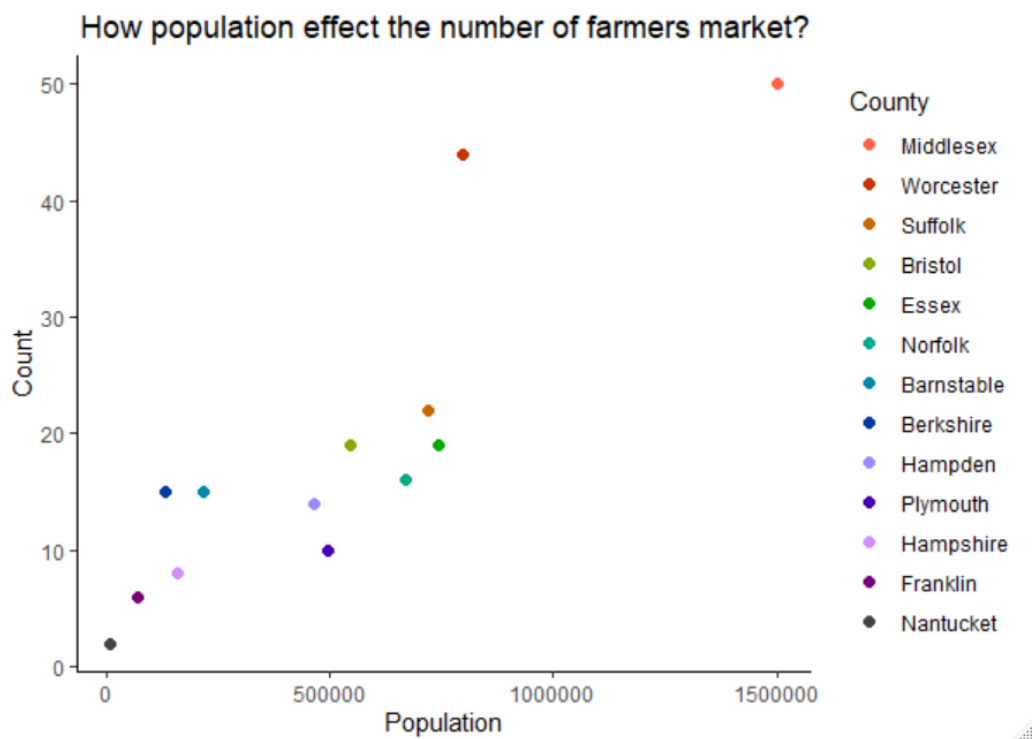
Variables	What this represents?
Market Names	Name of each farmer’s market
County	Which county did these farmer’s markets hold in (e.g. Barton, Middlesex, New York, etc.)
State	Which state did these farmer’s markets hold in (e.g. Massachusetts, New York, Ohio, etc.)
Season1 Date	When did these farmer’s markets hold
Products	29 product types, use “Y” and “N” to represent if this market has this type of vendors (e.g. Meats, Fruit, etc.)
Payment mode	5 kind of payment method (Credit, WIC, WICcash, SFMNP, SNAP)

# Geography

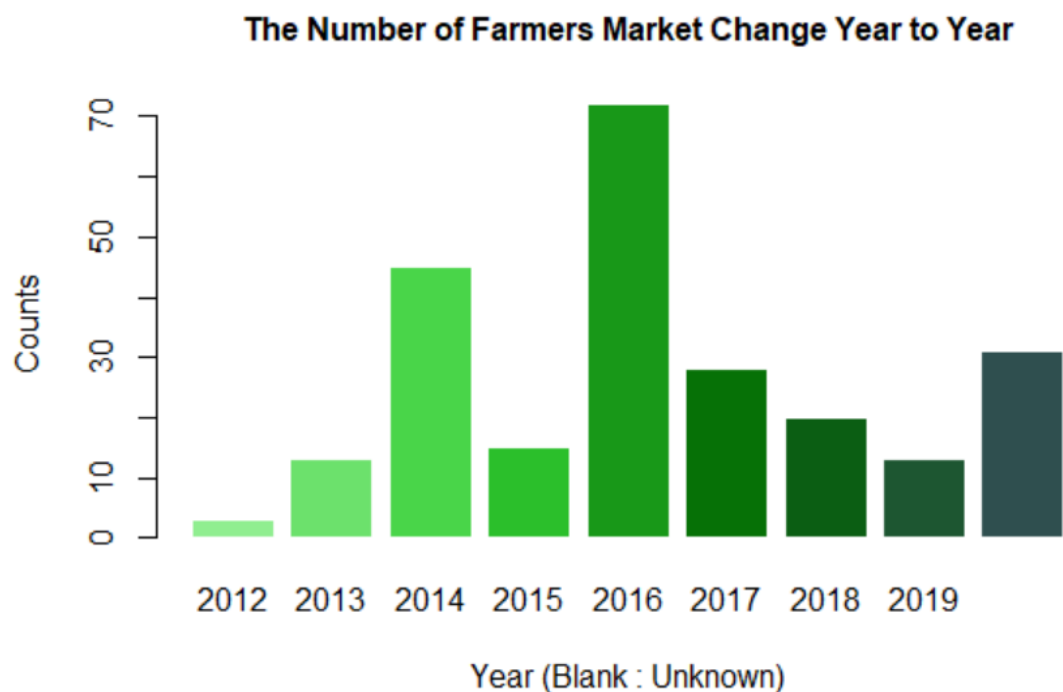
Location where to hold a farmer’s market is an important factor. In MA, there is 14 counties and for each has some factors that may affect the efficiency for holding a farmer’s market.



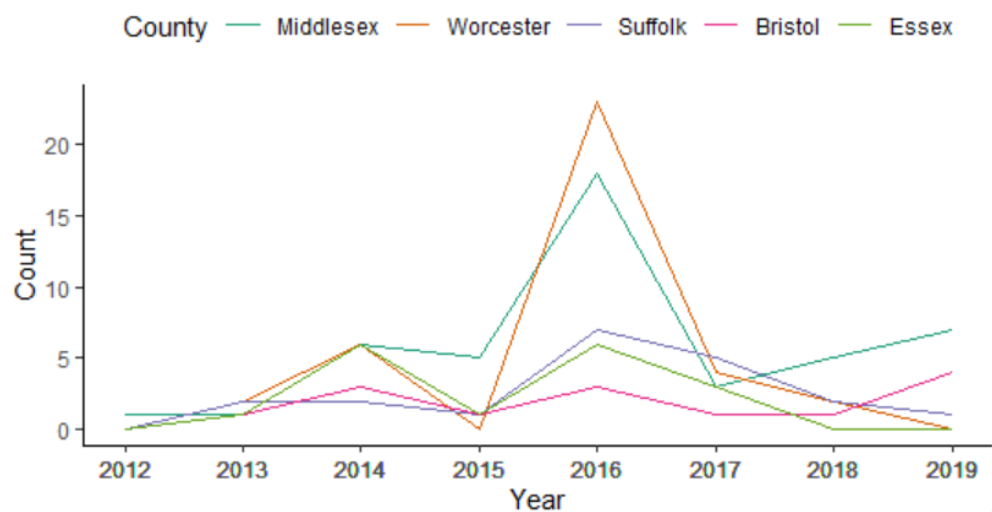
In the upper plot, we can easily seen that farmer’s market which located in Massachusetts concentrated in **northeast** Massachusetts, then extended out. The reason for this might affected by some reasons, one of it may be **population**. The scatter plot below shows positive relationship between the count and county’s population. **Middlesex** has the most population and total count of farmer’s market.



# Evolution These Years



Differed from supermarket, a new mode of selling products has been called up in 2010s, that is farmer’s market. It is built by farmers and customers, based on **local environment** and **organic agricultures**. This healthy style of marketing not only benefit for farmers and customers, but also the economic in United States. However, it has been declined in 2015, but luckily, consumer demand for foods that are fresher has led to growth of farmer’s markets again in **2016**. But the good circumstances did not last too long, After the term of “**New Retail**” and “**online shopping**” became more and more popular, the count of farmer’s market fallen again from 2017 until now.



Take a closer look at top five county, although **Middlesex** has the most farmer’s market in total, but it did not held the most in each year. **Worcester** had more than it in **2016** and **2017**, yet it declined after this.

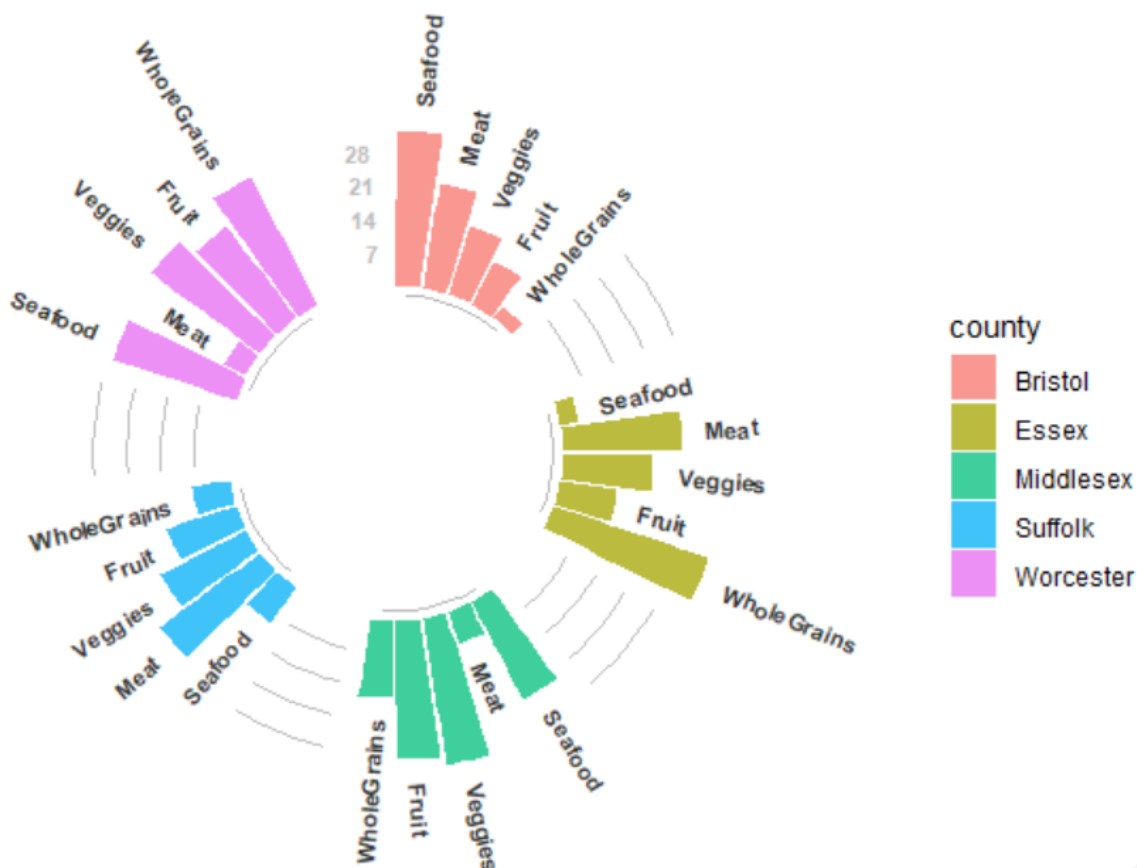
# Type of Product

As a farmer’s market who has the most vendor of Seafood, Meats, Vegetables, Fruits, and Whole Grains. We should know more about the vendor structure of the competitors.

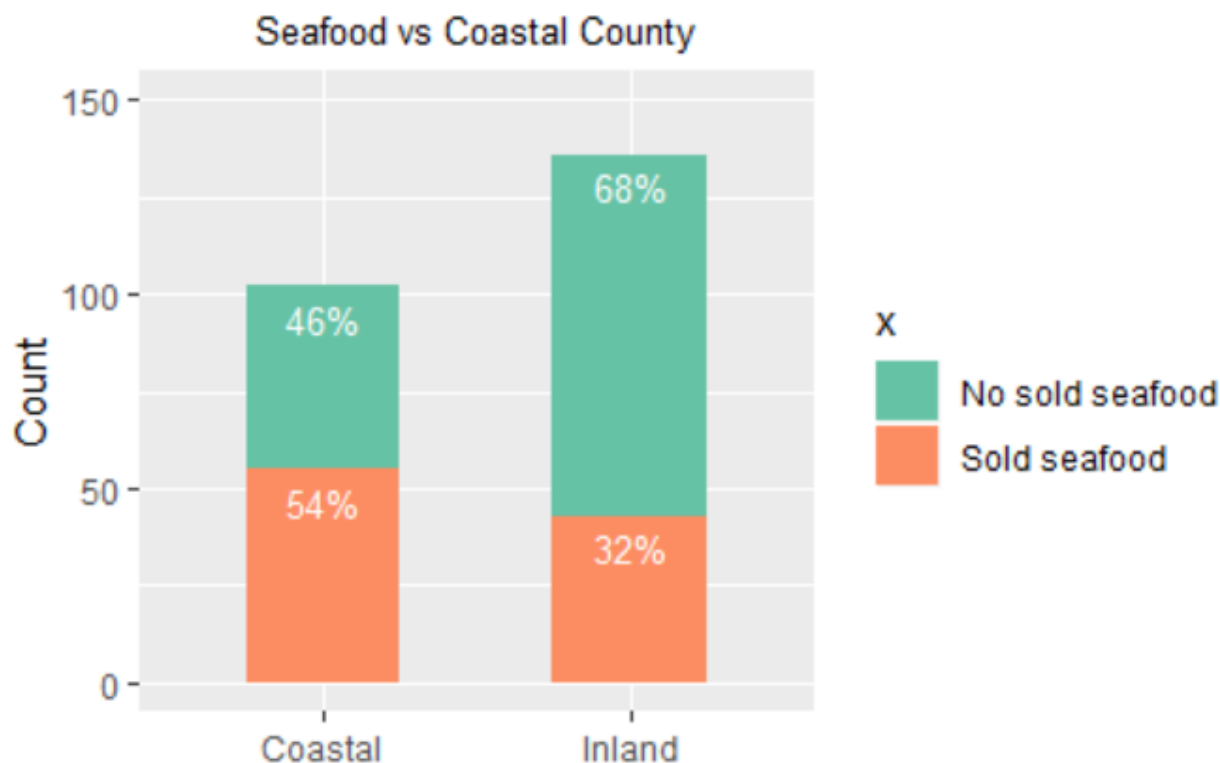
First, vegetables and fruits are two types of product that seems much more stable. However, **seafood**, **meat**, and **whole grains** have a gap in different county. Suffolk and Essex were lack of seafood vendors, but had more meat vendors; Middlesex and Worcester were in the opposite situation. This may influenced by the location of each county, we would discuss this later.

Moreover, we could see that the vendor structure in Bristol is totally the **same** as IE6600 farmer’s market. Thus, it is not a good choice to set the market in the area of Bristol or it would not been outstanding in those markets.

For who has sufficient vendors of “seafood” and “meat”, but relatively scarcity of “whole grains” vendors, **Essex** may be a good county to choose to locate. There has less than 10 seafood vendors, but over 30 whole grains vendors. If IE6600 farmer’s market set in Essex would appeal those customers who are willing to buy seafood but hard to find in other farmer’s market in Essex.



## Type of Product vs County Location



Massachusetts is a long state that has counties near ports and oceans but also has inland counties. As we mentioned in previous picture, it seems has some relationship between **seafood supply** and **counties' location**.

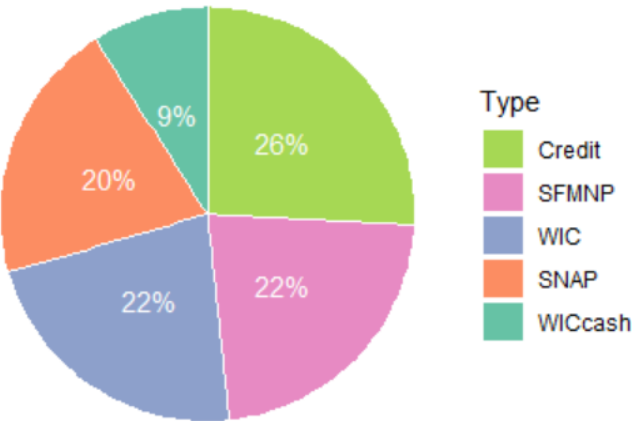
In the stacked bar plot we could get the information of the seafood vendors located in coastal or inland area significantly. Total count of farmer's market of inland counties is more than coastal counties, however, the percentage of vendors who sold seafood or not had a different view. There has over 50 seafood vendors in coastal area, but only about 40 seafood vendors in inland area. In coastal area, vendors sold or not sold seafood were almost **half and half**, but who sold seafood still has a little superiority. On the other hand, in inland counties, there only **32%** of vendors had sold seafood.

The reason of this situation might because seafood is a critical products that asked for a high quality. To drive outside a coastal county always take half to an hour, this might caused the damage of the seafood.

## Payment Method

Nowadays society, there has bunch of method to make the transaction. There are 5 kinds of payment method were used in recorded farmer’s market. They are “Credit”, “SFMNP”, “WIC”, “SNAP”, and “WICcash”. **Credit** is a well-known payment method, however, SFMNP, WIC, and SNAP were also wide used in farmer’s market.

Percentage of Payment Method



What is worthy noticed is that credit are not the first payment method in 2012 to 2014. **SFMNP** was at first, then **WIC** rise rapidly. Credit and SNAP developed in a stable rate, but SNAP has no significant difference between years. Finally, **credit** became the most usage payment method. Another thing to focus on is that **WICcash** has not used in farmer’s market until 2013, it had a great reflection in the first year but credit’s involution might beat it, so it did not have a significant performance in these years.

How the payment method differ from year to year?

