# US Food Supply Chain Performance During Covid-19

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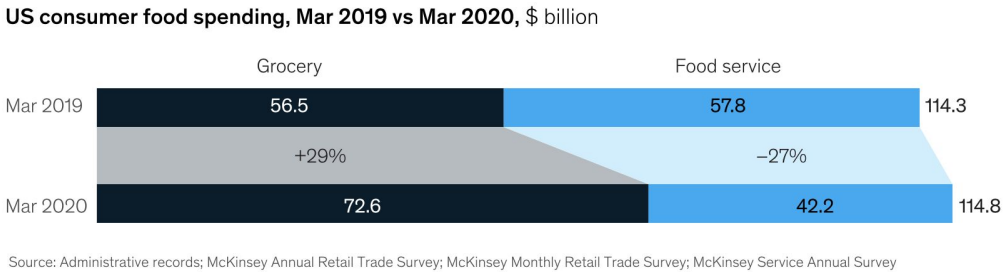
https://github.com/aslihancelik/Supply-Chain-and-Demand-Forecast-for-COVID19

# Motivating Idea / Problem Statement

- Epidemic outbreaks are a special case of supply chain (SC) risks which is characterized by a long-term disruption existence and high uncertainty. [1]
- Food supply chains are affected.
  - US consumer food spending focused more on grocery shopping than food service during COVID-19.
  - Virus outbreaks in factories and lockdown situations affecting  the industries



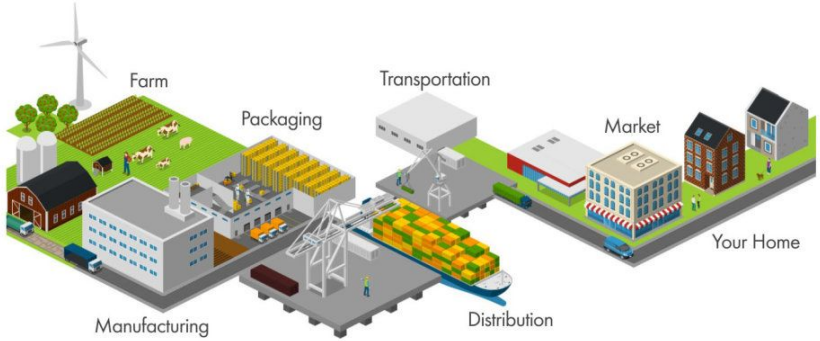

[1] Predicting the impacts of epidemic outbreaks on global supply chains: A simulation-based analysis on the coronavirus outbreak (COVID-19/SARS-CoV-2) case

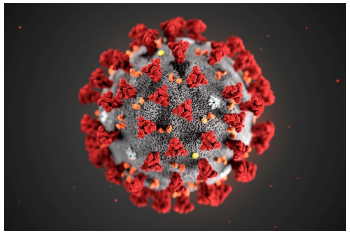
# Project Description

The purpose of this project is to both determine and predict the fluctuations in the food demand and production capacities in the US during the pandemic in accordance with Covid-19 data.

-The relationship between new cases/ death rate and production capacities

-What is the food product demands during pandemic?



# HOW?

Datasets

1) The Commodity Flow Survey data (CFS) from Census Bureau available for 1993, 1997, 2002, 2007, 2012 and 2017
2) Using USDA's monthly production data for food products in the US to determine how the production is affected during Covid19.
3) Using the daily Covid-19 cases data provided by Johns Hopkins to update the demand and production (supply) forecasts.

# Benefits of the Project

-Analyzing the impact of COVID-19 on food supply chains quantitatively.

-Generating information that can lead to better planning in food supply chains.

-Predicting the shortages in certain food products in certain

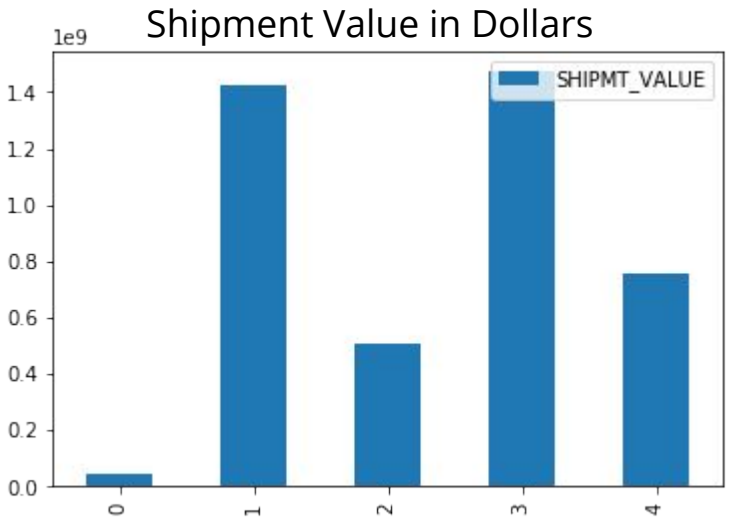
locations in the US

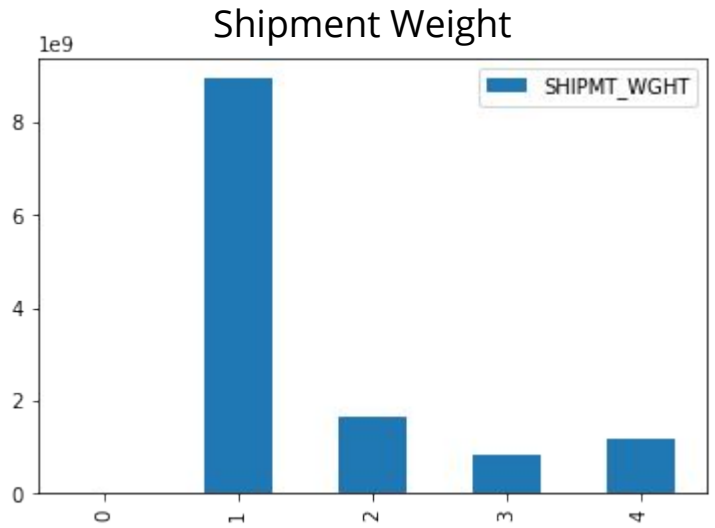
-Analysis useful for post-Covid19 supply chain forecasts

and planning for future epidemics/pandemics

# Commodity Flow Survey Data

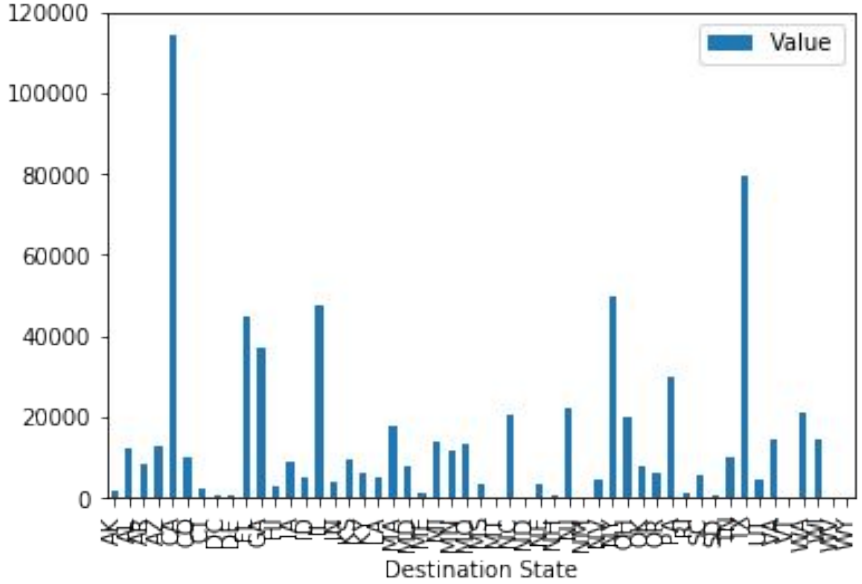
- 0 - Animals and Fish (live)
- 1 - Cereal Grains (includes seed)
- 2 - Animal Feed, Eggs, Honey, and Other Products of Animal Origin
- 3 - Meat, Poultry, Fish, Seafood, and Their Preparations
- 4 - Milled Grain Products and Preparations, and Bakery Products



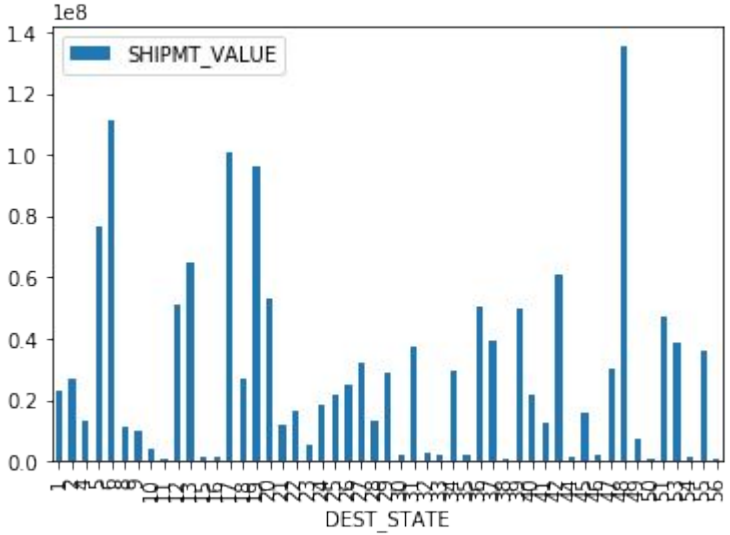



# Meat Demand

Demand is the most for meat, fish, seafood and their preperations in CA in 2007. The second highest demand is in Texas.



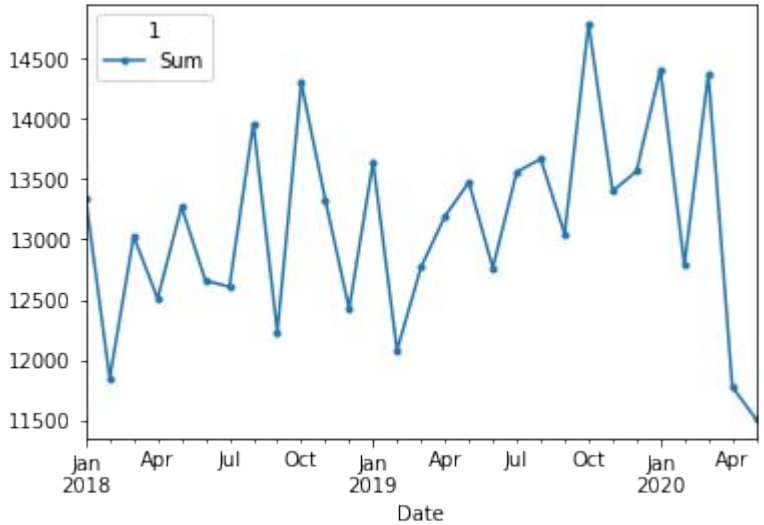
Meat, fish, seafood and their preperations are demanded the most in Texas in 2012. The second highest demand is in CA.



# US Meat Production Data

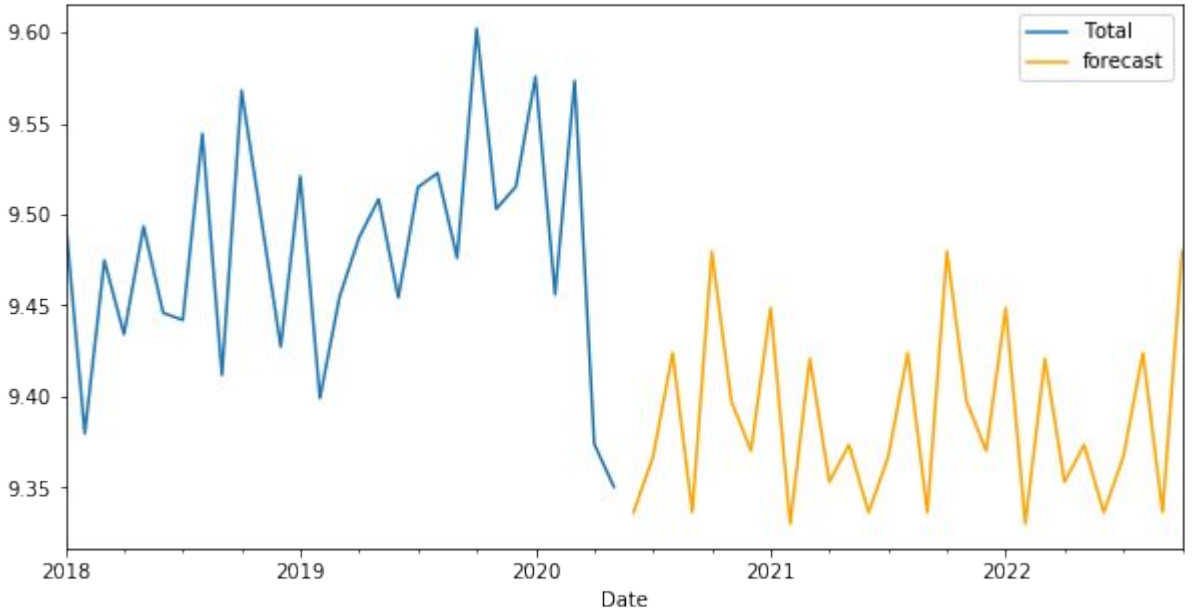
Determining the Forecasting Method

Both trends and seasonality can be seen in the historic data. We can use Exponential Smoothing specifically Holt-Winter's Method for the production forecast.

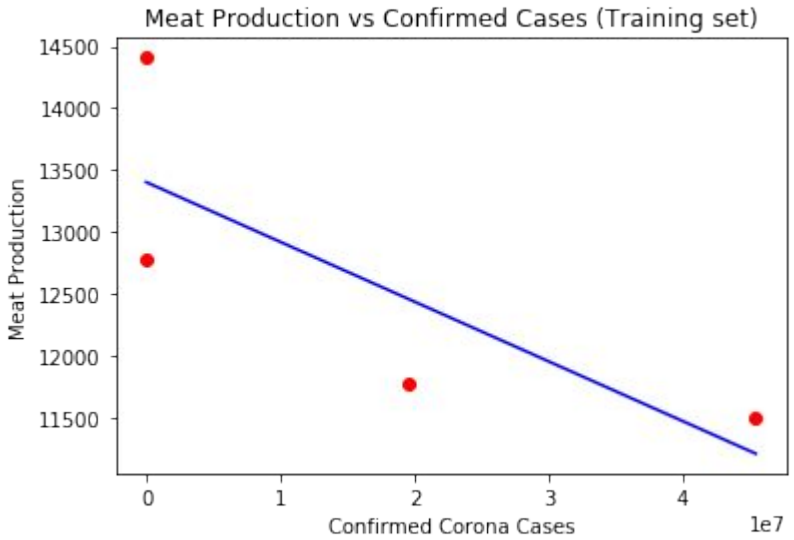


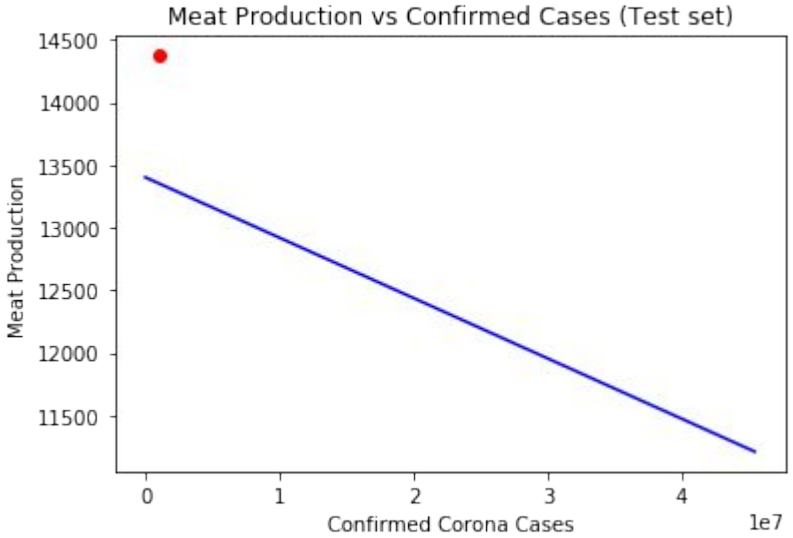
# Forecasting the Meat production

Exponential Smoothing Holt-Winter's Method



# Predictive Modelling




Confirmed cases dataset from
https://raw.githubusercontent.com/CSSEGISandData/COVID-19/master/csse_covid_19_data/csse_covid_19_time_series/time_series_covid19_confirmed_US.csv

# Current Findings/Initial Analysis on Datasets

- Negative correlation between meat production and new confirmed corona cases.
- The biggest flow in weight in food supply chain in the US is for the cereal grains.
- The biggest food product flow in value(dollars) is for the meat products in both 2007 and 2012.
- For years 2007 and 2012, meat demand is the highest in TX and CA among the states.

# Further Analysis

- Including the analysis of the effects of lockdown period on the production and supply capacities for certain food products.
- Including the death rates in the predictive modelling.
- Demand and production forecasts including per state and the US in general
- Using 2017 Commodity Flow Survey data in forecasts upon its release
- Online update of the forecast according to the new daily Covid-19 cases and deaths data
- Findings about what portion of the food supply belongs to a which states according to years
- Exploring the relationship between population metrics and demand or production capacity fluctuations for a similar historic event such as Swine Flu or Influenza.

# Thank you!

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