Avocado Buying Trends In The United States Using SAC

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Overview

Introduction

- Hass Avocado Board Data From 2015-2020
- https://www.kaggle.com/timmate/avocado-prices-2020
- Dataset Size: 3.37 MB
- File Format: CSV
- Conventional Avocados vs. Organic Avocados
- Pricing Trends
- Geographical Prevalence
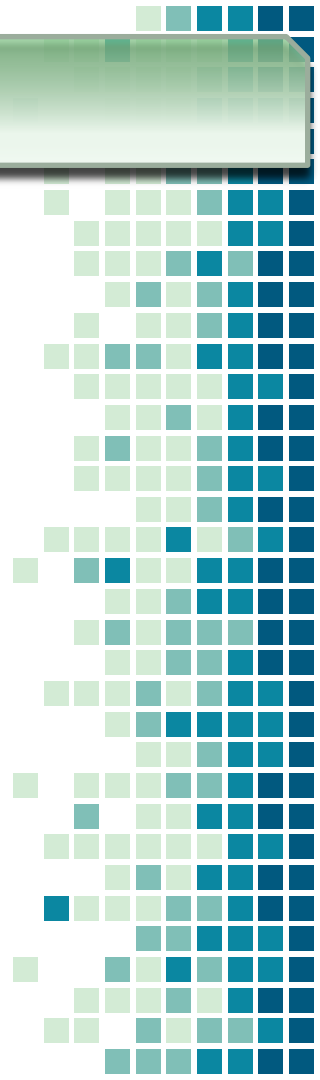
Related Work

- **George Washington University**
  - Focuses on the correlation between price and volume sold for conventional and organic avocados
  - Our study extends the trend analysis to the three common avocado and bag sizes purchased throughout the United States

- **Agronometrics In Charts**
  - The installment tracked the changes in price over 2020 and attributed price anomalies to events
  - Our analysis extends to the end of 2020 and includes a time series and regression analysis

Specifications

Data Set - Avocado Size	Size (Total 3.37 MB)
4046 – Small/Medium Hass Avocado	1688 KB
4225 – Large Hass Avocado	1562 KB
4770 – Extra Large Hass Avocado	120 KB

- The data we used was retrieved from Kaggle
- The data has been updated on a consistent basis with data from Hass Avocado Board to be inclusive of 2015-2020
- The dataset consists of actual scan data from retailers' cash registers as well as multi-outlet reporting

Data Analysis
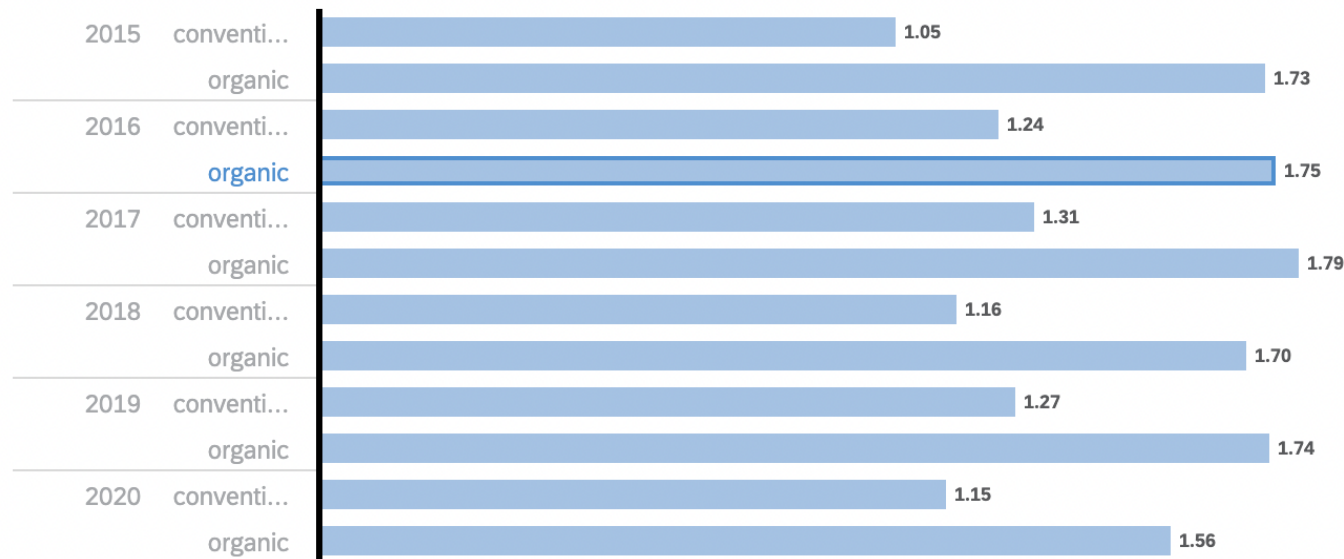
Implementation Flowchart

```
┌─────────────────────┐                      ┌─────────────────────────┐
│  Dataset retrieved   │ ───────────────────> │  Upload dataset to SAP  │
│   from Kaggle        │                      └─────────────────────────┘
└─────────────────────┘                                   │
                                                          ▼
                                              ┌─────────────────────────┐
                                              │      Clean Data         │
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                                                          │
                                                          ▼
┌─────────────────────┐                      ┌─────────────────────────┐
│    Format for       │ <─────────────────── │ Create story and models │
│    PowerPoint       │                      └─────────────────────────┘
└─────────────────────┘
```
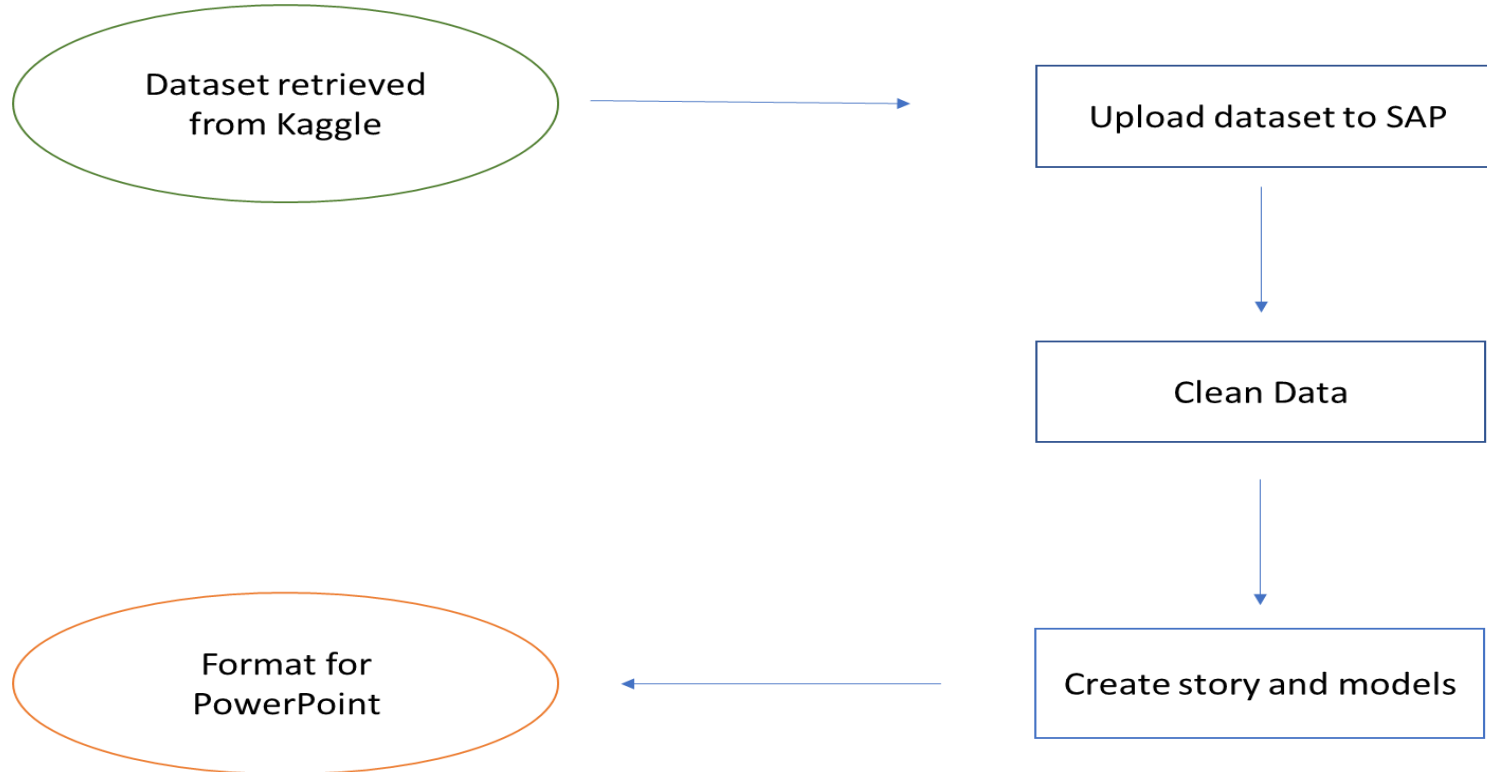
Data Visualization

Average Price Per Type & Year

Average Price per type, year

|		
2015	conventi...	1.05
	organic	1.73
2016	conventi...	1.24
	organic	1.75
2017	conventi...	1.31
	organic	1.79
2018	conventi...	1.16
	organic	1.70
2019	conventi...	1.27
	organic	1.74
2020	conventi...	1.15
	organic	1.56

Data Visualization

Average Price Per Type & Year

- Highlights difference in average price per type of avocado (conventional/organic) during the timeline of years 2015-2020

- Conventional increased slightly from $1.05 in 2015 to $1.15 in 2020

- Organic has trended downward from $1.73 in 2015 to $1.56 in 2020

Data Visualization

Average Price Per Type, Conventional & Organic
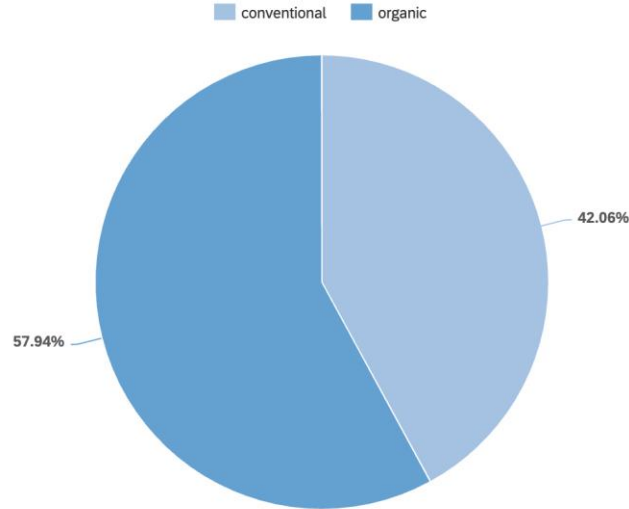
Data Visualization
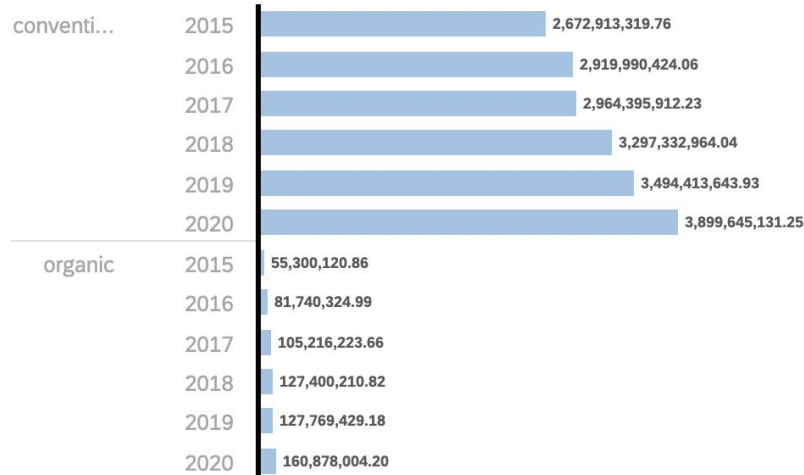
Average Price Per Type, Conventional & Organic

- Illustrates the average price per type of conventional and organic avocados

- Nearly 58% of organic avocado sales averaged $1.80 per avocado

- Roughly 42% of conventional avocados averaged $1.30 per avocado

Data Visualization

Total Volume Per Type & Year

Historical Data

total_volume per type, year

conventi...	2015	2,672,913,319.76
	2016	2,919,990,424.06
	2017	2,964,395,912.23
	2018	3,297,332,964.04
	2019	3,494,413,643.93
	2020	3,899,645,131.25
organic	2015	55,300,120.86
	2016	81,740,324.99
	2017	105,216,223.66
	2018	127,400,210.82
	2019	127,769,429.18
	2020	160,878,004.20

Data Visualization

Total Volume Per Type & Year

- The total volume output of conventional avocados far outnumbers the total volume output of organic avocados

- The total volume output of both conventional and organic avocados has grown steadily year after year confirming its popularity
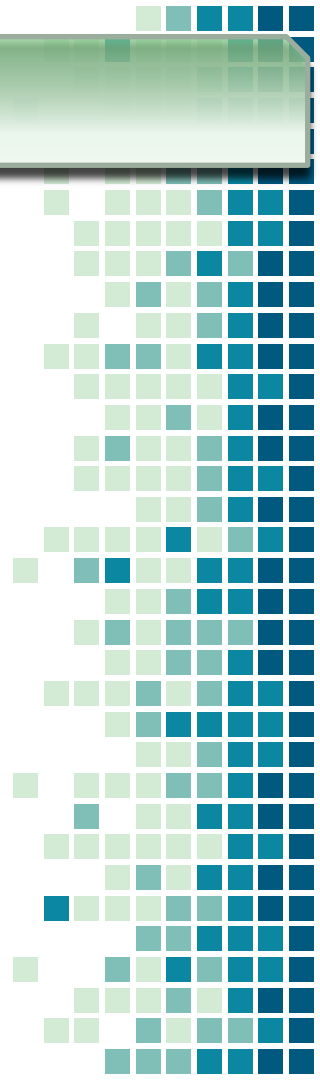
Data Visualization

Time Series

Time Series Analysis and Forecast of Avocado Size and Total Volume Purchased

⤢ | ↗ **Forecast**

- total_volume ● 4046 ● 4225 ● 4770

1M 3M 6M YTD 1Y All

64,759,808.31

64,641,589.76

77,318,434.8

19,875,245.11

20,942,066.08

24,168,609.29

968,352.15

1,085,280.21

1,627,791.75

150,000,000

100,000,000

50,000,000

0

-50,000,000

Jul 1, 2015   Jan 1, 2016   Jul 1, 2016   Jan 1, 2017   Jul 1, 2017   Jan 1, 2018   Jul 1, 2018   Jan 1, 2019   Jul 1, 2019   Jan 1, 2020   Jul 1, 2020   Jan 1, 2021   Jul 1, 2021   Jan 1, 2022

Jan 1, 2016   Jan 1, 2017   Jan 1, 2018   Jan 1, 2019   Jan 1, 2020   Jan 1, 2021   Jan 1, 2022
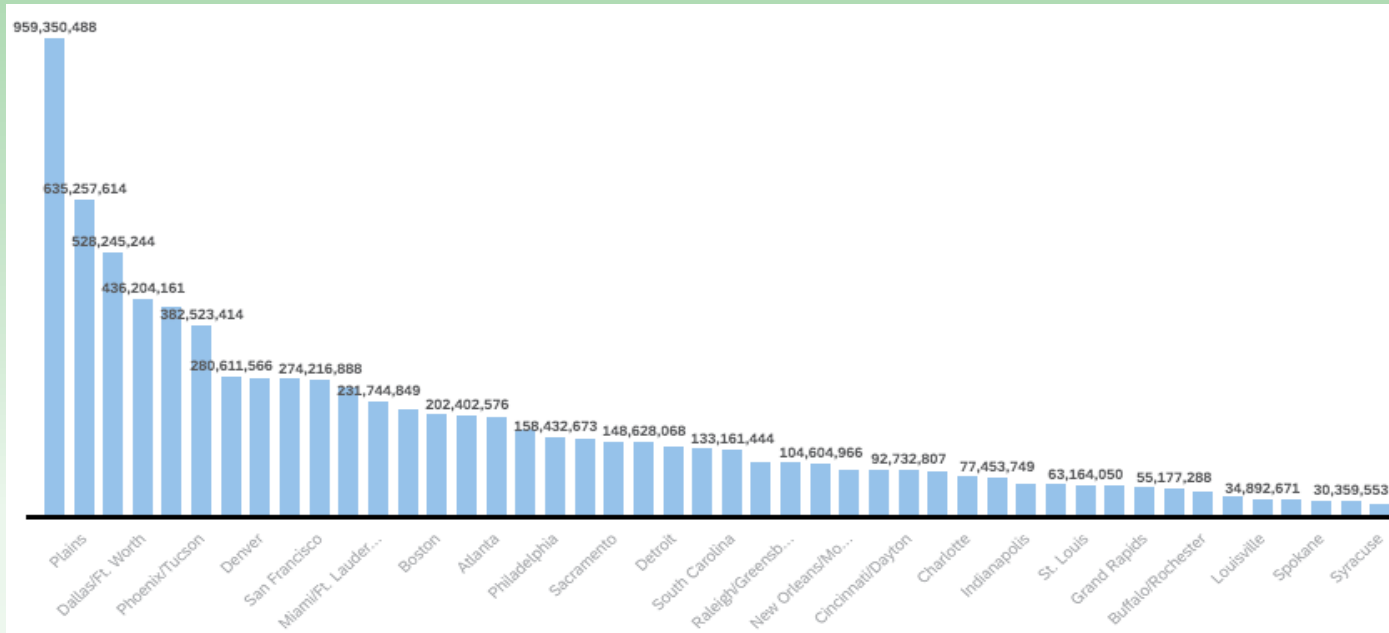
Data Visualization

Time Series

- The time series analysis and forecast of avocado size and total volume purchased over the course of one year

- *4046* represents small/medium Hass avocados, *4225* represents large Hass avocados, and *4770* represents extra-large Hass avocados

- The graph shows a gradual increase in total volume as the year progressed

Data Visualization

Total Volume Purchased By Geography

*Entire chart is too large to include but Los Angeles is the highest city

Data Visualization

Total Volume Purchased By Geography

- Land-locked areas with harsher climates were on the lower end of the spectrum as accessibility to the crop is reduced

- Avocado trees do best in moderately warm temperatures (60 F to 85 F) with moderate humidity

- Syracuse, NY, and Boise, ID are the lowest two cities on the chart with approximately 24.1 million and 30.3 million, respectively

- *As the highest-ranking city, Los Angeles contributes significantly with over 959 million purchases

Data Visualization
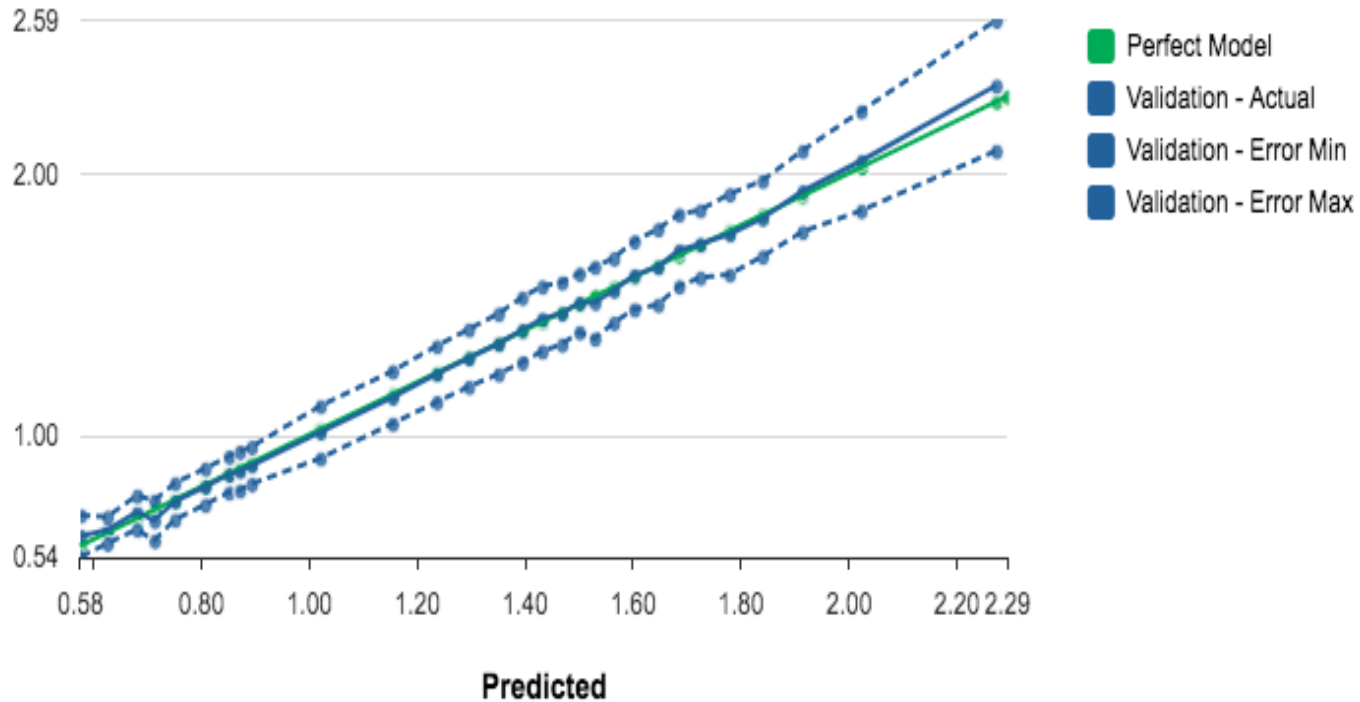
Predictive Price Model – Regression Analysis

Global Performance Indicators ⚙

Root Mean Square Error (RMSE)	Prediction Confidence
0.12	98.29%

- Predictive Goal = Average Price of Avocados

- RMSE = .12 where the closer to 0, the better the model

- Prediction confidence = 98.29% which measures if the predictive model can do the predictions with the same reliability when new cases arrive [100% is ideal]

Data Visualization

Predicted vs. Actual

Legend:
- Perfect Model
- Validation - Actual
- Validation - Error Min
- Validation - Error Max

Data Visualization

- Validation – Actual is $2.05 while the Predicted Value is $2.02

- The regression analysis shows a Validation - Error Max of $2.24 and a Validation - Error Min of $1.86

- A Perfect Model would have shown $2.03, so our model's $2.02 prediction is very close

Measure:	Validation - Actual
Predicted:	2.02
Validation - Actual:	2.05

Measure:	Validation - Error Max
Predicted:	2.02
Validation - Error Max:	2.24

Measure:	Validation - Error Min
Predicted:	2.02
Validation - Error Min:	1.86

Measure:	Perfect Model
Predicted:	2.03
Perfect Model:	2.03

Key Findings

- The price of organic avocadoes is on average 35-40% higher than conventional avocados.

- The sales volume of conventional avocados per year is on average 30 times bigger than that of the organic avocado sales

- Seasonality trends reveal that the highest point of sales take place in early February as well as the first week of May

- Climate and geographical location play a role in avocado buying behaviors

References

[1] Hass Avocado Board (March, 2021) Inside HAB. Retrieved from https://hassavocadoboard.com/inside-hab/

[2] Holland, S. (July, 2019) Towards Data Science: Millennials' Favorite Fruit: Forecasting Avocado Prices with ARIMA Models. https://towardsdatascience.com/millennials-favorite-fruit-forecasting-avocado-prices-with-arima-models-5b46e4e0e914

[3] Colin, F. (June, 2020) Agronometrics in Charts: Avocado prices begin to recover as Mexico winds down. Retrieved from https://www.freshfruitportal.com/news/2020/06/02/agronometrics-in-charts-avocado-prices-begin-to-recover-as-mexico-winds-down/

[4] Kaggle. https://www.kaggle.com/timmate/avocado-prices-2020

THANK YOU