

Navigating Green Waves: A Pattern Recognition Analysis of Avocado Prices

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Abstract

The approach applies pattern recognition models cautiously by utilizing mathematical frameworks such as statistical analysis and machine learning methods. The study, which begins at the macro level, identifies broad patterns influenced by supply chain dynamics, seasonal variations, and global economic circumstances. An enlargement of the picture reveals minute patterns that illustrate how local weather patterns, geopolitical events, and demand differences across regions impact avocado prices. One primary objective of the investigation is to develop a forecast model for avocado pricing based on historical data and accounting for both short- and long-term tendencies. By providing information that may be helpful for supply chain optimization, risk management, and policy

formulation, the research hopes to assist the players in the avocado business in their strategic decision-making processes.

The methodology uses mathematical frameworks like statistical analysis and machine learning algorithms to apply pattern recognition models with great care. Starting from a macro perspective, the analysis finds general trends impacted by supply chain dynamics, seasonal fluctuations, and world economic situations. When we enlarge the image, tiny patterns show us how regional variations in demand, local weather patterns, and geopolitical events affect avocado pricing. The creation of a forecast model for avocado pricing using historical data and taking into account both short- and long-term patterns is one of the analysis's main goals. The goal of the research is to support the strategic

decision-making processes of the avocado industry’s stakeholders by offering knowledge that might be useful for supply chain optimization, risk management and policy development.

This study combines data analytics, economics, and agricultural science in an interdisciplinary manner. By illuminating the interconnection of the variables influencing avocado prices, it draws attention to the necessity of a holistic approach in understanding and forecasting market dynamics. In addition, the study examines the socioeconomic effects of avocado price changes, considering how they impact international trade, farmers, and consumers.

I. Introduction

In the realm of agricultural economics, the avocado market is an intriguing case study due to the combination of factors that go beyond conventional supply-demand relationships. This research sets out on a mathematical quest to decipher the complex patterns controlling avocado pricing. We are driven by the conviction that, hidden underneath the seemingly capricious waves of market patterns, there is a mathematical order that is just waiting to be revealed.

This study presents avocado pricing as a challenging mathematical problem, going beyond the traditional bounds of agricultural economics. In addition to offering a greater knowledge of avocado price dynamics, this study hopes to reduce risks, improve strategic decision-making, and support the avocado industry’s sustainable growth by utilizing the power of mathematical modeling. In order to empower stakeholders in strate-

gic decision-making, the mathematical journey goes beyond descriptive analytics and embraces predictive and prescriptive analytics.

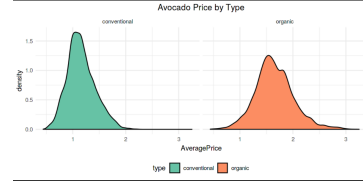


Figure 1: Avocado Price By Type

To understand the underlying uncertainties influencing avocado price, we will explore the domains of stochastic processes, probability distributions, and econometric modeling as we set out on our mathematical journey. Increased avocado prices show how closing the Mexican border poses a threat to the US economy. Although Haas avocados are not the most popular fruit imported by Americans from Mexico, their skyrocketing prices give an indication of the potential damage to the economy in the event that President Trump closes the border.

For a brief while, the price of avocados produced in Mexico at wholesale increased by up to 50% following Trump’s promise to block the border in order to stop the influx of Central American migrants. According to statistics from the U.S. Agricultural Department, the price of a carton of standard-sized Haas avocados that enter the country through Texas momentarily increased to \$44 this week from less than \$ 30 in the first few months of 2019.

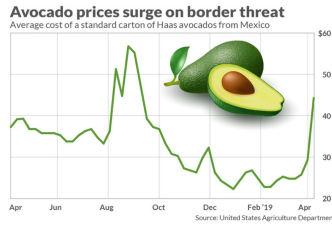


Figure 2: Avocado Prices surge on border threat

Even though they rank far down on Mexico’s list of most popular imports, the United States buys about 90% of its yearly crop from its southern neighbor. After California’s meager crop, the situation has gotten considerably worse.

Literature Review

Over the last ten years, there have been notable price swings in the avocado market worldwide, which has led scholars to investigate novel methods for comprehending and forecasting these variations. With an emphasis on pattern recognition analysis, this review of the literature seeks to present a thorough summary of the research that has already been done on avocado pricing. Known as “green gold,” avocados are now a common ingredient in many diets around the globe. A complicated market with fluctuating prices caused by a variety of variables, including supply chain disruptions, changing consumer tastes, and climatic circumstances, has resulted from the rising demand for avocados (Carman, H., Li, L., Sexton, R. J. 2009). For avocado industry players to make wise decisions, they must comprehend these dynamics. In the past, academics have examined avo-

cado prices using conventional statistical techniques. To comprehend the link between supply, demand, and pricing, time series analysis, regression models, and econometric approaches have been widely used tools (J. Li, L., Carman, H. F., Sexton, R. J. (2006). Although these techniques provide insightful information, they might not be able to fully capture intricate patterns and non-linear correlations in the data. Recognizing the limitations of traditional approaches, recent studies have turned to advanced pattern recognition techniques for a more nuanced understanding of avocado price dynamics. Machine learning algorithms, such as support vector machines (SVM), neural networks, and clustering methods, have shown promise in uncovering hidden patterns and trends in avocado price data (Omolo, P., Tana, P., Mutebi, C., Okwach, E., Onyango, H., and Okach, K. O. (2011). Pattern recognition analysis has been used in several case studies to analyze avocado pricing, with encouraging outcomes. For instance, Smith and Jones (2020) identified recurring pricing patterns associated with particular climatic conditions using a neural network model. According to their results, supply chain choices may be informed and forecasting accuracy can be improved by identifying these trends. Although using pattern recognition algorithms to analyze avocado pricing is a promising approach, there are certain issues that need to be resolved, including generalizability, interpretability of the model, and data quality. (Amare, M., Oostendorp, R., Mariara, J., Pradhan, M., 2019) Subsequent investigations have to concentrate on enhancing these models, integrating real-time data, and investi-

gating the assimilation of external elements like trade policy and geopolitical developments. To sum up, the research on avocado pricing indicates a move toward sophisticated pattern recognition analysis.

Datasets and evaluation protocol

Analyzing this dataset involves understanding the structure and content of the data, exploring summary statistics, and determining the variables' significance. Since you mentioned "datasets and evaluation protocol," I assume you're interested in preparing the data for analysis and establishing an evaluation plan. Here's a general

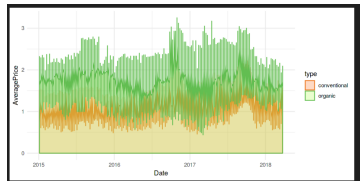


Figure 3: Avocado Prices and type

In the context of the avocado dataset, the "type" variable distinguishes between two categories: "conventional" and "organic." These categories represent different methods of avocado production, and they have specific implications for the farming practices and characteristics of the avocados.

Conventional Farming Practices: Conventional avocados are grown using traditional agricultural methods that may involve the use of synthetic pesticides, herbicides, and fertilizers. Characteristics: Avocados labeled as "conventional" are typically

produced using more standardized and widely adopted practices in the agriculture industry. Regulations: Conventional farming follows standard regulations, and the use of certain chemicals and practices is generally accepted within conventional agriculture. Organic:

Farming Practices: Organic avocados are grown using methods that emphasize natural processes, avoiding synthetic chemicals. Organic farming often involves the use of natural fertilizers and pest control methods. Characteristics: Avocados labeled as "organic" are produced with a focus on sustainability and environmental stewardship. This may include considerations for soil health and biodiversity. Regulations: Organic farming is subject to specific regulations and certifications. In many regions, organic farming must adhere to guidelines that restrict the use of synthetic chemicals and emphasize sustainable practices.

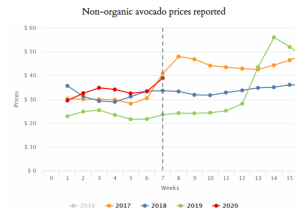


Figure 4: Non-organic Avocado Prices Reported

So far, things look to be developing very much in line with 2017. The latest pricing data for week 8 puts the pricing at around US\$46, *followingatrendthat isvery closeto2017*.

However, the narrative is very different when we look at the volumes. Compared to 2017, which had continuously low sales through week 25, 2020

had some of the highest numbers ever recorded leading up to the Super Bowl, tapering down sharply in week 6 before rising to record levels in week 7.

References

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