



# Noah Manneville

*Climate Maize Project* Case Study

Career Foundry  
Data Analytics Portfolio



# Climate Maize: Data Analysis of Agriculture and Climate

**Overview:** Climate Maize is a data analysis project I conducted to determine the effects of climate change on corn farmers in the US.

**Purpose and Context:** Climate Maize was a personal project that I conducted as a part of my Career Foundry data analytics course to demonstrate my mastery of exploratory analysis and data visualization.

**Objective:** To present findings that prepare US farmers for a warmer future and a bonus of adding a complete data analysis project to my portfolio.

**Role:** Data Analyst

**Scale:** 1 month project

**Stakeholder:** Career Foundry Data Analytics Course

**Tools:**

- Python
- Excel
- Tableau

# Process

Click [here](#) for a list of **data sets** used in this project.

The **source page** can be found on the last page of my [Tableau Storyboard](#).

## Research and Prep

**Finding the Data:** I conducted independent research, selecting reliable and trustworthy sources utilizing APIs.

**Choosing Metrics:** I determined that Plant Hardiness Zones (PHZ) would be a useful tool for examining climate change over time.

**Data wrangling and cleaning:** This step required merging data sets in Excel using concatenate and Vlookup functions. I also created unique variables in order to merge datasets.

## Exploration and Analysis

**Geomapping:** This project required a geographic component which I explored using GeoJson formatting and completed using the folium Python library.

**Connecting the dots:** I forayed into unsupervised machine learning by creating cluster charts and regression lines.

**Checking the work:** Using time series analysis and normalizing data sets I ensured the data was unbiased for further analysis.

## Conclusion and Presentation

**Forecasting:** From the analysis results I was able to predict future changes to the climate and production of crops.

**Data Visualization in Python:** I exported geomaps and various plots for presentation to stakeholders.

**Tableau Storyboard:** In Tableau I created and polished visualizations and created a data story as a final deliverable.

# Findings



**Across the US,  
temperatures are  
increasing.**



**There is a clear line  
between areas that can  
and cannot grow corn  
well. The delineation is  
based on temperature  
range.**



**Despite rising temps  
and less arable land in  
the US, sales and  
production have  
increased due to  
inflation and better  
farming tech.**



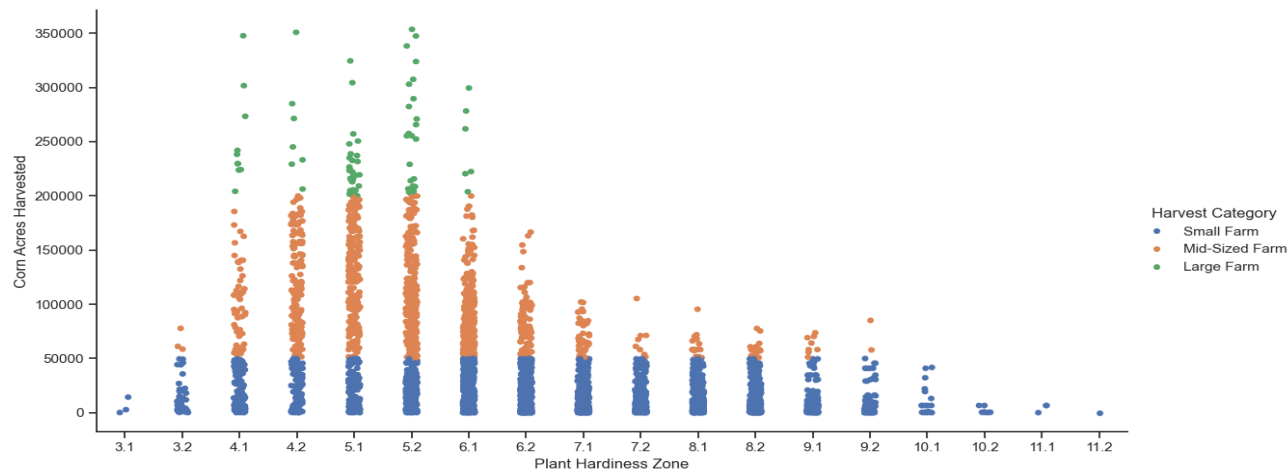
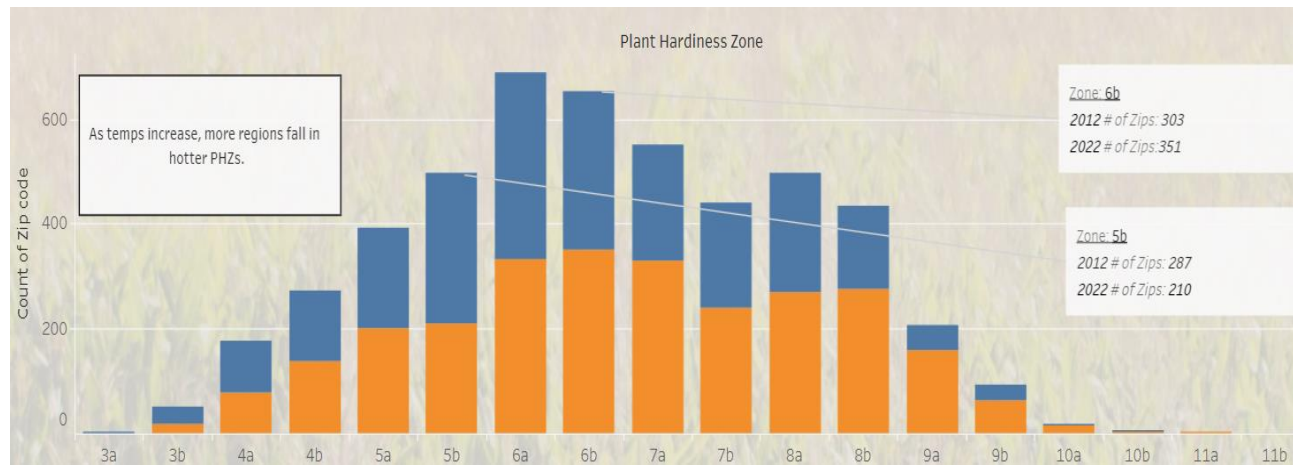
**There is still time to  
act! The most  
productive regions still  
have a buffer before  
production is set to  
decline.**



Across the US,  
temperatures are  
increasing. Regions across  
the US are averaging  
higher PHZs



There is a clear line  
between areas that can  
and cannot grow corn  
well. The delineation is be  
correlated to PHZ.

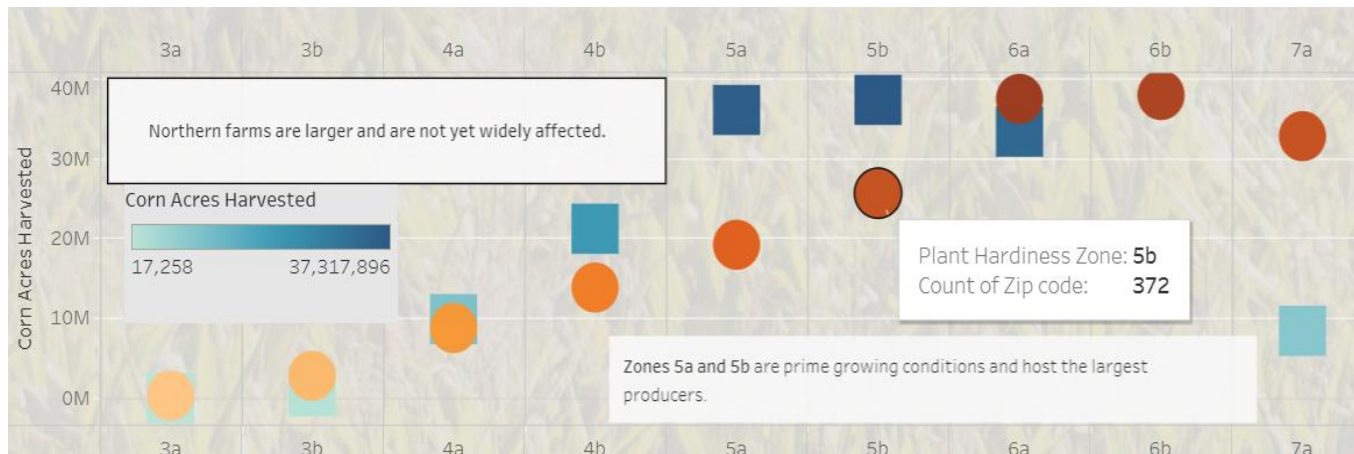




Despite rising temps and less arable land in the US, sales and production have increased. This is due to inflation and improved farming tech.



There is still time to act!  
The most productive regions still have a buffer before production is set to decline.



# Challenges

**Finding Common Variables:** Since the datasets were both large and from different sources, it was difficult to merge the data without creating blanks or errors.

**Solution:** **Concatenate** and **Vlookup** functions in Excel proved to be the simplest solution- all the data sets contained some combination of the US county the data was collected from, the zip code, and the year it was collected. By creating a variable that combined all three, I was able to then merge the data sets. In Python using **join functions**

**GeoJson / Choropleth:** The datasets I was using were too large and kept crashing my computer when I tried to run Json functions.

**Solution:** I imported the **folium** library and created a **color map** for temperature zones within Python that was simplistic enough to not crash the program but complex enough to show how individual data points (US counties) had received new designations, visually indicating climate change.

## Some Python Skills utilized:

Cleaning and Wrangling Datasets  
Merging and Joining Data  
Geomapping  
Aggregation  
Forecasting  
Clustering  
Supervised Machine Learning  
Correlation mapping and pairplots  
Deriving Variables  
Visualizations

# Recommendations

**Diversify:** Farmers in vulnerable zones should consider adding new crops to their fields that are hardier in warmer climates.

**Invest in technology:** The past century has seen massive improvements in yields per acre. Doing more with less could prove to be vital in the coming century.

**Renew the land:** Increasing arable land instead of developing it will improve US inhabitants' food accessibility and could be beneficial in other ways like improved air quality.

**Act quickly:** The largest corn producing regions are still protected, but that will not last long. Farmers and government need to act now to protect and assist with food production or else!



# Retrospective

## Next Steps

I would like to expand my research to find out what crops are well suited to the new climate conditions so that farmers have the knowledge to prepare for an impending warmer future.

Time to start finding new crops to grow that are more tolerant of heat.

Are there crops that could replace corn in the US?

How would they fare in rising temperatures?

## Improvements

I would like to improve the presentability of my visualizations. Specifically, polishing my UX and UI skills in Tableau and Python presentations

# Thanks for reading!

Find the full project and associated data, Python scripts and additional visualizations at my [GitHub page!](#)

Connect with me on [LinkedIn!](#)