AGRICULTURE EXPORTS IN USA (DATA FROM 2011-2022)

Final Project

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DATA-53000, Spring 2024

Data Visualization

Lewis University

Introduction

•**Why our data is meaning to our group and the audience?**
•The data on US agriculture exports provides valuable insights into a crucial industry that contributes greatly to the US economy and trade position globally.
•Analyzing this data can inform strategies to further strengthen the agriculture sector and its export performance.

We analyzed agricultural exports from 10 US states between 2011 and 2022 and ranked them. Below is a screenshot of the CSV file data we collected after cleaning it using df.drop( ) ,df=df.iloc.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	State	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
2	California	17,199.70	19,005.10	22,708.60	23,334.60	22,690.60	21,655.10	22,487.40	23,345.20	23,849.70	22,378.80	23,884.70	24,743.10	
3	Iowa	10,820.00	11,609.60	10,394.10	11,414.90	9,902.70	10,930.30	10,290.20	10,502.10	9,971.50	11,316.50	14,281.70	16,514.80	
4	Illinois	8,685.80	8,810.10	7,374.70	9,416.40	7,960.40	8,233.90	8,006.40	8,531.90	7,860.90	8,756.90	11,219.80	13,690.20	
5	Minnesota	7,127.00	7,883.20	7,943.60	7,392.00	6,284.00	6,980.40	6,899.80	6,886.00	6,243.10	7,129.80	9,382.80	10,038.90	
6	Nebraska	7,293.10	6,820.50	6,396.90	7,336.30	6,409.90	6,621.20	6,292.00	6,726.40	6,215.00	7,263.60	9,294.00	9,977.00	
7	Texas	6,873.40	6,061.90	6,100.50	6,397.40	5,704.00	5,745.00	6,852.40	6,831.00	6,159.40	5,898.90	7,169.50	8,539.70	
8	Indiana	5,064.90	5,121.60	4,599.80	5,759.30	4,679.30	4,524.10	4,734.50	4,591.20	4,539.40	5,220.00	6,659.40	7,402.10	
9	Kansas	4,611.20	4,304.90	4,858.10	4,640.20	4,117.30	4,672.70	4,787.00	4,845.90	4,923.00	5,814.70	7,032.90	7,230.60	
10	Missouri	4,107.90	3,930.50	3,969.20	4,388.70	3,598.10	3,540.80	4,063.10	4,012.90	3,700.30	4,499.30	5,251.70	6,146.90	
11	Ohio	3,663.30	4,426.90	4,477.20	4,485.00	3,682.90	3,629.80	3,654.10	3,803.90	3,562.00	4,097.60	5,061.90	6,082.50	
12														
13														
14														

Data Description

The cleaned data set contains various information about the states. The data set under consideration pertains the following fields:

State

Year

Tools

We obtained the data from the Kaggle website and generated the visualizations using Pandas and Processing. Overall, this combination of tools and resources enabled us to conduct a thorough analysis and draw meaningful insights from the data.

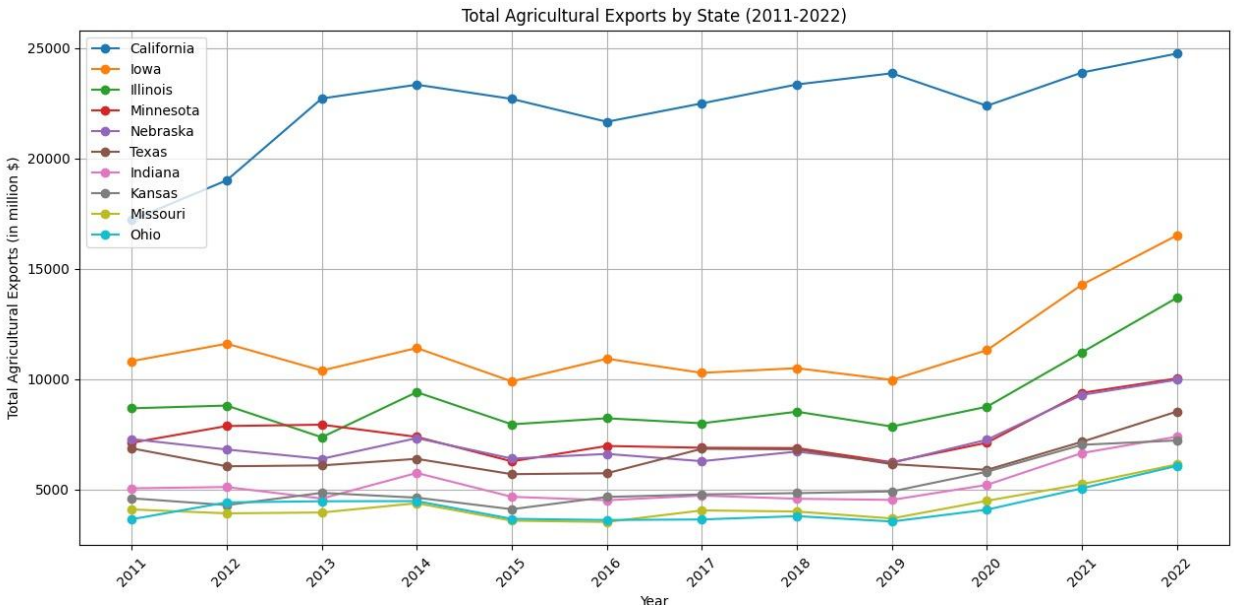
Methodology and results

Visualization using a programming library.

C: > Users > Ayush > mat.py > ...

```python
import pandas as pd
import matplotlib.pyplot as plt

# Import data from CSV file
df = pd.read_csv('agriculture.csv', index_col='State')

# Plot
plt.figure(figsize=(12, 8))
for state in df.index:
    plt.plot(df.columns, df.loc[state], marker='o', label=state)

plt.title('Total Agricultural Exports by State (2011-2022)')
plt.xlabel('Year')
plt.ylabel('Total Agricultural Exports (in million $)')
plt.xticks(rotation=45)
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.show()
```

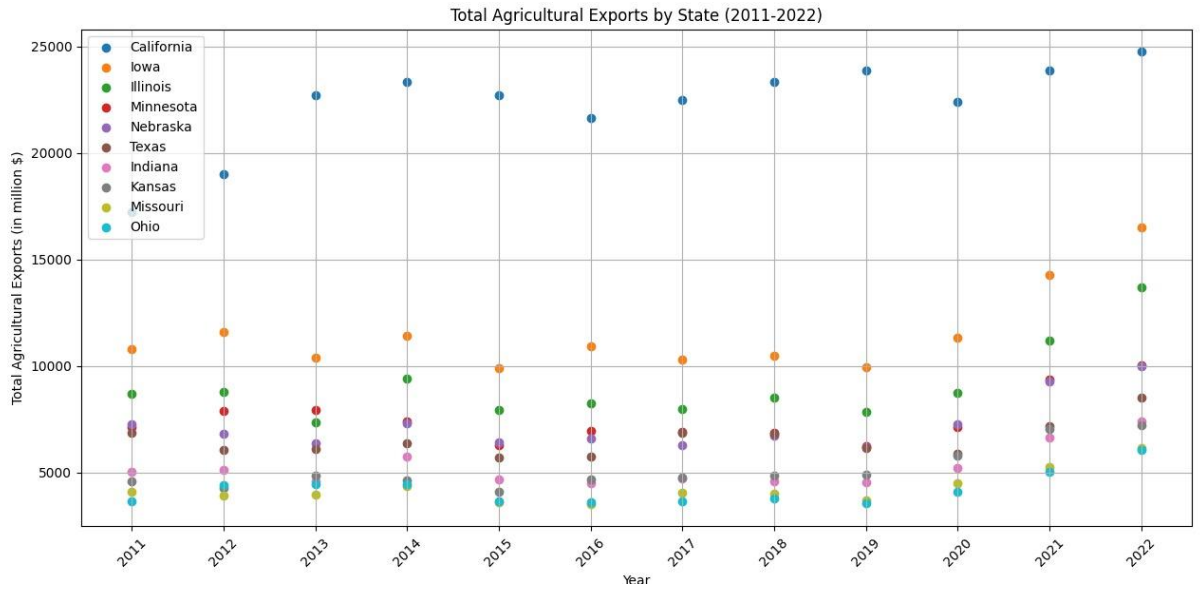
The code snippet demonstrates how to create a Line graph using pandas and matplotlib in Python.Below is the visualization for it.



C: > Users > Ayush > mat.py > ...

```python
import pandas as pd
import matplotlib.pyplot as plt

# Read data from CSV file
df = pd.read_csv('agriculture.csv')

# Set the State column as the index
df.set_index('State', inplace=True)

# Plot
plt.figure(figsize=(12, 8))
for state in df.index:
    plt.scatter(df.columns, df.loc[state], marker='o', label=state)

plt.title('Total Agricultural Exports by State (2011-2022)')
plt.xlabel('Year')
plt.ylabel('Total Agricultural Exports (in million $)')
plt.xticks(rotation=45)
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.show()
```

The code snippet demonstrates how to create a Scatter plot graph using pandas and matplotlib in Python.Below is the visualization for it.



Creation code of interactive visualization:

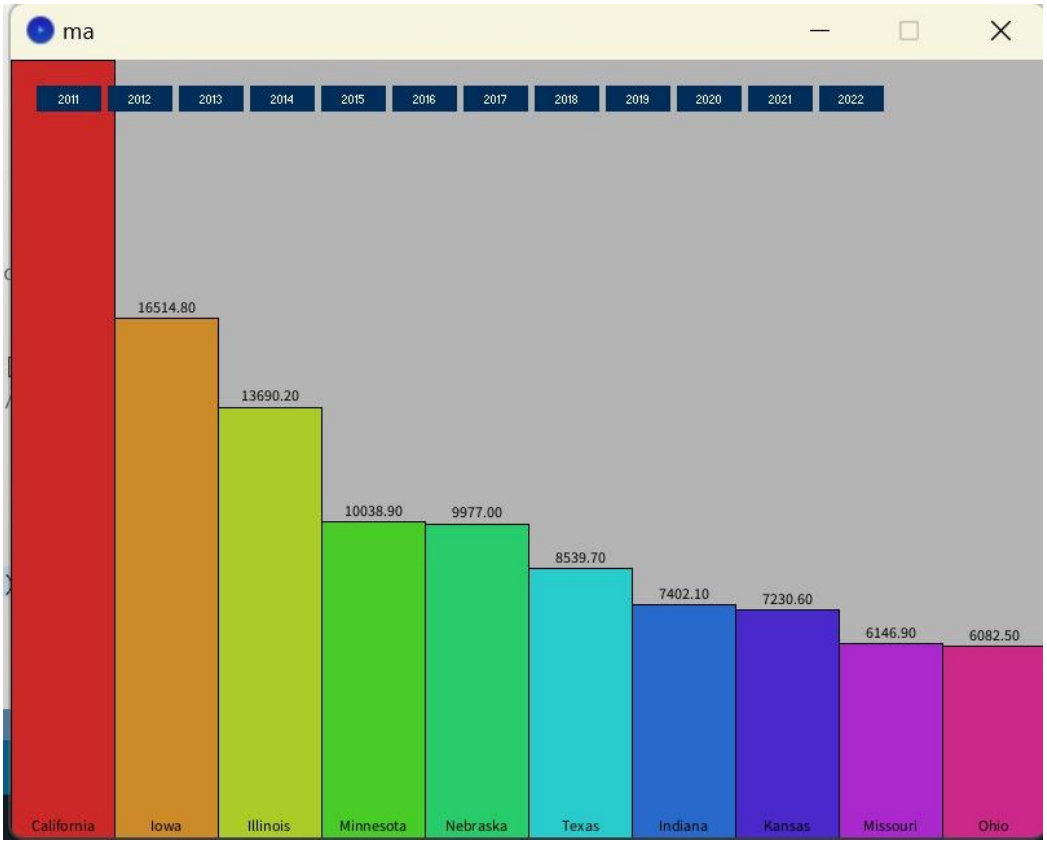
```
import controlP5.*;
ControlP5 cp5;
int selectedYear = 0;

void setup() {
  size(800, 600);
  cp5 = new ControlP5(this);

  int x = 20;
  int y = 20;
  int tabWidth = 50;
  int tabHeight = 20;

  for (int i = 0; i < data.length; i++) {
    final int yearIndex = i;
    cp5.addButton(Integer.toString(i))
       .setLabel(Integer.toString(2011 + i))
       .setPosition(x, y)
       .setSize(tabWidth, tabHeight)
       .addListener(new ControlListener() {
         public void controlEvent(ControlEvent event) {
           selectedYear = yearIndex;
         }
       });
    x += tabWidth + 5;
```

```
        }
      });
    x += tabWidth + 5;
  }
}

void draw() {
  background(255);

  // Draw bars
  float barWidth = width / states.length;
  colorMode(HSB, 360, 100, 100); // Use HSB color mode
  for (int i = 0; i < states.length; i++) {
    float x = i * barWidth;
    float h = map(data[selectedYear][i], 0, max(data[selectedYear]), 0, height);
    fill(map(i, 0, states.length, 0, 360), 80, 80); // Vary hue for different bars
    rect(x, height - h, barWidth, h);
    fill(0);
    textAlign(CENTER);
    text(states[i], x + barWidth/2, height - 5);
    // Display amount on top of the bar
    text(String.format("%.2f", data[selectedYear][i]), x + barWidth/2, height - h - 5);
  }
}

```

•This code sets up a data visualization interface for analyzing agricultural export data.
• It initializes variables and UI elements, loads CSV data, handles user interactions like toggling between line and bar graphs, and displays tooltips when hovering over data points.
•The main functions include drawing the graph, handling mouse events for interactivity, and loading and processing data from a CSV file.

In this we provided several interactive features to be implemented to enhance the user experience and enable switching between different visualizations. Here's an overview of how these features work:

•**1. *Mouse Interaction**:
•- *Mouse Pressed:* Clicking on the tabs switches to different columns for visualization, and clicking the toggle button switches between line and bar graphs.
•- *Mouse Moved:* Displays the hovered value near the mouse pointer when hovering over data points or bars, and clears the value when moving away.
•**2. *Keyboard Interaction:*** - *Key Pressed (' '):* Pressing the spacebar cycles through different columns for visualization.
3. *Visualization Switching:* - The showLineGraph boolean variable controls whether to display a line graph (true) or a bar graph (false).
4. *Highlighting and Legends:* - Hovering over data points or bars highlights them by displaying their values near the cursor. - A legend can be added to the graph to indicate the meaning of different colors or elements, enhancing the understanding of the visualization.
5. *Button Controls:* - A toggle button allows users to switch between line and bar graphs, providing a convenient way to compare different representations of the data.
6. *Dynamic Updating:* - The visualization dynamically updates based on user interactions, such as selecting different columns or toggling between graph types, providing a real-time view of the data.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2011
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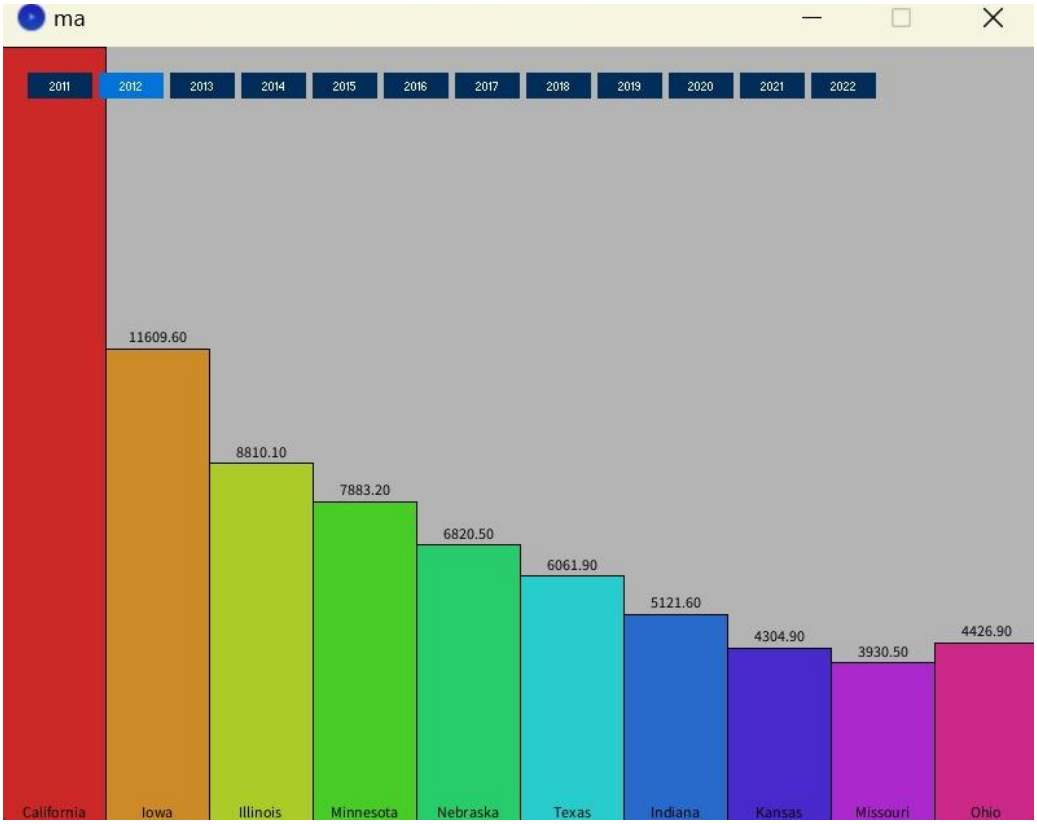
16514.80
13690.20
10038.90
9977.00
8539.70
7402.10
7230.60
6146.90
6082.50
California
Iowa
Illinois
Minnesota
Nebraska
Texas
Indiana
Kansas
Missouri
Ohio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2011
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2022
11609.60
8810.10
7883.20
6820.50
6061.90
5121.60
4304.90
3930.50
4426.90
California
Iowa
Illinois
Minnesota
Nebraska
Texas
Indiana
Kansas
Missouri
Ohio

Conclusion

For this report, we used a dataset obtained from Kaggle, which serves as an open and public data source library. We used various fields like pandas and processing generated reports based on their correlation. The reports help to understand the hidden relationships among various fields and attributes.

Reference: https://www.ers.usda.gov/data-products/state-agricultural-trade-data/