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Introduction

In today's competitive market, it is essential for businesses to effectively track their performance and understand customer behaviors to make successful decisions. With this in mind, we developed a dynamic dashboard for ABCDEats, focusing on customer segmentation, behavioral analysis, and regional insights. This dashboard aims to provide an intuitive interface for users to visualize and interact with key performance indicators (KPIs), customer patterns, and other important metrics.

In this chapter of our project, we developed a dashboard to analyze customer segmentation and its associated characteristics. While creating our dashboard, we utilized Plotly Dash to create layouts and interactive charts. The primary goal of creating this dashboard is to provide users with a tool to evaluate ABCDEats' overall performance and identify patterns among customer clusters. To achieve this, we divided the dashboard into several tabs, each designed to focus on a specific analysis aspect. This structure allows users to seamlessly navigate KPIs, cluster insights, regional analysis, and cuisine preferences. In the following part, the tabs and visuals will be explained in detail.

Tabs of Dashboard and Its Functionalities

The Overview Tab

It is the starting point of the dashboard and it presents **three key performance indicators**: **Total Product Count, Total Spend, and Total Orders**, which are displayed at the top of the page. Directly below these KPIs, users can filter data by cluster and variable through dropdown menus to customize their view. These variables are customer age, vendor count, product count, total spend, total orders, and average order revenue. To enhance regional analysis, we added the **region (the US) map** which visually represents customer density across various regions. To do this we mapped numerical regions to states of the United like New York, Los Angeles, and Houston. We added also a **summary table** next to the map. Additionally, users can analyze trends through two charts: a **cluster bar chart** that highlights aggregated metrics for each cluster, and a **bubble chart**, and users can see the size of each cluster in terms of the total volume of spend. **Figure 1** shows what the charts look like under this tab.

The Distribution of Cluster Tab

This tab shows customer segmentation and allows users to explore statistical insights for each cluster. Dropdown menus were added at the top for selecting specific clusters and variables. We put multiple interactive visualizations, such as a **boxplot chart**, which displays the distribution of the selected variable across clusters, and a **violin chart**, illustrating the density of data points within clusters. To show a correlation of variables as mentioned above a **correlation heatmap** was added, enabling users to identify relationships between variables. The tools in this tab are particularly useful for uncovering patterns and detecting outliers within customer groups. There is no need to discover outliers for now but for the future usages of it, it might be helpful for users. **Figure 2** illustrates the visuals in this tab.

The Regional Analysis Tab

This tab shows customer behaviors from a geographical perspective. A **US density map** visually represents the concentration of customers, where regions with higher densities are marked in deeper shades of green. In addition to this, a **donut chart** provides a breakdown of metrics by region. Users

can filter the clusters using the dropdown menu to explore these insights for specific clusters. **Figure 3** illustrates the charts under this tab.

Customer Behaviour Insights Tab

This tab was designed to explore customer preferences such as their promo usage, payment methods, information on when they tend to purchase in a day, etc. It provides some insights to the understanding of how customers interact with the platform. To analyze promotional behavior, we added a **promotional usage table**, which displays detailed usage statistics across different clusters. Alongside this table, a **pie chart** visually represents the proportional distribution of promo usage, making it easier to identify trends.

To dive deeper into customer preferences, we added a **payment method analysis**, which includes a **table** showcasing the payment preferences for each cluster and a **bar chart** to highlight the distribution of payment methods. Additionally, to capture temporal behaviors, the tab provides **hourly** and **daily usage analysis** (weekend/weekdays), represented through **tables** and **donut charts** that illustrate customer activity patterns at different times of the day and week.

By combining these features, this tab offers a holistic view of customer engagement, enabling stakeholders to identify patterns, improve promotional strategies, and optimize payment experiences. The user also can filter clusters. We added a dropdown menu for this. **Figure 4** shows the visualizations and the tables under this tab.

Cuisine Preferences Analysis Tab

This tab focuses on analyzing customer preferences for different cuisines to uncover cultural and taste-related patterns. While designing this tab, we started adding a **favorite cuisines table** to illustrate the average percentage preference for each cuisine across various clusters that help to identify overall trends. To provide more insights, a **top 3 cuisines table** was added. This table highlights the three most favored cuisines for each cluster and their respective percentages.

To make this data more interactive, we added two visualizations. A **funnel chart** was added to show the top 5 cuisines, and a **horizontal bar chart** was added as an alternative view by displaying these preferences in a mirrored structure. Both charts allow users to gain a quick understanding of the most popular cuisines among customers.

This tab empowers users to understand customer tastes better, enabling more personalized marketing campaigns and enhanced service offerings. **Figure 5** shows the interface of this tab.

How Does the Application Run?

As mentioned in the introduction part, we utilized Plotly Dash to create visuals. To run this code, the user needs only to open the folder in the zip file and run the code in any IDE, and to be read the CSV file by the program, the CSV path should be added. After importing the necessary libraries (see below), in this folder, the user should run this code in its own terminal.

Necessary Libraries:

- plotly.express , pandas, dash (and its some tools- dcc, html, Dash, callback, Input, Output)

Appendix

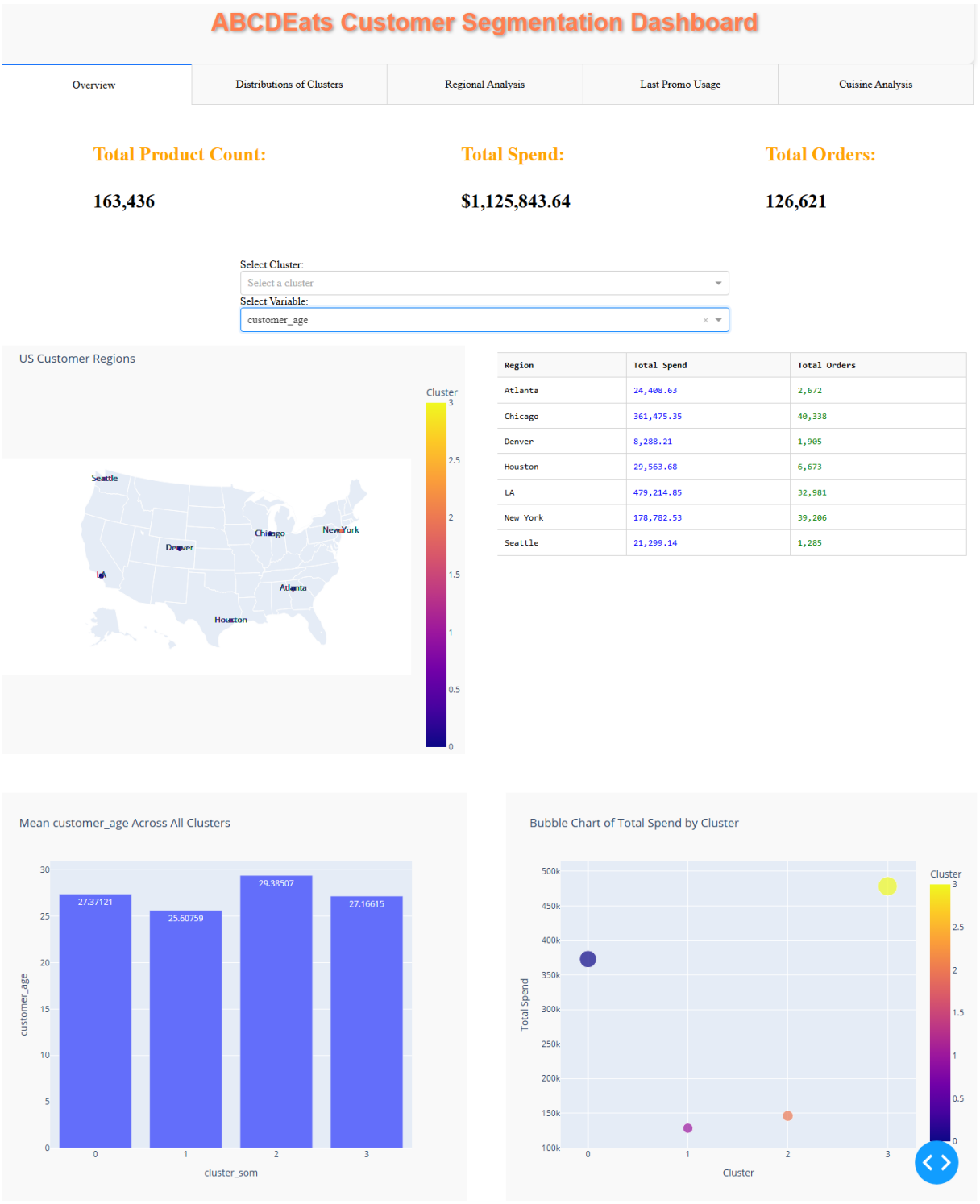

Figure 1. Overview Tab of Dashboard

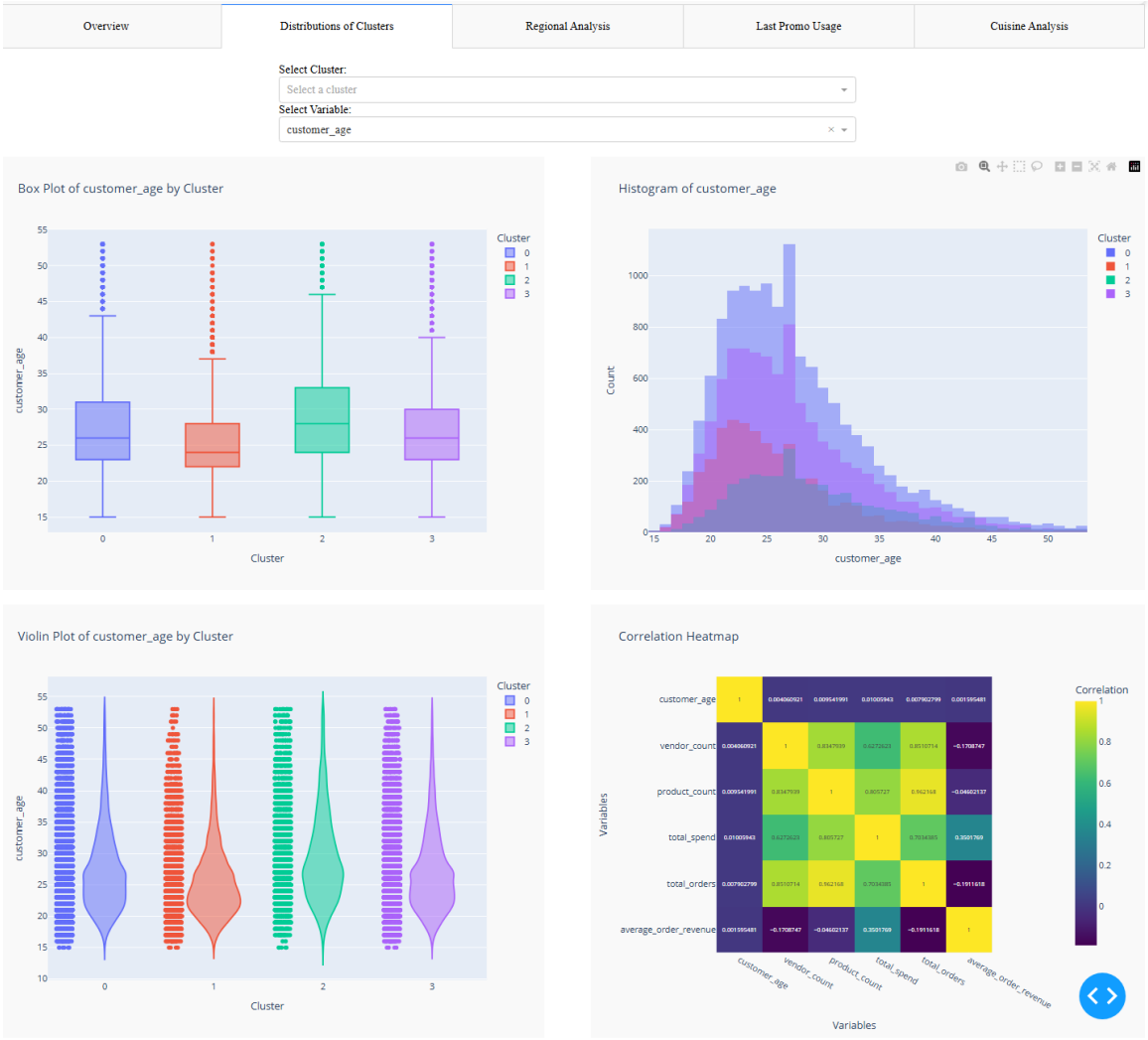

Figure 2. Distribution of Clusters Tab of Dashboard

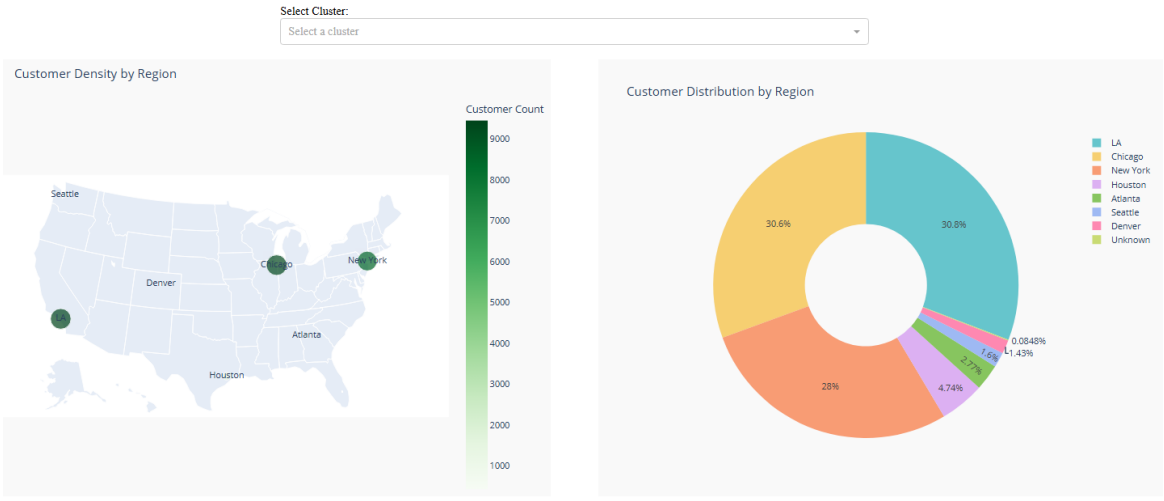

Figure 3. The Regional Analysis Tab of Dashboard

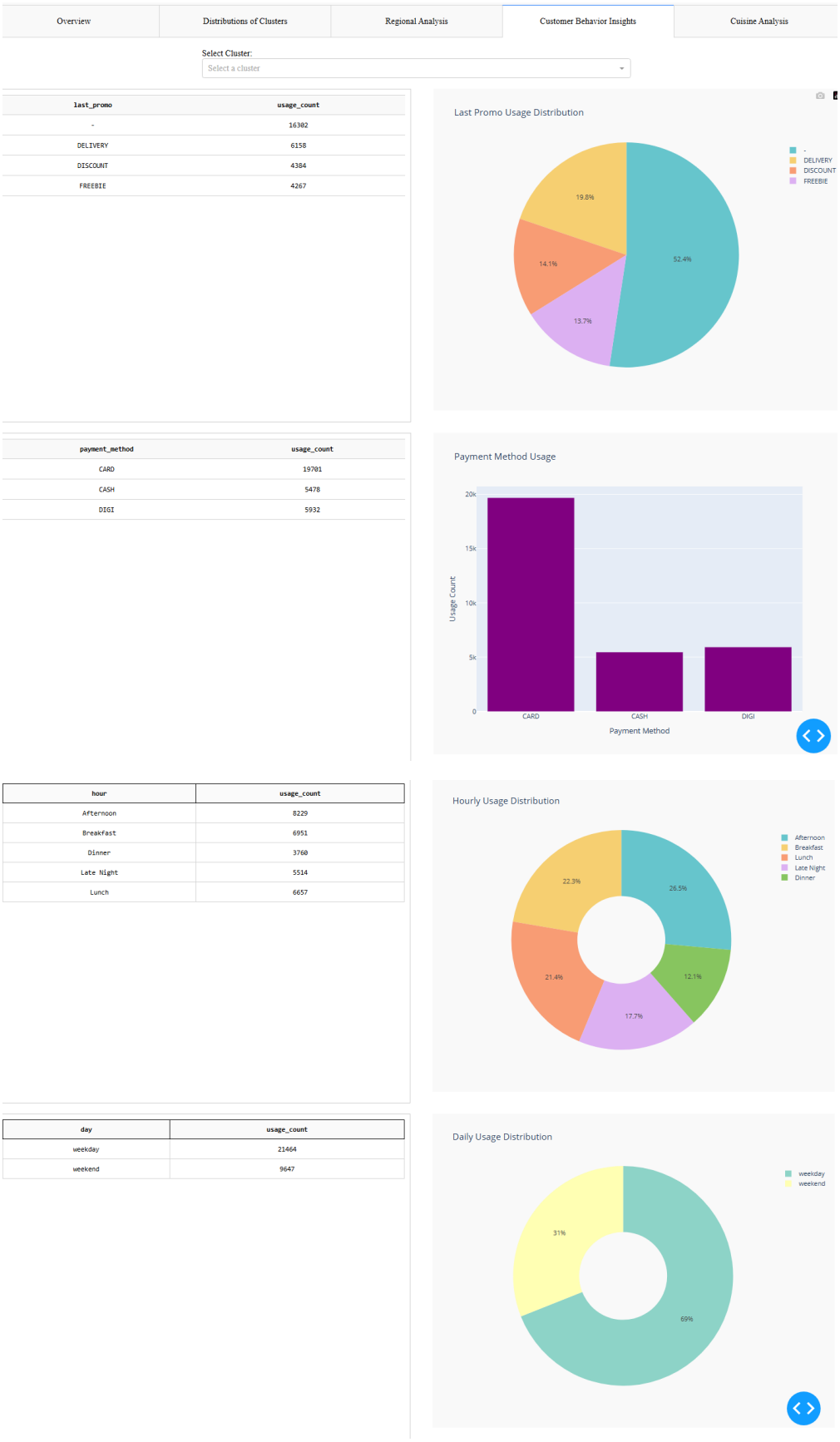

Figure 4. Customer Behavioral Insights Tab

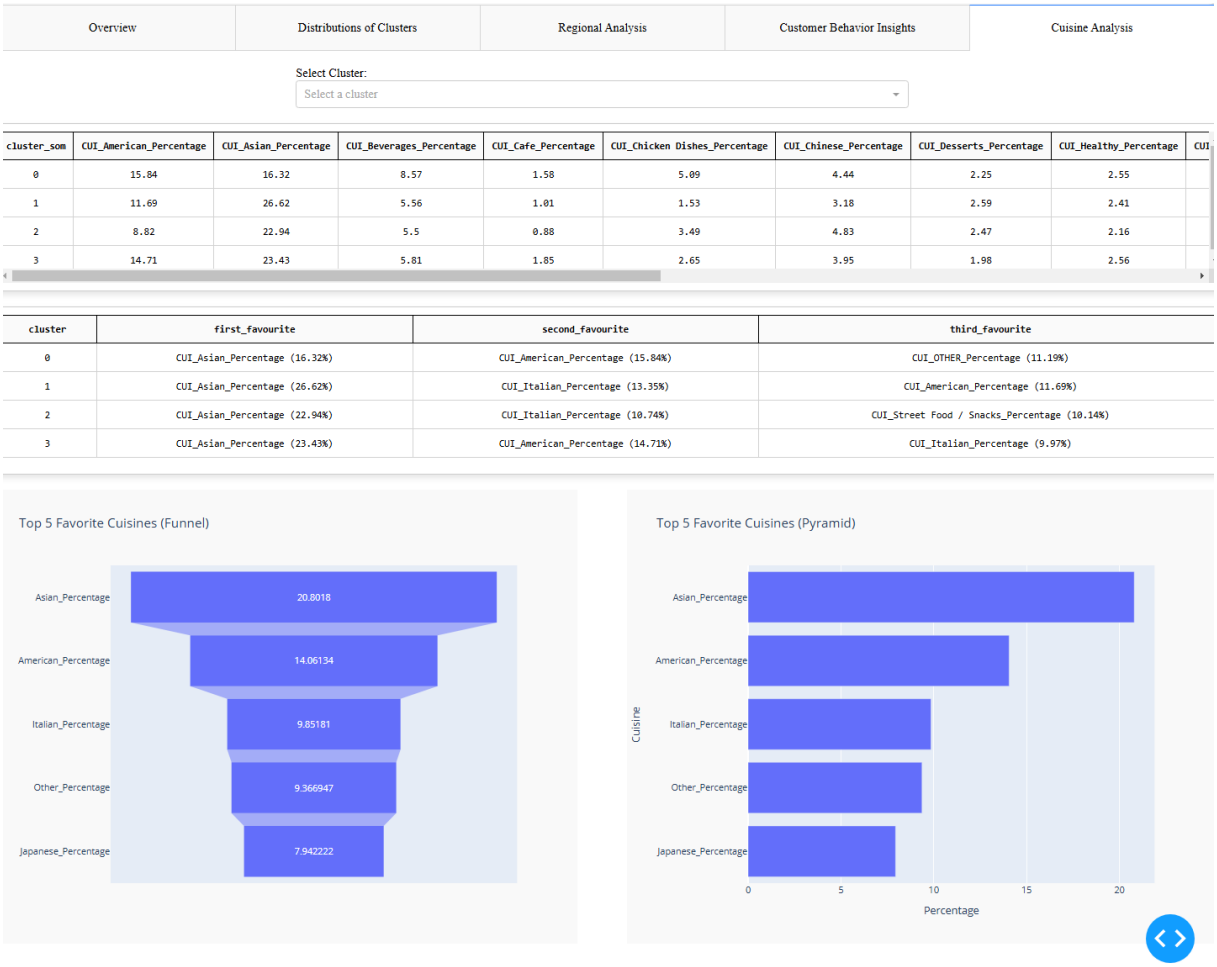

Figure 5. Cuisine Preferences Analysis Tab of Dashboard