Eats4Life Association Analysis

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EATS4LIFE ASSOCIATION ANALYSIS

Overview

Eats4Life seeks to refresh its menu by incorporating wine recommendations for its main entrées. Our team conducted an association analysis of eight distinct meat dishes and thirteen wine brands to support this initiative. We identified eleven specific wine pairings that strongly correlate with their respective entrées. For example, Blackstone Merlot is 3.2 times more likely to be ordered with Filet Mignon than random selection. Incorporating these pairings into the menu could boost wine sales and overall revenue. Additionally, our analysis of the wine inventory emphasizes the need to focus on high-demand wines like the Blackstone Merlot or Duckhorn Chardonnay and assess whether to continue carrying low-demand wines like the Three Rivers Red and Helben Blanca.

Methodology and Analysis

This section of the report details our process in determining entrée and wine pairings.

Data Used

The dataset comprised orders from 76,233 guests over the past few years. Each guest order was aggregated to give a complete overview of their selections, including the main dish, side, and wine (where applicable). We organized these items into three primary categories: Meats, Wines, and Sides, as shown in Table 1.

Category	Type	Item
Meats	*Pork*	Pork Chop, Pork Tenderloin
	Beef/Game	Filet Mignon, Duck Breast, Roast Chicken
Fish		Seabass, Swordfish, Salmon
Wines	*Reds*	Three Rivers Red, Innocent Bystander Sauvignon Blanc, Single Vineyard Malbec, Adelsheim Pinot Noir, Echeverria Gran Syrah, Blackstone Merlot, Louis Roug
	Whites	Total Recall Chardonnay, Duckhorn Chardonnay, Helben Blanc, Brancott Pinot Grigio, Cantina Pinot Bianco, Oyster Bay Sauvignon Blanc
Sides		Bean Trio, Caesar Salad, Roasted Potatoes, Warm Goat Salad, Mashed Potatoes, Roasted Root Veg, Seasonal Veg

Table 1: Order Breakouts

Table 1 illustrates how meats (e.g., fish, pork, beef/game) and wines (i.e., reds and whites) were further categorized. This classification allowed for a more detailed exploration of potential associations in these grouped categories.

Exploratory Data Analysis

We visualized the frequencies and distributions of guest ordering habits to understand which entrées were popular. Figure 1 details the distribution of meat orders.
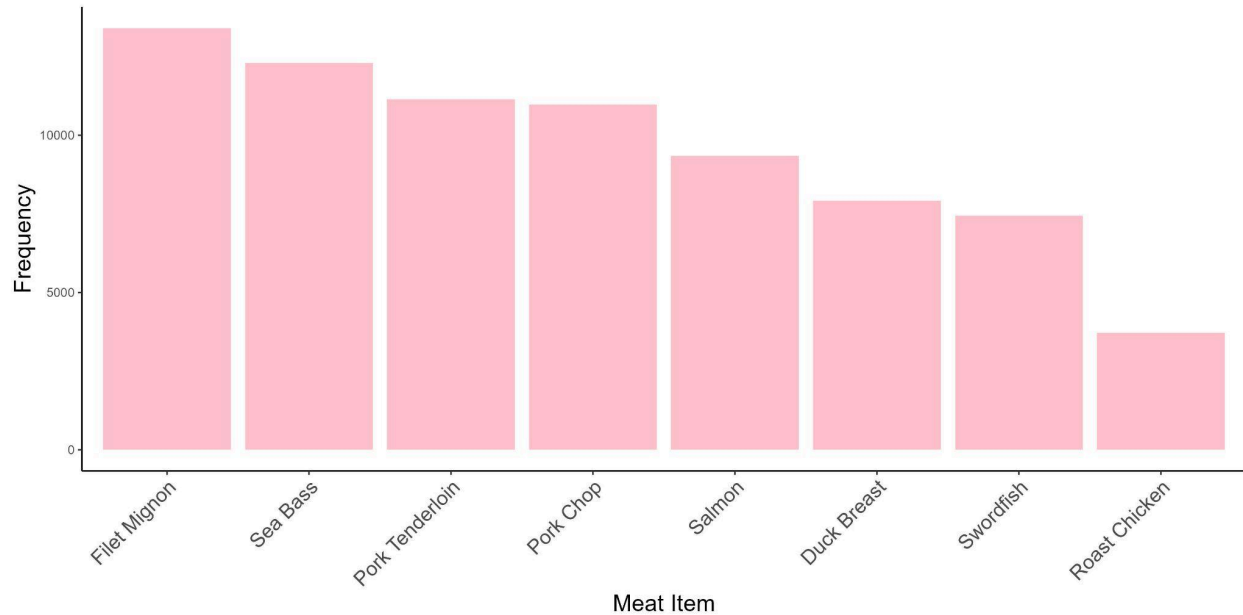

Figure 1: Histogram of the Distribution of Meat Orders

Figure 1 shows that the most popular main entree is Filet Mignon, followed by Sea Bass. The least popular is Roast Chicken. Eats4life aims to understand relationships between entrees and wine pairings. We visualize the percentage of red or white wines ordered by entrees in Figure 2.
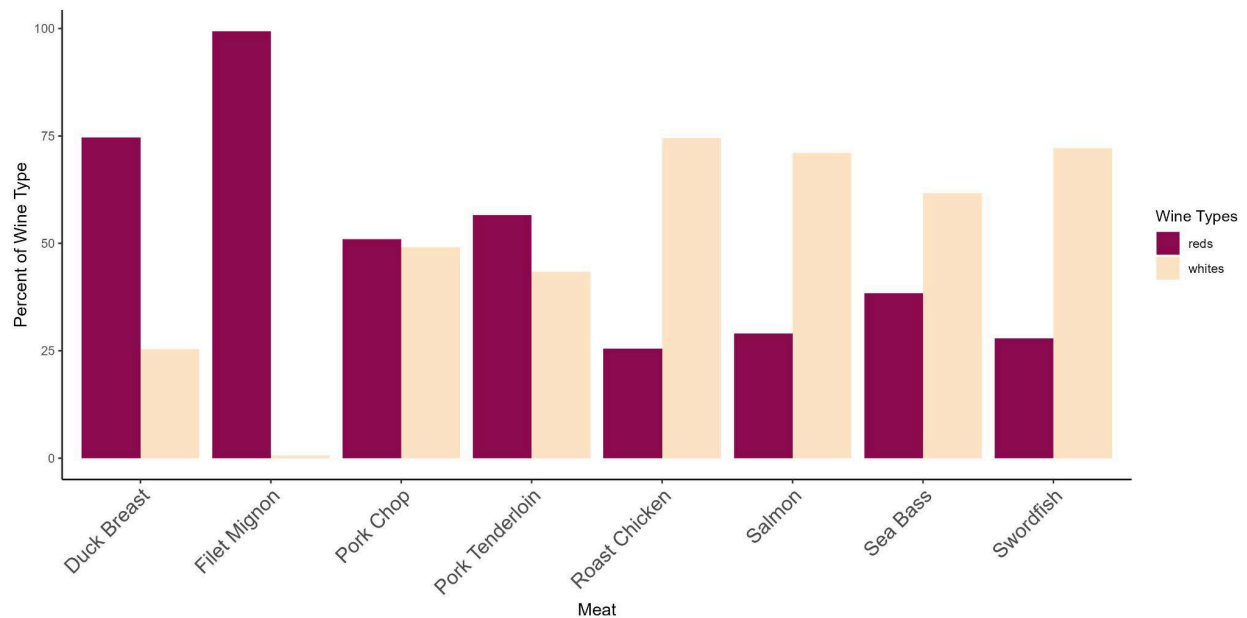

Figure 2: Percent of Wine Types by Meat

As shown in Figure 2, the filet mignon and duck are overwhelmingly ordered with red wine, while the fish entrées are typically accompanied by white wine. Pork entrées tend to favor red wine slightly, although the balance between white and red is quite close. The roast chicken is most often ordered with white wine. Figure 2 provides preliminary insights into which types of wine might be suitable recommendations for each entrée.

Association Analysis

Our recommendation strategy is built on the premise that guests typically select their main entrée first, guiding their wine choice. By focusing our analysis on the main entrée, we can align our pairing suggestions with the natural decision-making process of guests. This approach allows us to offer straightforward, complementary wine options that enhance the overall dining experience.

We conducted an association analysis to find the support, confidence, and lift between all entrée and wine pairings, focusing on high-support combinations to prioritize pairings that affect a sizable proportion of transactions. We also used higher confidence values to make more robust, more reliable recommendations, indicating consistent guest preferences. Lastly, we focused on high-lift combinations (lifts greater than one) to identify pairings that occur more frequently than expected, potentially indicating strong guest preferences or successful existing recommendations. Because we are concerned with how guests choose their wine based on their entree, we generally prefer confidence in assessing the wine pairings. This approach ensures our recommendations have a broad impact, enhancing the dining experience for many guests.

Results and Recommendations

This section presents our recommendations from our association analysis, broken down into the entrée categories.

Meat Entrées

Our analysis for filet mignon shows a strong preference for red wines, with 99% of filet orders paired with a red wine selection. Blackstone Merlot is the most popular choice among red wine orders; those who order filet mignon have a 36% chance of ordering it, making it our top pairing recommendation for this dish. Alternative pairings are Single Vineyard Malbec (21%) or Adelsheim Pinot Noir (28%). Given the high popularity of filet mignon among guests, we suggest ensuring a well-stocked selection of red wines.

For pork entrées, we recommend offering both white and red wine options to accommodate diverse tastes. For the pork tenderloin, guests strongly favor the Adelsheim Pinot Noir (28%) and Duckhorn Chardonnay (24%). Our top white wine pairings for the pork chop include the Duckhorn Chardonnay (23%), while for red wine enthusiasts, we suggest Single Vineyard Malbec (17%).

Our analysis for duck breast shows a confidence of 32% for Blackstone Merlot. This pairing reinforces a general preference for red wines with meat dishes.

There is no clear wine pairing trend for roast chicken; for this dish, it might be best to allow the guest to consider the various white wine options, as 75% of customers who order roast chicken order a white wine. (See Table 2 in the Appendix)

Fish Entrées

Sea Bass was the second most popular dish and the most favored fish entrée. White wine pairings are predominant for sea bass, aligning with the overall trend for fish dishes. We

recommend Duckhorn Chardonnay as the top pairing (25%), with Innocent Bystander Sauvignon Blanc (23%) as an alternative. Sea Bass with these pairings is an ideal choice to promote to pescatarian guests.

Our analysis for swordfish didn't reveal an overwhelmingly strong confidence in a specific wine. However, the Bancott Pinot Grigio was 2.6 times more likely to be ordered whenever the swordfish was ordered than when someone ordered the wine randomly. This suggests the Pinot Grigio might be a good option for the swordfish. However, with no strong confidence in any specific wine for the swordfish, we recommend offering a variety of white wines without specifying a single choice. This will maintain flexibility and cater to diverse preferences among Swordfish orders.

We observed low support levels with salmon due to infrequent co-ordering patterns with specific wines and do not recommend any particular wine pairing for this dish. Instead, encouraging guests to choose based on personal preferences might be the best approach.

Special Dietary Recommendations

Our analysis reveals an interesting trend for vegetarian and vegetable associations. Seasonal vegetables are often ordered alongside Filet Mignon and paired with Blackstone Merlot. Based on these items' popularity, we suggest pairing seasonal vegetables with Blackstone Merlot for vegetarian guests. Though this recommendation is based solely on item popularity rather than direct vegetarian orders, it could provide an appealing option for this dietary group.

Wine Inventory Recommendations

Analysis of wine frequency yields several recommendations for Eats4Life's wine inventory management. Wines like Duckhorn Chardonnay, Adelsheim Pinot Noir, and Blackstone Merlot, which are frequently ordered across various entrées, should remain well-stocked. Also, wines that account for a smaller percentage of overall orders but have strong associations with specific entrées should be stocked. For example, Bancott Pinot Grigio, while representing 0.13% of total wine orders, is most often paired with swordfish and should be stocked to cater to guests with specific taste preferences. Figure 3 shows that Three Rivers Red and Helben Blanc are lower-frequency wines. These wines also have minimal associations with specific entrées and may warrant reduced inventory levels.
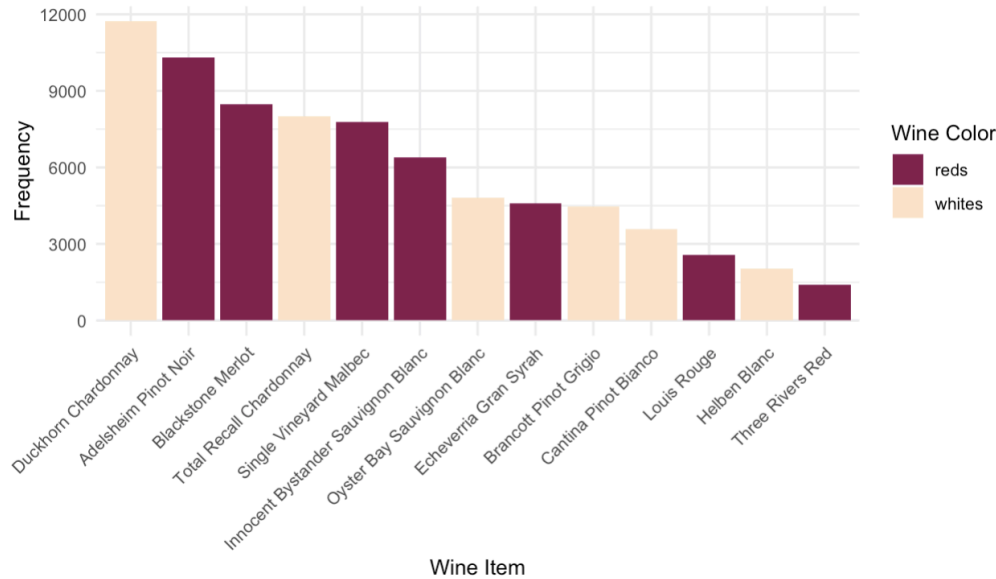
Figure 3: Frequency of Wine by Type

Figure 3 shows that the most commonly ordered wines are Duckhorn Chardonnay, Adelsheim Pinot Noir and Blackstone Merlot. The least ordered wines are Three Rivers Red, Helben Blanc, and Louis Rouge. We recommend examining the inventory levels of these rarely ordered wines and adjusting resource allocations if need be.

Conclusion

This report uses association analysis to guide entrée and wine pairings for Eats4Life. We found that most meats pair well with red wines. Specifically, Blackstone Merlot has 36% confidence with filet mignon and 32% with duck breast. Sea bass and swordfish are most commonly paired with white wines. However, we did not observe brand preferences for Swordfish and Salmon, suggesting that we should offer flexibility in wine choices for these entrées in particular. Additionally, Blackstone Merlot often pairs well with sides like seasonal vegetables. Our inventory analysis suggests prioritizing high-demand wines while maintaining select premium options for profitability.

Our suggestions aim to optimize wine pairings for each entrée while providing flexibility to accommodate various tastes and dietary requirements. Eats4Life can effectively cater to diverse guest preferences by implementing our recommendations and enhancing the overall dining experience.

Appendix

Table 2: Wine Suggestion Summary

Entree	Wine Type	Brand
Filet Mignon	Red	Blackstone Merlot
	Red	Single Vineyard Malbec
	Red	Adelsheim Pinot Noir
Duck Breast	Red	Blackstone Merlot
Pork Tenderloin	Red	Adelsheim Pinot Noir
	White	Duckhorn Chardonnay
Pork Chop	Red	Single Vineyard Malbec
	White	Duckhorn Chardonnay
Roast Chicken	White	No Brand Recommendations
Swordfish	White	Bancott Pinot Grigio
Salmon	White	No Brand Recommendations
Sea Bass	White	Duckhorn Chardonnay
	White	Innocent Bystander Sauvignon Blanc

Table 3: Support, Lift, Confidence of Entrees by Wine Type

Entree	Wine Type	Support	Confidence	Lift
Filet Mignon	Red	0.175	0.994	1.82
Duck Breast	Red	0.078	0.747	1.369
Roast Chicken	White	0.0363	0.745	1.639
Swordfish	White	0.070	0.722	1.587
Salmon	White	0.0869	0.710	1.562
Sea Bass	White	0.0995	0.616	1.356
Pork Tenderloin	Red	0.0827	0.566	1.037
Pork Chop	Red	0.0734	0.510	0.935
Pork Chop	White	0.0706	0.490	1.078
Pork Tenderloin	White	0.0634	0.434	0.955

Homework Report Checklist

As instructed by Dr. Egan Warren, the team member(s) responsible for checking each item should enter their initials in the field next to each question. All items should be addressed before submitting the assignment with the initialed checklist attached.

Sections & Structure

Overview

RO	Is the overview concise?
RO	Does it provide context about the business problem? <Content>
RO	Does it briefly address your team's work, quantifiable results, and recommendations? <Action>
RO	Does it offer audience-centered reasons for recommendations? <Context>

Body Sections

RO	Does the report body include information on methods, analysis, quantifiable results, and recommendations?
RO	Is content grouped into appropriate sections (*methodology*, *analysis*, *results*, *recommendations*)?

Conclusion

RO	Does the report have a conclusion?
RO	Does the conclusion sum up the report and emphasize relevant takeaways?

Structure

RO	Does each major section have a heading?
RO	Are sections, subsections, and paragraphs organized logically for easy navigation?

Visuals

Introduction, Discussion, and Captions

EB	Is each visual introduced in the text before it appears?
EB	Is each visual close to where it is introduced?
EB	Does each visual include a title with the following information: type (*table* or *figure*), number, and a descriptive caption?
EB	Is each visual discussed and interpreted in the text?
EB	Are figures and tables numbered separately?
EB	Are table captions above the table? Are figure captions below the figure?

Visual Design

RO	Do figures/tables use audience-friendly labels rather than variable names?
RO	Are the visuals easy to interpret?
RO	Are the visuals appropriately sized?
RO	Do tables appear on one page (*not split between 2 pages*)?

RO	Are legends and axis labels included for figures?
RO	Are numbers in tables right aligned?
RO	Are the visuals designed well (*ex*: *re-created in Word or Excel, not blurry or stretched,…*)?

Document Design

Title Page Design

KD	Does it include a descriptive title?
KD	Does it state the team name, team members' names, and the submission date?

Table of Contents Design

KD	Does it list all the major sections of the report with corresponding page numbers?
KD	Do the page numbers and sections in the Table of Contents match the report?

Document Design for Entire Report

KD	Is a standard typeface (*Calibri, Arial, etc.*) used?
KD	Is the size of the body text between 10-12 pt.?
KD	Are headings and subheadings used to organize information?
KD	Are distinctive text styles (*bold, italic, etc.*) used to distinguish between heading levels?
KD	Are text styles for headings used consistently (*ex*: *all level-one headings are bold*)?
KD	Are all paragraphs an appropriate length (*fewer than 12 lines*)?
KD	Is white space used to indicate paragraph breaks?
KD	Are bullet lists used for a series of items and numbered lists to show a hierarchy?

Writing Style and Mechanics

Spelling and Capitalization

KD	Are spelling errors located and corrected?
KD	Is spelling consistent throughout (*no switching between acceptable spellings*)?
KD	Is capitalization used appropriately (*proper nouns, etc*.)?
KD	Is capitalization of words consistent throughout the report?

Grammar and Punctuation

KD	Are verb tenses used appropriately?
KD	Are marks of punctuation used appropriately?
KD	Is subject-verb agreement used in every sentence?
KD	Is the grammar checker updated and are underlined grammar issues addressed?

Writing Style

KD	Are all sentences in the report easy for your audience to understand quickly?
KD	Are most sentences written in active voice?
KD	Are idioms and vague words eliminated from the report?
KD	Are acronyms introduced before being used?
KD	Are well-written topic sentences included at the beginning of each paragraph?
KD	Are lists parallel?
KD	Is the appropriate point of view used when addressing your audience or describing team actions?