EATS4LIFE: DATA-DRIVEN WINE PAIRING ANALYSIS

BLUE 5
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Overview

Eats4Life seeks to update its menu by incorporating wine recommendations for every main entrée. The owner is interested in using data analytics to identify the best wine and entrée pairings from years of customer orders.

Our team analyzed 228,699 customer orders, consisting of 13 wines, eight entrées, and seven sides. We curated two wine recommendations for each entrée - one being a "popular" choice and the other an enticing "off the beaten path" selection. We've also highlighted unpopular combinations of entrées and wines to assist staff in guiding less-experienced customers.

Methodology & Analysis

Data Used

The data contain 228,699 transaction records of past entrée, side, and wine orders. Figure 1 shows the order frequency of the main entrées grouped by the most popular wines. Additionally, Appendix A includes the frequency of main entrées without considering wine pairings.
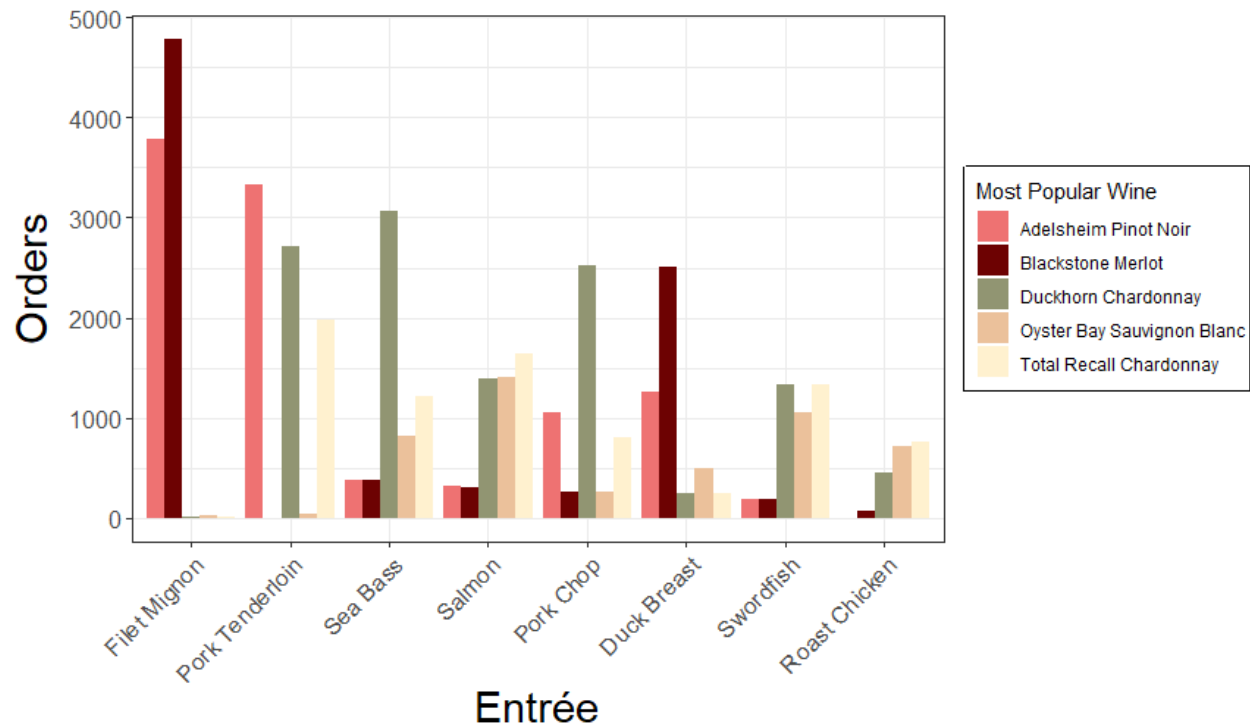

Figure 1: **Entrée Order Frequency Grouped by Wine.**

Association Analysis

We provided two types of recommendations for each main entrée based on confidence and lift (see Appendix B). For the first recommendation, we chose the combinations with the highest confidence to select a pairing based on the wine's popularity with the main entrée. For the second recommendation, we chose the combinations with the highest lift to select a pairing with the highest association compared to randomly selecting the main entrée.

Recommendation names and descriptions are as follows:

- **Most Popular:** The wine most frequently ordered with the main entrée.
- **Off the Beaten Path:** The wine whose popularity increased the most when ordered with a particular main entrée.

For example, 22.92% of customers who ordered the pork chops also ordered the Duckhorn Chardonnay, making it the most popular wine companion to that entrée. The "off the beaten path" recommendation for the pork chops is the Louis Rouge because its popularity rises by 240% when paired with the pork chops. For the remaining popularity statistics, see Appendix C.

Results & Recommendations

Table 1: Wine Recommendations for Each Main Entrée

Wine Recommendations		
Main Entrée	**Most Popular**	**Off the Beaten Path**
Duck Breast	Blackstone Merlot	Adelsheim Pinot Noir
Filet Mignon	Blackstone Merlot	Adelsheim Pinot Noir
Pork Chop	Duckhorn Chardonnay	Louis Rouge
Pork Tenderloin	Adelsheim Pinot Noir	Single Vineyard Malbec
Roast Chicken	Oyster Bay Sauvignon Blanc	Brancott Pinot Grigio
Salmon	Oyster Bay Sauvignon Blanc	Cantina Pinot Bianco
Sea Bass	Innocent Bystander Sauvignon Blanc	Brancott Pinot Grigio
Swordfish	Brancott Pinot Grigio	Oyster Bay Sauvignon Blanc

Additional Findings

In addition to recommending popular wine and main entrée pairings, Eats4Life staff can use information about unpopular combinations to help guide inexperienced customers. For example, although the filet mignon and Duckhorn Chardonnay are individually sought-after items, their combination is notably unpopular. Refer to Appendix D for a table of the least favored pairings.

In addition, we investigated the association between wines and sides and identified no significant relationships.

Conclusion

We analyzed the frequency of all 104 combinations of wines and entrées to curate two wine recommendations per entrée. The first recommendation is based on which wine customers ordered the most, and the second is based on which wine had the largest increase in popularity when paired with the entrée. We observed that red wines paired with red meat entrées and white wines paired with white meat entrées. We also discovered that the type of side did not influence wine choice.

Lastly, we identified several combinations of entrées and wines that were particularly unpopular with customers. This information can guide staff in assisting customer choices and may be especially useful for inexperienced clientele.
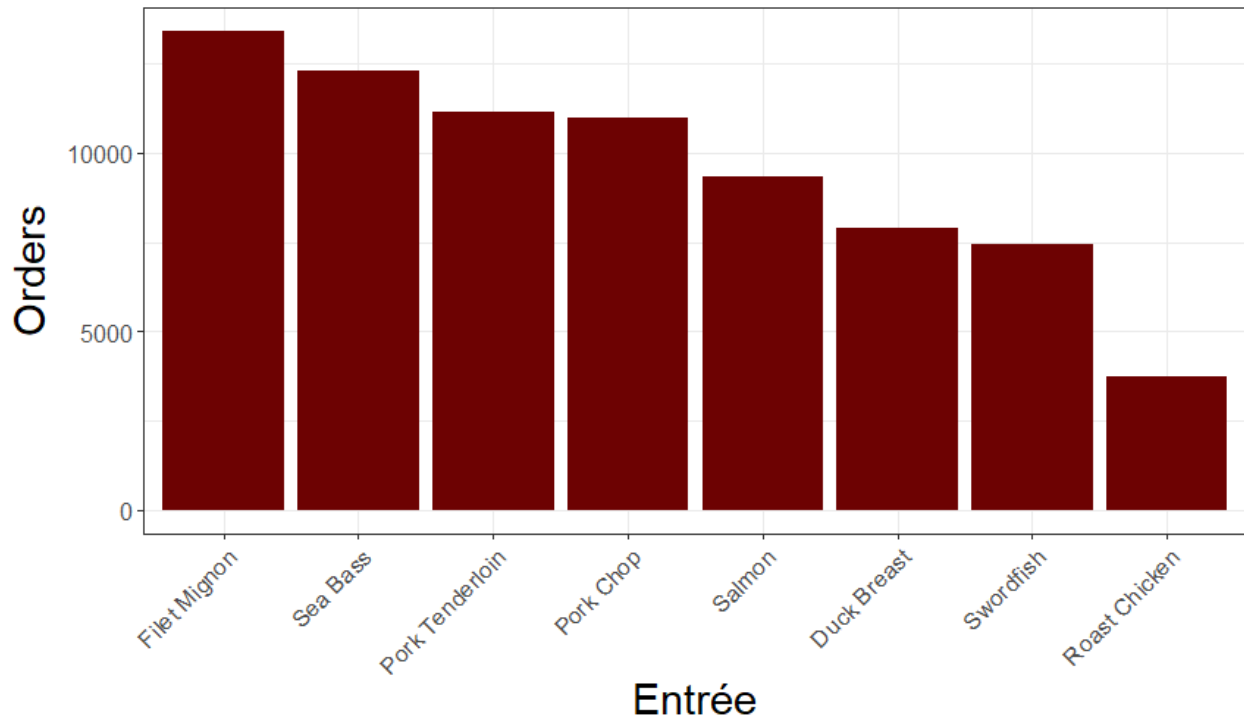
Appendix

Appendix A

Figure 2: Entrée Order Frequency.

Appendix B

Association rule descriptions:

- **Confidence:** Given that a customer ordered a particular entrée, a wine's confidence indicates what percentage of the time that wine was ordered.
- **Lift:** Given that a customer ordered a particular entrée, a wine's lift indicates how much greater the probability of ordering the wine is than randomly selecting the main entrée.

Appendix C

Table 2: Popularity statistics of entrée and associated wine

Popularity Statistics			
Entrée	**Associated Wine**	**Confidence**	**Lift**
Duck Breast	Blackstone Merlot	31.67%	2.85
Duck Breast	Adelsheim Pinot Noir	15.87%	1.17
Filet Mignon	Blackstone Merlot	35.67%	3.20
Filet Mignon	Adelsheim Pinot Noir	28.23%	2.09
Pork Chop	Duckhorn Chardonnay	22.92%	1.49
Pork Chop	Louis Rouge	11.50%	3.40
Pork Tenderloin	Adelsheim Pinot Noir	29.93%	2.21
Pork Tenderloin	Single Vineyard Malbec	17.88%	1.75
Roast Chicken	Oyster Bay Sauvignon Blanc	19.41%	3.07
Roast Chicken	Brancott Pinot Grigio	17.31%	2.95
Salmon	Oyster Bay Sauvignon Blanc	15.00%	2.37
Salmon	Cantina Pinot Bianco	10.88%	2.31
Sea Bass	Innocent Bystander Sauvignon Blanc	22.71%	2.71
Sea Bass	Brancott Pinot Grigio	10.45%	1.78
Swordfish	Brancott Pinot Grigio	15.07%	2.57
Swordfish	Oyster Bay Sauvignon Blanc	14.25%	2.26

Wines with the highest confidence were selected as the "popular" recommendation. Wines with the highest lift were selected as the "off the beaten path" recommendation. In cases where the highest confidence wine also had the highest lift, the second-highest lift wine was selected for "off the beaten path."

Appendix D

Table 3: Unpopular dish and wine combinations

Unpopular Combinations	
Dish	**Wine**
Duck Breast	Duckhorn Chardonnay
Filet Mignon	Duckhorn Chardonnay
Pork Chop	Blackstone Merlot
Pork Tenderloin	Blackstone Merlot
Roast Chicken	Adelsheim Pinot Noir
Salmon	Single Vineyard Malbec
Sea Bass	Adelsheim Pinot Noir
Swordfish	Adelsheim Pinot Noir