

Eyewear Demand Forecasting

Background

VSP Vision is a leading provider of eye care services in the U.S., sitting at the intersection of healthcare and retail. Effective supply chain management requires maintaining the right inventory levels. Too much inventory leads to unnecessary costs, while too little results in missed sales opportunities. Demand forecasting is the process of predicting future customer demand for a product or service using historical data, market trends, and other influencing factors (seasonality, promotions, or economic conditions). As an eyewear frame manufacturer, VSP releases new frames to the marketplace on a periodic basis. These frame releases are called seasons. In preparation for the new season, VSP must order the frames from the manufacturer(s) months in advance. VSP orders inventory equal to 4 months of frame sales as the initial order. The new frame sales eyewear demand forecast is used to generate the initial frame order amount. For this project, the goal is to create an accurate initial new frame sales eyewear demand forecast for all frames for the season. As these are new frames, there is no prior frame sales data for these specific frames to use in the forecast.

The Data

Kathleen Lovett and the team at VSP Vision have provided a sample of demand for 9/2023 – 8/2024 in AO-BI275 DEMAND KC KP LA LS KO KS 12.17.25

Calvin Klen_Sept24 ATP, LCAOSTE_Sept24 ATP, and Nike_Sept24 ATP provide product information for each brand.

The Tasks

For this final project, the assignment is to create a new frame sales demand forecast model to predict how much product should be ordered in the initial order using historical frame data sales, develop a Machine Learning (ML) model to predict frame sales at the Frame Style/Color/Size level.

Create a ten-minute presentation and a 10-20 page report that answers the following questions. Since the presentation is relatively short, you may choose to focus on a few highlights from your analysis and expand further on the details in the report.

1. General analysis:
 - a. For each frame style size color combination in a season, how many frames should be ordered?
 - b. What are the key features that drive frame sales?
 - c. What could have made your model more accurate?

The intention behind the assignment is to gain a deeper understanding of the supply chain planning role and how tools are used to analyze their data to create the ideal inventory count to ensure that we do not have too much or too little product. Creating the data model and interpreting the outputs, is sufficient to do this project. You are free to do some outside research

to validate/supplement the findings, especially if you are unfamiliar with the domain, and to apply other more sophisticated text analysis techniques you may know of, but they should not be required. Large language models are not required for this analysis; if you use them; please complement the use of LLMs with other techniques (e.g. topic modeling).

Please submit a .pdf of your slides, as well as the final report. There are no hard guidelines for the final report, but if you are submitting more than 20 pages, you are probably including too much detail. Similarly, if your report is fewer than 10 pages, you may not be answering the questions fully. The 10-20 pages is for the text of the report, and does not include the code. The preferred submission format for the final report is a .pdf file accompanied by the code in a separate Jupyter notebook. The final report should be separate from your slides and the code

Rubric

Each team should turn in separate files for the presentation, the season 434 scoring spreadsheet, the report and a Jupyter notebook for the code. The presentation and report will be graded based on clarity, organization and presentation/writing quality as well as content. Watch for typos and grammatical mistakes. Structure your presentation and report to tell a coherent story: with executive summary (one slide/page with key results), introduction/motivation that states why you are performing the analysis and a conclusion that reinforces key findings/recommendations.

Presentation: 10 points total, 8 points for answering the questions below, and 2 points for presentation quality. Focus the presentation on the problem you are solving and any insights/results, and leave the details to the report.

- What problem is being solved? Focus on one or two key insights from your results, not all ranges of assortments that the data could address.
- What does the data look like based on your exploratory data analysis?
- How was the data prepared for modeling?
- What modeling approach did you use?
- What are the results?
- How did you evaluate the results?
- What next steps would you recommend based on your results?

Presentations are in class on Feb 25. Please submit separate files for your slides, final reports and code notebooks.

Only one team member needs to submit the slides and final reports on behalf of the team. Remember to include a paragraph in your report describing who did what in your team. **Report and code:** 10 points total for the report/deliverable, 8 points for answering the questions above, and 2 points for report quality, including appropriate use of visualizations. Code should be well structured and easy to follow, with liberal use of comments.