



NIKEID DATA ANALYTICS STRATEGY

JOHN BELLAMY

AGENDA



Summary and
introduction to case
study



Data (endogenous
and exogenous) &
Tooling



Four pillars of
analysis



Plan of Attack



Outcomes



Recommendations



Conclusion



About the author

SUMMARY & INTRO TO CASE STUDY



NIKEiD has missed sales targets for the past two months. This team has been tasked with identifying analytical approaches to identify root causes of the drop in sales as well as recommendations to improve decision-making and insight going forward.



To meet the tasks on the left, sample retails sales data was sourced (see next slide) to create concrete examples of recommendations. The repo to support what is demonstrated here can be found in my Github: <https://github.com/johnlbellamy/Product-Data-Science>

DATA (ENDOGENOUS AND EXOGENOUS) & TOOLING

Because most retail is driven largely by the state of the economy, we can look at both our own internal (endogenous) data and external (exogenous) data. Exogenous data can be data about gas prices, unemployment, the consumer price index (CPI), suppliers or anything else that could affect sales.

Our example data is taken from Kaggle and represents weekly sales data from a retail chain. Information about store type, markdowns and other details are provided. In addition, external data in the form of weekly average unemployment rate, CPI and gas prices are also included to test the hypotheses that these factors have affected sales. The datasets are in my Github and were sourced from [Kaggle](#).

Case study data was viewed and combined and cleaned in Jupyter using Pandas and saved as a csv. This data was further analyzed with data science tools (Scikit-Learn, NumPy, etc.) and loaded into Tableau to create dashboards. Several fields including new calculations Weekly_Sales/Size (sales per sf) and Total Markdowns.

FOUR PILLARS OF ANALYSIS



The four main types of analysis are:

- **Descriptive:** Summarizes and describes past events. Examples are feature analysis and dashboards.
- **Diagnostic:** Examines past performance to find causes. A/B testing. Testing hypotheses about differences in population; high-gas prices result in lower sales, etc.
- **Predictive:** Forecasts future events using historical data and models/ML. What we think of when we say AI. Computer vision, generative AI, recommenders, etc.
- **Prescriptive:** Recommends specific actions based on data analysis. Gauging metrics and adjusting inputs/outputs in response. We see some reality and how do we continue this trend or reverse it.

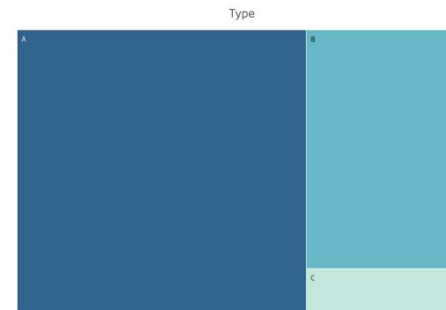
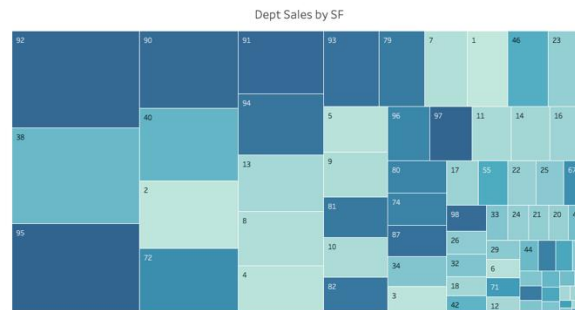
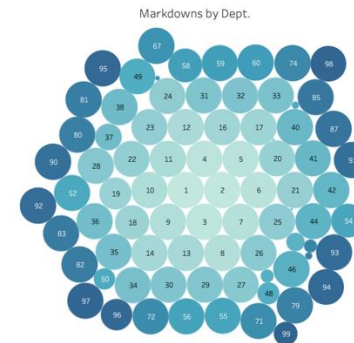
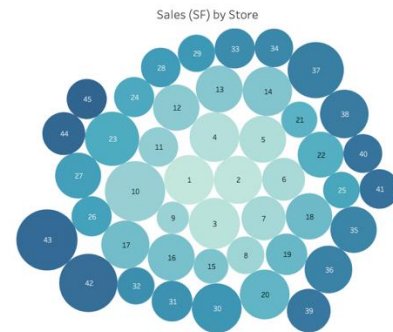
PLAN OF ATTACK

Look at internal and external data points using the 4 pillars to create “Outcomes” as the foundation of recommendations for Nike:

- Descriptive: We can create dashboards to slice and dice data. Are sales down across all venues or only some?
- Diagnostic: Have any changes occurred on the website within last few months and if so test whether these changes might have affected sales. We can also create new A/B testing experiments. We can look at exogenous data and test if external economic/supply factors affected sales.
- Predictive: Recommend NIKEiD shoes to the target demographic and those most likely to buy the brand. Also create a recommender to recommend other products a NIKEiD purchaser might like to increase overall sales. Create new or improve old forecast models.
- Prescriptive: Are some retailers under-performing? Are some regions underperforming? Are some retailers/regions over-performing? We can learn from both cases and try to bring positive outcomes through discoveries.
- The following slides show the outcomes on real data for the four pillars followed by final recommendations.

OUTCOMES (DESCRIPTIVE)

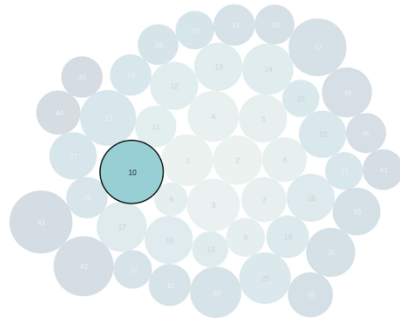
Store and Dept Sales



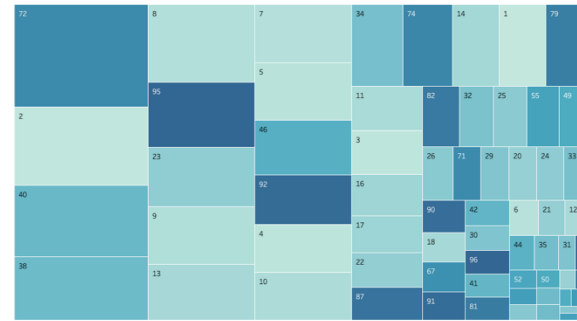
OUTCOMES (DESCRIPTIVE)

Exogenous Factors (Fuel Cost)

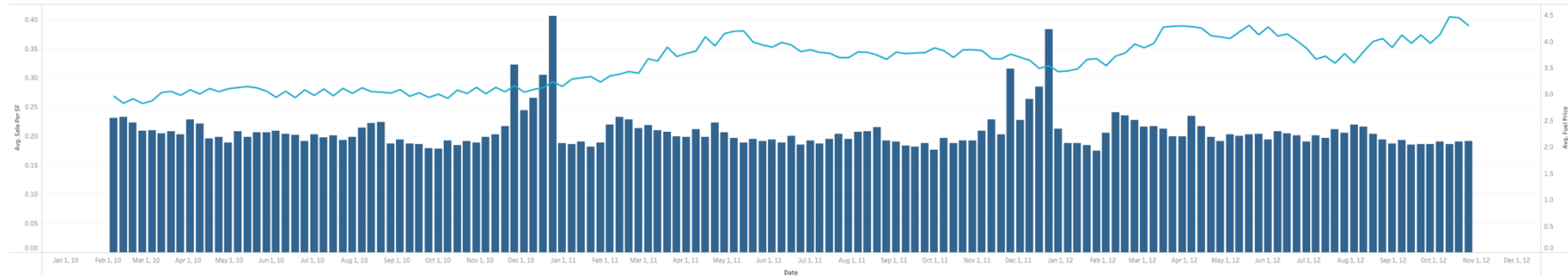
Sales (\$F) by Store



Dept Sales by SF



Avg Sales (By SF) by Month Fuel



Store Sales by SF | Dept Sales by SF | Weekly Sales by Type | Store and Dept Sales | Total Markdowns | Avg Sales (By SF) by Month CP | Avg Sales (By SF) by Month Fuel | Fuel Blms | **Exogenous Factors (Fuel Co.)** | Exogenous Factors (CP)

OUTCOME (DIAGNOSTIC)

Hypotheses

h0 : There is no difference between the population of `u_low_unemployment` and `u_high_unemployment`.

h1: There is a differences between the population of `u_low_unemployment` and `u_high_unemployment`.

`p = .05`

```
# split data into two sets. One where fuel prices are higher and one where fuel prices are lower. A good cutoff could be ~8
low_df = df[df["Unemployment"] <= 8.0]
high_df = df[df["Unemployment"] > 8.0]
Executed at 2024.10.09 11:23:44 in 42ms
```

```
# get random samples representing about 30% of data
x_train_low = low_df["Weekly_Sales_Scaled"].sample(int(round(len(low_df) * .25))) # .25 so we can get somewhat even number of samples from each group
x_train_high = high_df["Weekly_Sales_Scaled"].sample(int(round(len(high_df) * .30)))
Executed at 2024.10.09 11:23:44 in 14ms
```

```
res = stats.ttest_ind(x_train_low, x_train_high, equal_var=False)
Executed at 2024.10.09 11:23:44 in 5ms
```

res


Executed at 2024.10.09 11:23:44 in 3ms

`TtestResult(statistic=np.float64(-3.203105515794621), pvalue=np.float64(0.0013599845370659708), df=np.float64(96109.11418102641))`

$.0014 < .05$ so we must reject the null and accept the alternative.

OUTCOME (PREDICTIVE)

Create recommenders to show potential customers NIKEiD. Also create a recommender to suggest items when users are browsing NIKEiD



-6% \$78.68
Was: \$85.00

Size Chart ▾

Product details

Care instructions	Machine Wash
Origin	Imported
Sole material	Rubber
Platform height	1.00"

About this item

- Breathable Fabric Upper: Knit construction provides lightweight flexibility and breathable. Our running shoes let your foot always keeps dry and cool.
- Air Cushion Design: Provide cushioning and support effect for the feet, perfect accord with human body engineering provide more the protection of the foot and knees.
- Non slip Sole Design: The sneakers running shoes sole made from ultra light natural rubber material, the pattern on the bottom of sole features flexible grooves, strengthen the shoes ability of anti skid and grip, helping users adapt to any...

See more

Report an issue with this product or seller

Add to Cart


Buy Now

Ships from Amazon
Sold by Amazon
Returns 30-day refund/replacement
Payment Secure transaction

☐ Add a gift receipt for easy returns


Add to List

crocs




Crocs Unisex-Adult Echo Clog
★★★★★ 4,230
Shop now

Autper products customers bought together



This item: Autper Mens Air Athletic Running Tennis Shoes Lightweight Sport Gym Jogging...
4.2 ★★★★★ 8,361
\$39.99




Sponsored @
Women's Air Athletic Tennis Running Sneakers Lightweight Sport Gym Jogging Breathable...
4.2 ★★★★★ 5,622
\$42.99
prime

Total price: **\$82.98**


Add both to Cart

Some of these items ship sooner than the others.
Show details


Products related to this item




ikunka Men's Fashion Sneakers Lightweight Breathable Extra Wide Walking Shoes Tennis...
★★★★★ 1,698




NORTIV 8 Men's Comfortable Walking Running Tennis Shoes MovePropel Athletic...
★★★★★ 20




Autper Mens Air Athletic Running Shoes Sneakers Lightweight Sport Gym Jogging Walki...
★★★★★ 4,580




SKDOUL Men Sport Running Sneakers Tennis Athletic Walking Shoes mesh Breathable Co...
★★★★★ 12,144



QAUPPE Mens Air Running Shoes Athletic Trail Tennis Sneaker (White US 10 D/M)
★★★★★ 6,680



Kricely Men's Walking Shoes Lightweight Breathable Fashion Sneakers Athletic Gym...
★★★★★ 1,405



FitVille Men's Extra Wide Walking Shoes Orthopedic Trail Running Shoes Sneakers for...
★★★★★ 183

Page 1 of 58

OUTCOMES (PRESCRIPTIVE)



- Assume department 92 is the sales leader for this company. A high percentage of sales occurs in this department, yet there are a few stores that aren't selling. Why? What can be done to increase sales?
- We showed that high unemployment affects this company. What can we do to lower costs and pass value down to our shoppers?

FINAL RECOMMENDATIONS

- Check forecast models to make sure they are statistically sound. What are the variables? Have the variables changed? Have assumptions changed? Have external conditions in the world changed? Adjust models, as necessary.
- Develop an A/B testing program to test any website changes creating formal experiments and identifying appropriate metrics. Identify external/internal factors that might affect sales. Test different populations to see if outcomes are statistically due to these factors.
- Make sure current BI program and data engineering program supports dashboarding that will provide the needed descriptive/prescriptive analytics. Create new infrastructure and software, as necessary. Collect appropriate external market and other data to support analysis.
- Evaluate and create new predictive models especially in the areas of product recommendation.
- Finally, when statistical/analytical outcomes occur, make sure all leaders are apprised and able to develop and execute plans to take advantage of opportunities.

CONCLUSION

In this presentation I outlined the four pillars of analysis and provided a case study to provide real and fresh examples from each pillar. I finished the presentation by writing up final recommendations for NIKEiD. My goal was to hit on the major areas of analytics and provide a holistic solution.

Thank you for the opportunity. Had fun.

ABOUT THE AUTHOR

John Bellamy is a highly accomplished Data Scientist and Machine Learning Architect with a strong focus on natural language processing (NLP), computer vision (CV), and ML engineering. Throughout his career he has consistently delivered impactful projects, such as developing GPT-powered information retrieval applications with an impressive 98% accuracy and improving security detection by 40% utilizing Vision Transformer (ViT) models and Bayesian Neural Networks. His expertise spans MLOps practices, where he has reduced model redeployment times drastically, and has led in the areas of automation of machine learning pipelines and XAI.

In his various roles, John has demonstrated strong project management and leadership abilities, including managing multidisciplinary teams, driving new product offerings, and expanding client expenditures. His technical acumen is showcased by his proficiency in key technologies like Python, BERT, Kubernetes, AWS, and more, along with hands-on experience in creating and deploying NLP applications, anomaly detection models, and cloud-native solutions. John's career is marked by a series of key accomplishments, including the successful deployment of Kubernetes clusters in classified environments, reducing product support tickets, and developing scalable ML applications that significantly improved operational efficiency and data-driven decision-making across organizations.