

DSC 680
Project Two
Milestone 1
Milan Sherman

Topic: I am going to build a model to predict funnel metrics for the next 30 days for each of our marketing channels, including:

- Site visits
- Started applications
- Submitted applications
- Approved applications
- Bound (purchased) policies

Business Problem: to anticipate and plan for revenue, expenses, and cost per acquisition (CPA), we need to be able to generate the metrics noted above by channel. As our pay structure varies by channel, e.g., cost per click, started app, bound policy, etc., we need to be able to forecast these metrics by channel to get an accurate CPA. For revenue, it is sufficient to get the number of policies across all channels and use the average revenue per policy. Right now, the growth team is doing this forecast in a very manual way, using historical data and anticipated changes in marketing spend for the following month. They would like to develop a more sophisticated model that can be automated.

For revenue it's generally sufficient for the aggregated numbers across all marketing channels to be accurate, so some error/variation for individual channels is OK if the aggregated numbers are accurate. But the pay structure varies from channel to channel, as noted above, so we still need to try to minimize the error per channel to accurately predict our costs.

Research Questions:

1. Can we create a model that is as good or better at predicting funnel metrics by marketing channel?
2. Which parameters are most likely to improve the model accuracy?
3. What data will allow us to make the most accurate predictions (see below)?

Data: I will start with historical data from our various marketing channels over the past 2-3 years, but I'm not sure how the model will react to it. The company I work at is a tech start up, and about 9-10 months ago we began making major cuts to our marketing spending in anticipation of needing to become profitable. Before that time the goal was to drive as many users to our site as we could regardless of whether our revenue outpaced our spending. This approach relied on investors' money, but since last July/August, the goal has shifted to making our marketing spend profitable. Also, in December we shifted from selling policies that were underwritten by Sammons Financial Group (SFG) to underwriting our own policies by launching our own insurance company, Bestow Life Insurance Company (BLIC). Another change is the end of the pandemic, which was a boon for the life insurance industry. Thus, with so many changes over the last 2-3 years, part of the work of this project will be determining what data can be used to make accurate predictions over the next 30 days.

Another question regarding the data is the target. We have historical funnel conversion rates by channel, i.e., what percentage of users who visit the site from Facebook start an application, what percentage of those complete and submit the application, what percentage of those who submit an application are approved, and what percentage of approved purchase a policy. The question is which target (visits, started applications, submitted applications, approved applications, purchased policies) can we achieve the best accuracy, as we can calculate the rest of the numbers from that number using the conversion rates.

Methods: I used Neural Prophet for the time series model we did in 630, and it seemed to work well, so I plan to start with that. I will need to get more familiar with the parameters of that model in order to learn how to tune them and get the best predictions that we can.

Ethical considerations: the only thing that I can think of in terms of ethical considerations is that various marketing channels will reach different types of people, and thus the forecast could guide the company to focus on marketing to certain groups of people to the exclusion of others. I think the broader issue is balancing making good business decisions without systematically excluding certain groups of people, especially when the product we're selling is financial protection.

References:

Neural Prophet:

- <https://towardsdatascience.com/in-depth-understanding-of-neuralprophet-through-a-complete-example-2474f675bc96>
- https://medium.com/@cuongduong_35162/facebook-prophet-in-2023-and-beyond-c5086151c138

Time series:

- <https://towardsdatascience.com/time-series-forecasting-deep-learning-vs-statistics-who-wins-c568389d02df>