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Paper 1: Algorithmic Bias

Data analytics and algorithms can be useful in many ways, from predicting weather patterns to tracking consumer behavior. However, algorithmic bias is problematic in business since it unfairly places one group over another (Israeli and Ascarza 1). This paper will discuss how pricing and products from the 4 P's affects algorithmic biases, and potential solutions to solving these problems.

Pricing is one of the 4 P's in which algorithmic bias can occur. For example, say that "Crochet Corner", a boutique specializing in crocheted items, decides to open a store in a high-end mall such as Valley Fair. Within the first six months the store receives a lot of business, so the owner deploys algorithms to analyze customer feedback, track inventory, and optimize pricing strategies. Because Valley Fair is a luxury mall where people spend more on high-end products, the algorithm automatically adjusts for a higher-income demographic. The team uses the data to introduce a premium pricing strategy for Crochet Corner to match fellow competitors.

However, this creates algorithmic bias because the algorithm assumes that all customers can automatically afford items at a high price point. Furthermore, a feedback loop could occur where the algorithm sees successful sales as the sign to maintain higher prices when in actuality, they could be unaffordable for some customers. As a result, Crochet Corner could lose out on potential sales, negatively affecting the business. To rectify this, Crochet Corner can consider the following solutions: 1) introduce products at different price points to make it more accessible to a wide range of customers; minimize optimization within the algorithm so that it stops favoring costlier prices; and 3) conduct a demographic analysis of the Santa Clara area to better understand consumer preferences, competitor pricing methods, and gain insight into the local culture; these solutions could all help Crochet Corner grow their business.

Another one of the 4 P's is Product. There are several points at which algorithmic bias could occur during the development process, such as human bias within the team, bias during the product design, or bias during data collection. For instance, say that a company is releasing Version 2 of their sleep tracker app, "Cloud 9". They use algorithms to analyze historical data from Version 1 of the app, identify customer pain points, and generate ideas for new features. However, historical data can cause algorithmic bias because the previous data can be skewed towards

a particular demographic. The developers released Cloud 9 Version 2 onto the App Store and Google Play Store, app marketplaces geared towards younger tech-savvy customers. As a result, sleep patterns from previous data mainly follow the schedule of an average person working a 9-to-5 job. However, this data excludes other groups of people such as older adults who sleep less overtime; doctors and nurses who take overnight shifts; or people who need to take early morning meetings to talk to customers overseas.

There could also be algorithmic bias when creating new features for Cloud 9 Version 2. The developers are testing a new feature in which the algorithm recommends comfortable temperature and humidity levels for users; they conduct a pilot study with 30 participants. However, the developers did not diversify their participant pool, concentrating only on Bay Area residents who already have access to spacious housing, heaters and AC, and electricity. As a result, the algorithm is automatically biased towards affluent users who have control over the temperature and airflow within their homes. This excludes other Bay Area residents who do not have access to stable heating/AC; who choose to limit their AC and heater usage to save energy; or those who live in older apartments without good ventilation.

If this issue was raised on a managerial level, possible solutions include: creating user personas to better understand a wide array of customer needs; partnering with county board members to understand living arrangements and electricity use; and diversifying the team by hiring new developers from outside of the Bay Area. Creating customer journey maps allows the developers to see Cloud 9 from a customer's viewpoint - this gives them a better understanding of customer complaints and needs. Secondly, the developers can reach out to local members of the county to understand the demographic breakdown of potential users. This is important as they can develop new features based on area-based needs, such as adjusting the temperature based on weather patterns like storms or heat waves. And lastly, if the issue is taken to the managerial level, one solution would be expanding the developer team itself. For instance, if the manager hires new developers from Arizona and Maine, these developers can give a second opinion on weather-based recommendations; the algorithm can then be adjusted so that it is more inclusive. These solutions can help Cloud 9 avoid algorithmic biases, allowing them to create a better version of their app.

As a result, this paper discusses both Pricing and Products from the 4 P's and how each area can lead to algorithmic bias. This paper first identifies pricing and product development problems that are biased, and then offers solutions on how to mitigate these issues.

References

Israeli, Ayelet, and Eva Ascarza. "Algorithmic Bias in Marketing." Harvard Business School Technical Note

521-020, September 2020. (Revised July 2022.)