Decision Memo 1: The Drivetrain Approach to Decision Making - CS112

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PART I – Decision Memo

To

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Summary

Misfit is an American consumer electronics company that produces wearable technology. The company's main objective is to increase the wear time of their products. It is within Misfit's power to update and extend their software services on their products, add new features, or change their design to achieve this objective. They currently collect useful data from their devices, but do not engage in collecting data from active experimentation of product features. Models developed using A/B testing would be useful to select the desirable features for their product that can help the company increase user wear time.

Problem & Objective

Misfit's describes its promise to customers in two words, "Always On", which refers to the company's intention to provide product features that will warrant the user always to wear the device (Misfit, n.d.). This is not a particularly surprising goal in the industry of consumer electronics, where analysis of large-scale, user-generated data is often the key to commercial success. Increased wear-time, results in increased amount of available data, which may be used for the refinement of user experience and development of new features. **Currently not enough users wear Misfit devices around the clock, therefore preventing the establishment of a virtuous data cycle.**

Misfit's line of smart watches and fitness trackers are equipped with dozens of sensors that track the users' physiological functions in different settings. Be it from walking, through to swimming and running, misfit devices automatically recognise the type of activity and toggle specific measurements that will be useful for the user later. **Misfit needs to aim to provide services (i.e. specific fitness apps) that offer something for every type of activity of the user's day.** To do that Misfit needs to identify what type of activities it currently does not provide services for and find ways to encourage users to engage in activities that it already offers services for.

Levers

Introduction of new products or services

Misfit may want to experiment with the introduction of new services, e.g. an app for measuring and providing feedback on physiological signals when one is sitting at a desk. Also, they can think about introducing new devices that allow users always to wear at least one device, although for different activities.

Reminders and notifications

Misfit can encourage people to keep wearing their device by issuing reminders and notifications both to encourage people to engage in an activity for which they usually use a Misfit device for, or do not remove the device for an activity for which they do not normally make use of the device.

Changing exterior design and comfort features

Misfit can tweak the design of their product line to see whether there is a way to increase the utility and comfort of using their products. Such changes may encourage users to wear the product for longer.

Data

Existing data sources in the US cover (Misfit Privacy Policy, 2018):

- User identity (including age, gender, weight and height)

- App usage time ("to determine which functionalities are used more often than others")

- Geolocation (of different activities, e.g. run tracking)

- Phyisiometric data from sensors (e.g. heart rate)

Additional data sources to tap (if legally possible):

- Simple user-feedback data (user prompted for feedback on app at the end of activities)

- A/B Testing (by A/B testing I refer to randomised experiments with two product variants, A and B, which at the modelling stage allows for the establishment of predictive or causal inferences)

As it turns out from Misfit's site, the data they gather is already quite encompassing. Usage time and geolocation and sensor data could be used to analyse the specific type of activities where the watch is less likely to be used. However, Misfit could easily benefit from the additional collection of feedback data on whether users found Misfit's services useful. Also, A/B testing using changes made by the levers will be crucial to reaching the objective.

Modelling, Simulation, & Optimization

Models created using data obtained from user-feedback, and A/B testing for different levers is crucial in deciding as to what is the right approach to fulfil Misfit's objective. The dependent variable for these models should be usage time, and independent variables may be anything affected by pulling our levers. These may include some reminders, application updates, the introduction of new applications. Results gained from this model then may be used to simulate results, and then the company can optimise for its objective.

Randomised A/B testing for all lever functions can help us gain very precise predictive inference. By narrowing our focus to similar individuals and observing the changes prompted by different levers, we may also gain an understanding of some causal inference.

Conclusion & Policy Recommendation

Misfit's goal to make users to wear their devices longer is not unrealistic to achieve. The company already possesses valuable data on user identity and behaviour and has a great option of levers to select from. The key to finding the right ones to pull is to run a series of A/B experiments with different lever settings and optimise for longer wear time.

PART II – Dataset Questions

The code I wrote for the following questions can be found at:

https://gist.github.com/hamparmin/1d021e2a730594c8b87dcde980503460

3. The dataset contains missing data for the following:

column	# of missing entries
implementation.start.date	49
original.completion.date	691
revised.completion.date	236
cumulative.disbursements	322
undisbursed.amount	81
success.rating	2455

8. Create a histogram or a probability density plot that shows the distribution of project budgets.

Be sure to label the x axis and give your plot a title.

Project Budget Distribution
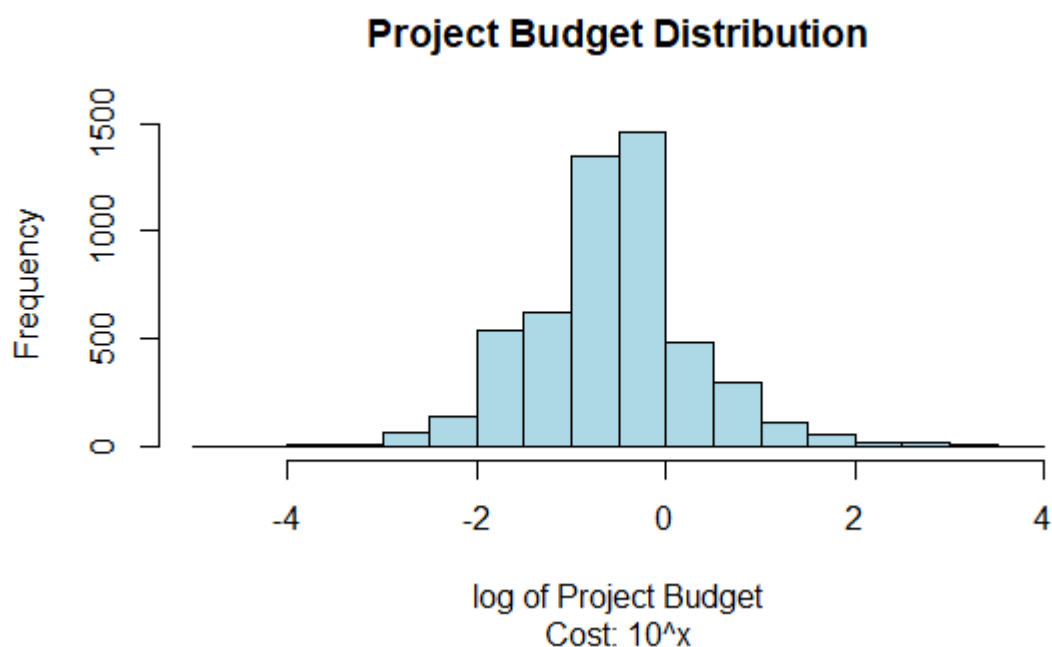
The project budget column was very difficult to visualise, as most of the projects ranged in between 0 and 1, while there were several outliers that went beyond the cost of 10, making it hard to plot it nicely. Thus, I have taken the natural log of the dataset to be able to display this data.

9. Approximately what fraction of projects get assessed at project completion?

The fraction is approximately **0.6154.**

References

Misfit. (2018). *Misfit Privacy Policy*. Retrieved from Misfit: https://misfit.com/legal/app_privacy_policy

Misfit. (n.d.). *Misfit Overview*. Retrieved from Misfit: https://misfit.com/overview/