

SOLVING MULTI-TOUCH ATTRIBUTION

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Motivation

The e-commerce industry spends a significant budget on online marketing. Effective marketing, in part, relies on an in-depth understanding of placement of marketing touchpoints and overall customer impact.

Customer Lifetime Value (CLV) is a metric designed to help us understand the potential value of a customer over one lifecycle of the relationship. Using CLV, we can show the impact of marketing activities on the business.

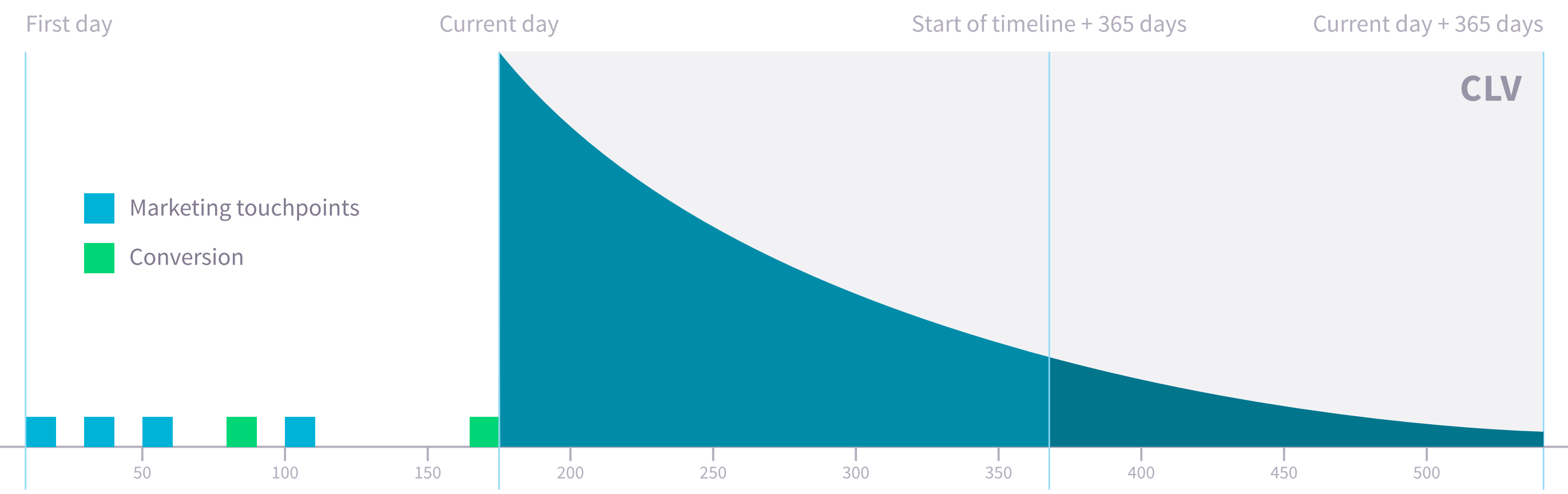
However, this metric is not useful unless the Multi-touch attribution problem is first addressed.

Customer Lifetime Value (CLV)

First, we cluster users based on their engagement level with Skyscanner through an internal system called State Machine[1]. For each state, we calculate an average CLV.

$$\text{CLV} = 12 \text{ months Customer Lifetime Revenue} - 12 \text{ months Customer Lifetime Cost}$$

This calculation is based on 3-months data, which we project forward to provide a 12-month estimate, an average customer cycle.

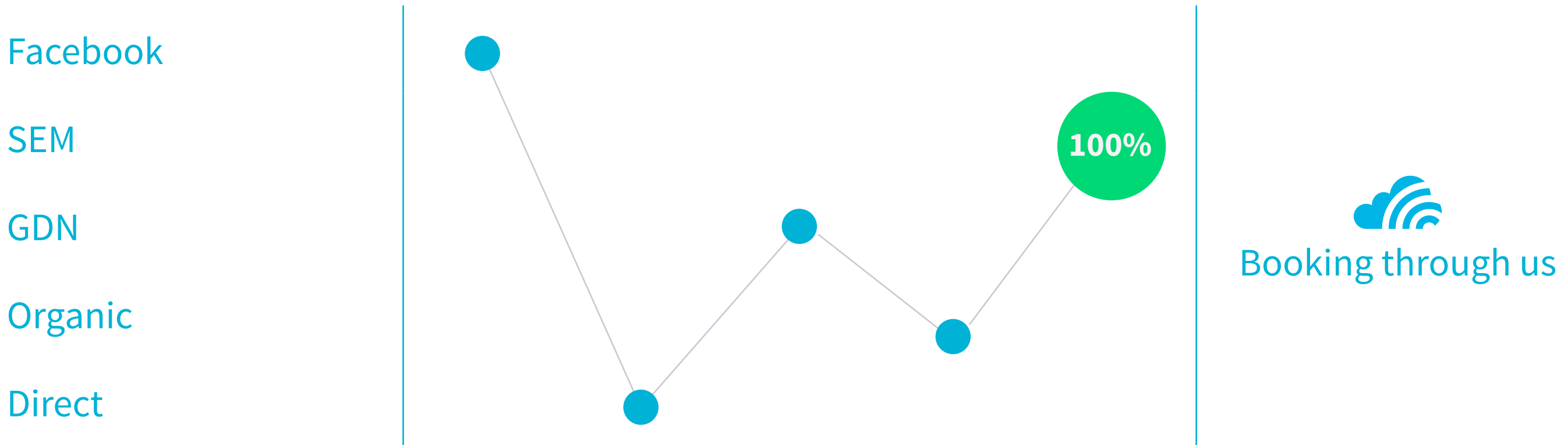


The problem

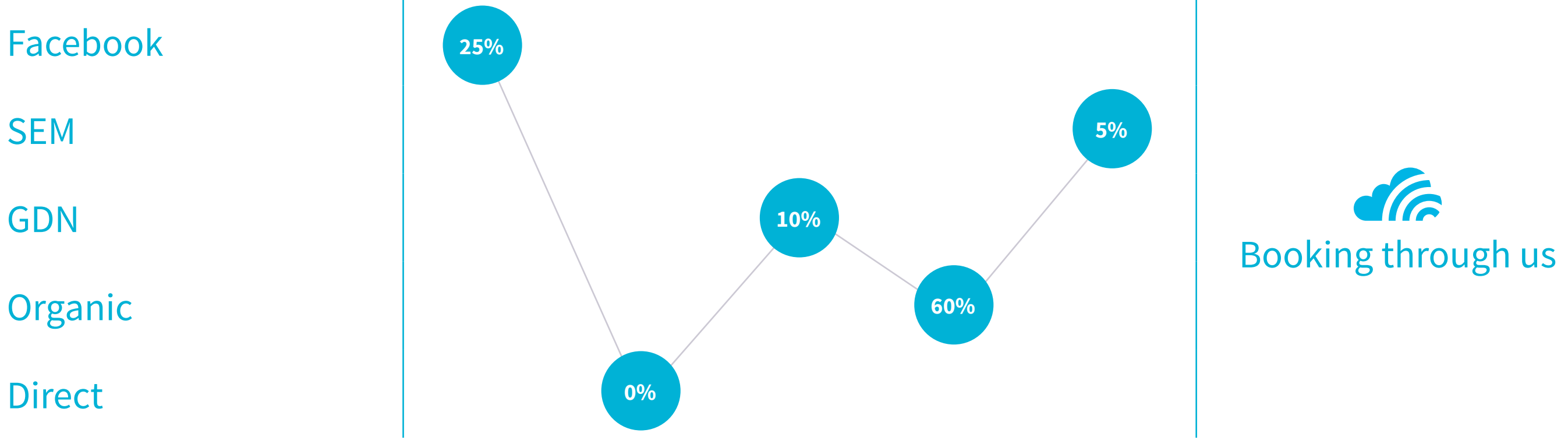
In general, customers are exposed to multiple marketing touchpoints before a purchase [2].

However, through the Last Touch attribution model, only the final paid touchpoint will receive the benefit. Using CLV alone, this problem becomes magnified as we project forward to estimate impact over 12 months.

To understand the true effect of a particular touchpoint on CLV, we must attribute benefit fairly across all touchpoints based on their impact. This is why it is essential to find first an appropriate solution for multi-touch attribution.



Aim: Find ideal weights (based on impact) of marketing touchpoints



Methodology

Classifier training methodology

To train our classifier, we are considering the following methodologies:

- Linear Regression
- Bayesian Ridge
- Random Forest
- ARD Regression
- Markov Chain with removal effect [3][4]
- Shapley Value [6]
- Survival theory [5]

Offline training & testing

As touchpoint weight is a latent variable, we need a simulated environment with estimated weights to train classifiers.

Simulated environment for validation

The simulated environment is based on Skyscanner marketing data over a 3-month period. This will emulate behaviour seen in real data samples, for the following distributions:

- Marketing touchpoint types overall
- Marketing touchpoint over our users' relative journey
- Order of marketing touchpoint exposure
- Conversion behaviour of users
- Any touchpoint over users

Validation is provided through comparison of simulated data vs. real-world across **conversion ratios by channel** and **distributions of session/conversions/conversion rates of channel by user touchpoint position**.

Assumptions

Our assumptions are:

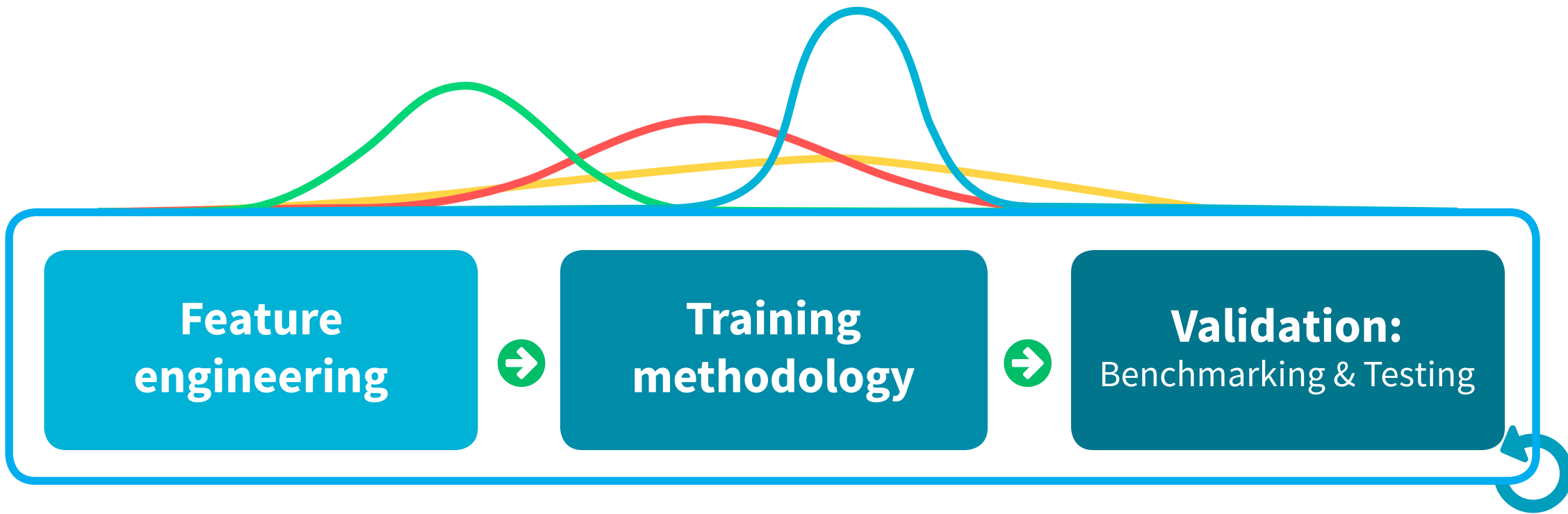
- A user is defined by a cookie
- Cross-device user behaviour is not accounted for, yet
- Touchpoint estimated values, set by expert knowledge, are close to true values
- Touchpoint distribution is consistent over time

Stress testing scenarios

Using the simulated environment, we can test if touchpoint weights are consistent in the following scenarios:

- What would happen if we increased SEM Brand marketing by 50%?
- What would happen if we turn off Retargeting?
- What would happen if we receive 30% higher traffic in a season?

The aim is to estimate for plausible situations but also to test the durability of our models despite temporal change.



Preliminary results

We are still in the process of validating simulated results and stress testing results. We hope to share our findings in the future through our Skyscanner Medium blog.

Next steps

We need to investigate current anomalies and iterate on both our simulated data environment and model. Firstly, it's important to tune our simulated data environment further to align with real-world patterns. Secondly, our model requires tuning to meet new benchmarks and improve accuracy.

Finally, we plan to run a live test, using the most favourable methodology, to measure impact in reality and to help drive the development of the above.

Online testing

After testing offline, the multi-touch attribution model must be tested online to prove the fit for Skyscanner.

Live test experiment

We are currently preparing to go live. Marketing testing will be executed across two markets as we cannot run a traditional A/B test in the marketing spacing. Success is measured in terms of:

- ROI (Multi-touch attributed)
- ROI (Last touch attributed)
- Statistical significance of change in test market vs control market

Conclusion

Multi-touch attribution is essential for CLV Application. Currently, Skyscanner is researching the best methods for Multi-touch attribution as stated.

We are in the stress testing stage. The next step will be to test our model in a live test, making ROI decisions based on model-based attribution.

