APPLYING AI TO BUSINESS PROBLEMS

LeoVegas

MOBILE GAMING GROUP

Two core business problems

- What is an efficient way of acquiring customers? (*acquisition*)
- How to keep customers satisfied so that they continue to use the product or service? (*retention*)

Today’s focus

1. Outline key problems for e-commerce companies in acquisition and retention that can be solved by applying AI

2. Pitfalls and insights from applying AI at LeoVegas

Marketing and
Campaign data

DB

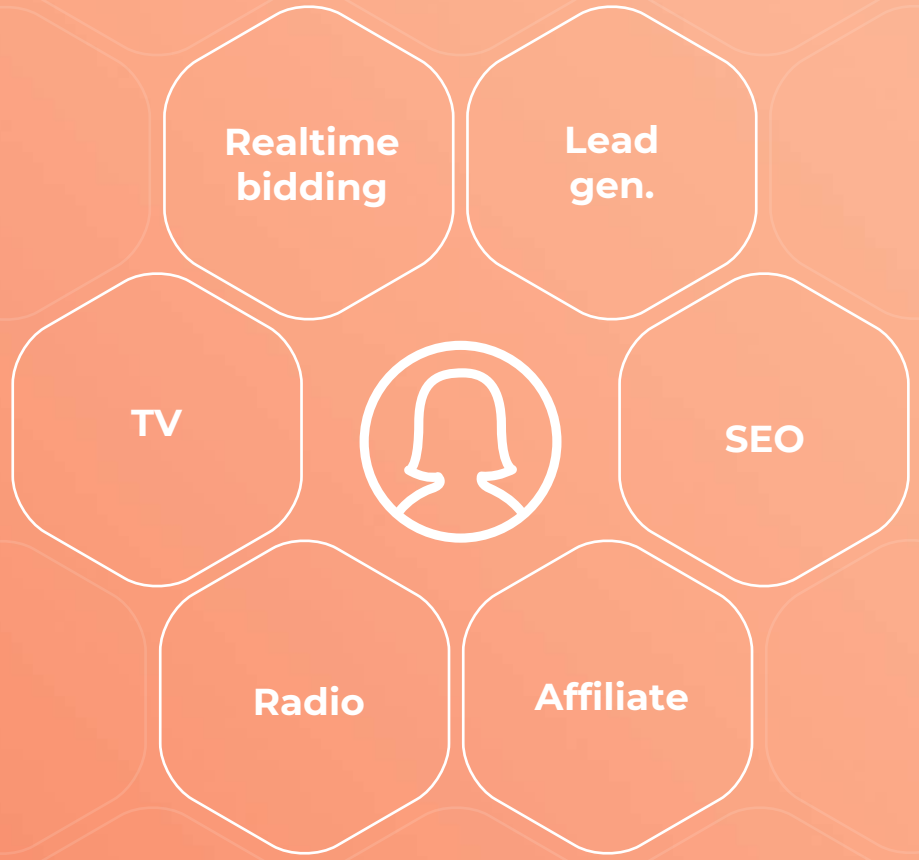
Cost data

Customer data

Acquisition

The attribution problem

Given several acquisition channels operating simultaneously, which channels should get credit for a given customer acquisition and how much?



Attribution modeling

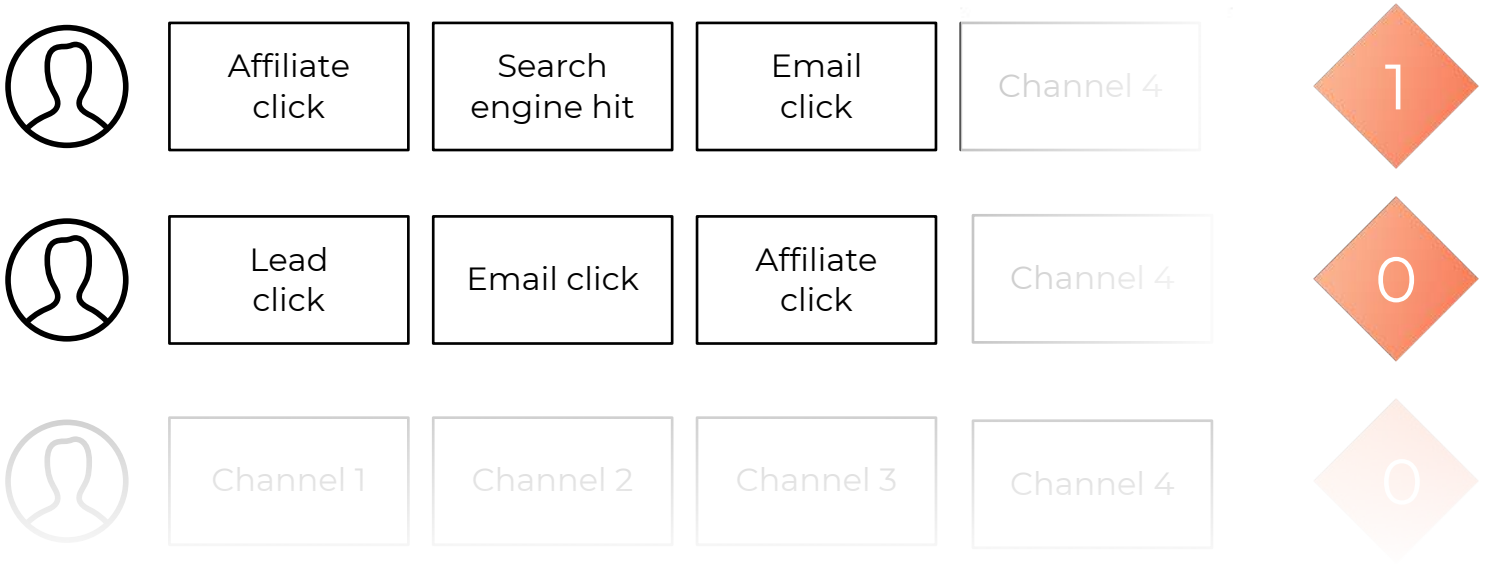
The attribution problem can be modeled as a binary classification problem

$$\underset{\theta \in \Theta}{\operatorname{argmin}} \frac{1}{N} \sum_{i=1}^{N} L\left(y_\theta\left(X_i\right), y_i\right)$$

$$y_i \in \{0, 1\}$$

Channel-customer interactions X

Customer i



Conversion y

The attribution model

Channel-person interactions

Attr. model

Channel contributions

Example

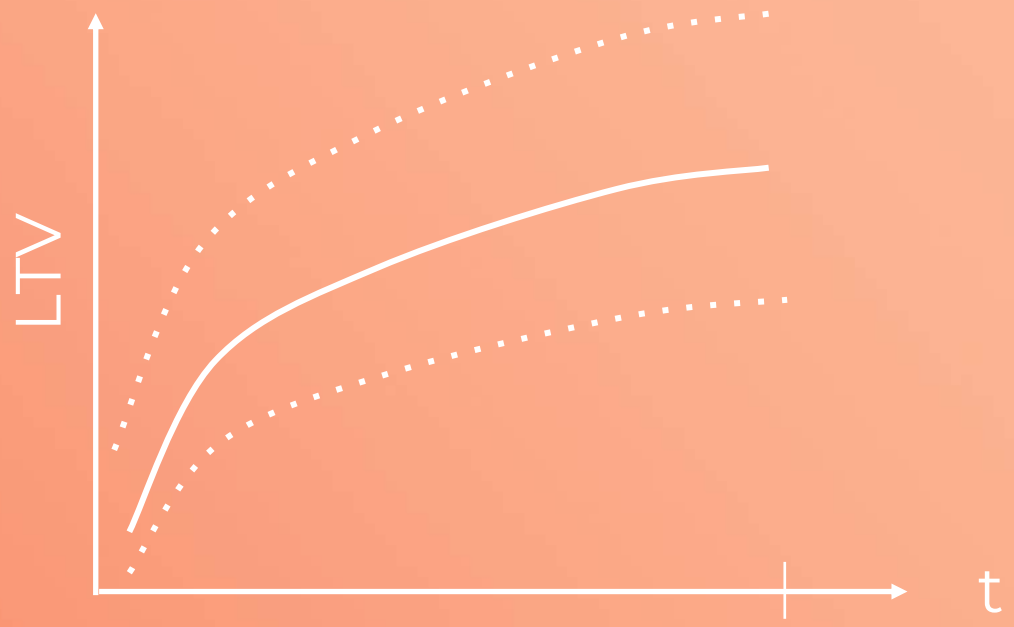
- 30% Affiliate xyz
- 60% Lead zxy
- 10% Direct

Completeness of input data?

Need for having several models in place!

The lifetime value problem

What is the monetary value of a given customer over her lifetime and how much uncertainty does the estimate have?

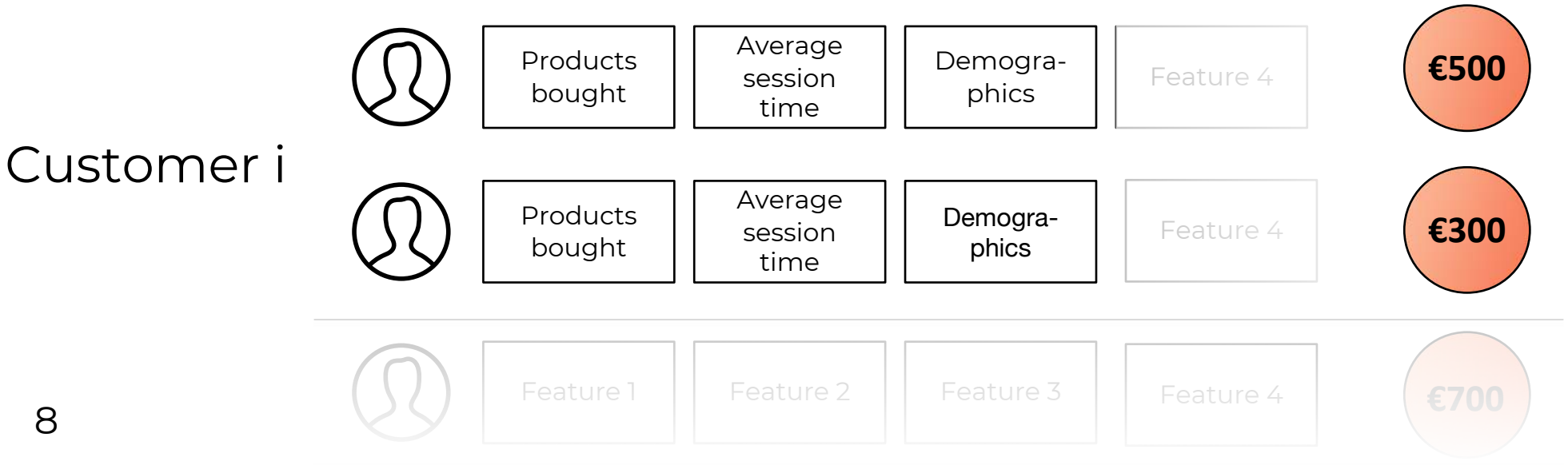


The LTV Problem

The LTV problem can be modeled as a regression problem

$$\underset{\theta \in \Theta}{\operatorname{argmin}} \frac{1}{N} \sum_{i=1}^{N} L\left(y_\theta\left(X_i\right), y_i\right)$$

$$y_i \in \mathbb{R}$$



The LTV model

Customer behavior and description

LTV model

Customer lifetime value and uncertainty

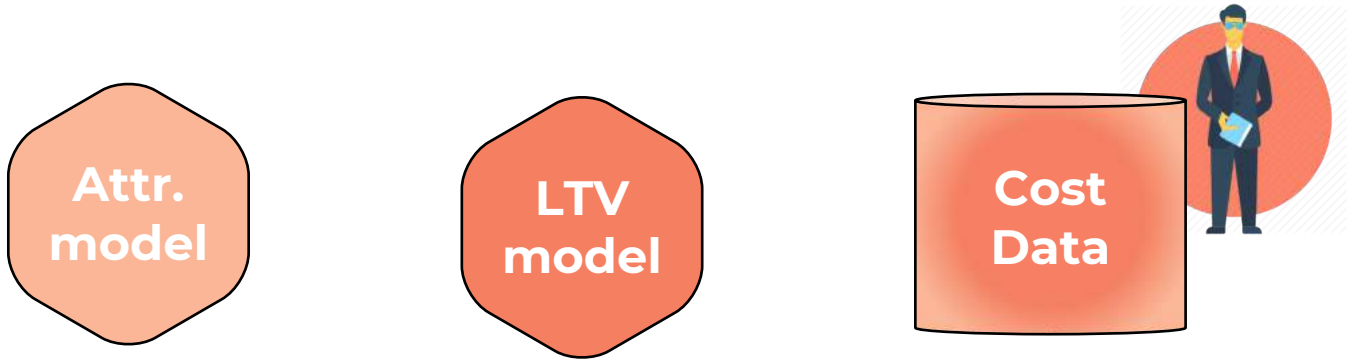
Example

LTV €200±€50

- Customer behavior can be noisy and may change over time
- Customers may behave very differently from each other
- The product changes over time which may change behavior of customers

- Model similar players together
- Put emphasis on recent data during training to capture recent conditions
- Important to quantify the uncertainty of the predictions
- The LTV-model has many uses in business

Steering acquisition



ROI of an acquisition channel :

$$ROI = \frac{LTV}{CAC}$$

Future gross profit of an acquisition channel:

$$FGP = LTV - CAC$$

ROI and FGP are used to steer customer acquisition

Retention

The churn problem

Which customers are at risk of leaving and why?

Non-parametric approach: estimate survival function for cohorts of players
$S(t) = P(T>t)$

Parametric approach: model as a binary classification problem

The churn model

Customer behavior and description

Churn model

Churn risk and likely explanation

Example

Probability of leaving 60%
Most influencing feature is average session length, which recently has declined

Difficult to get the relevant features into the model

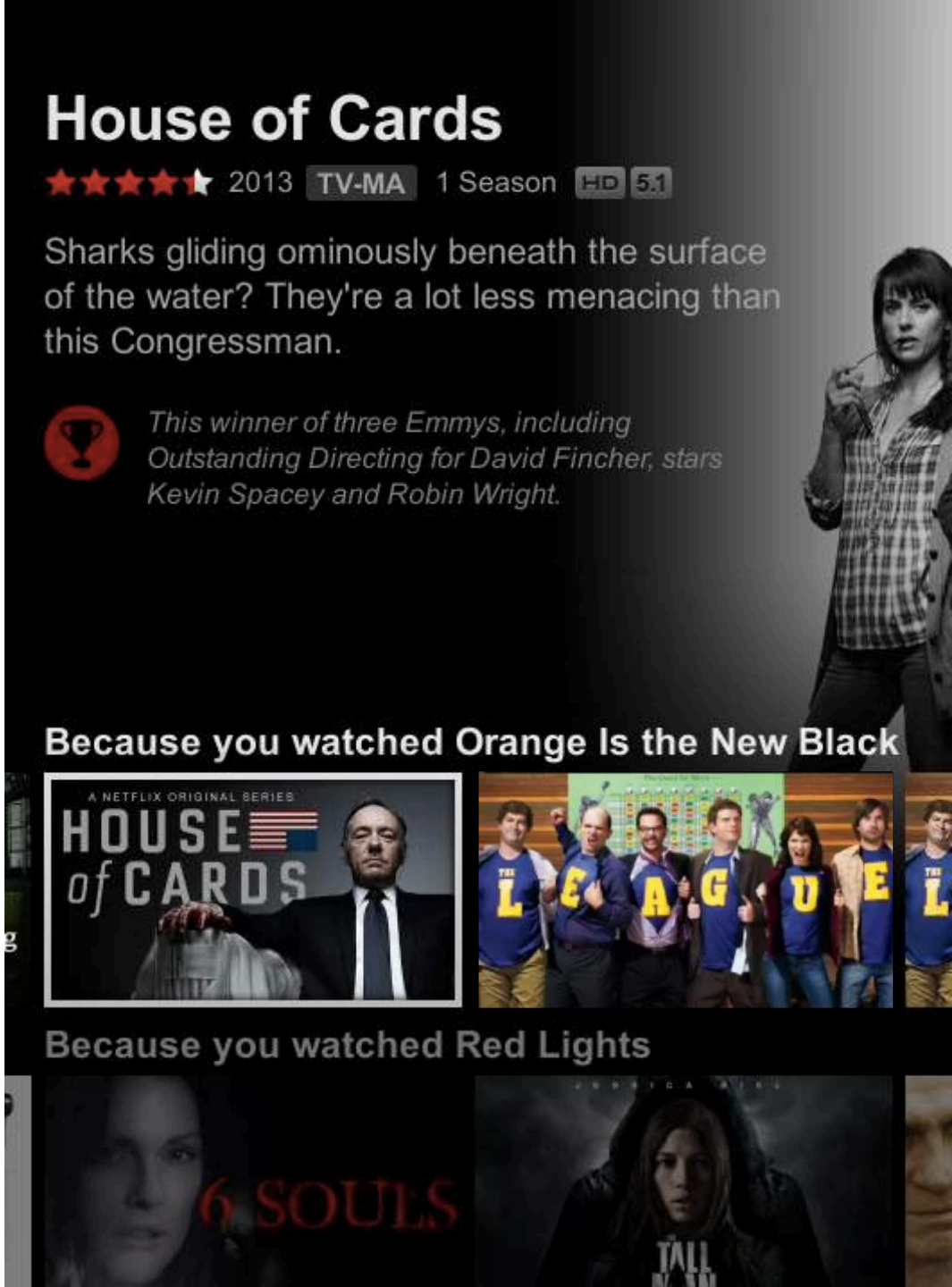
Predicted churn is useful for campaign management and as a KPI for assessing changes in the product or business

The product offering problem

How can customers find products that suit their tastes when the number of offered products is large?

3-step recommendation solution:

1. Customer preference function
2. Regression model
3. Ranking function



1. Customer preference function

Decide on a customer preference function that determines the interest of customer i in product j. It will later on be used as a rating.

Example

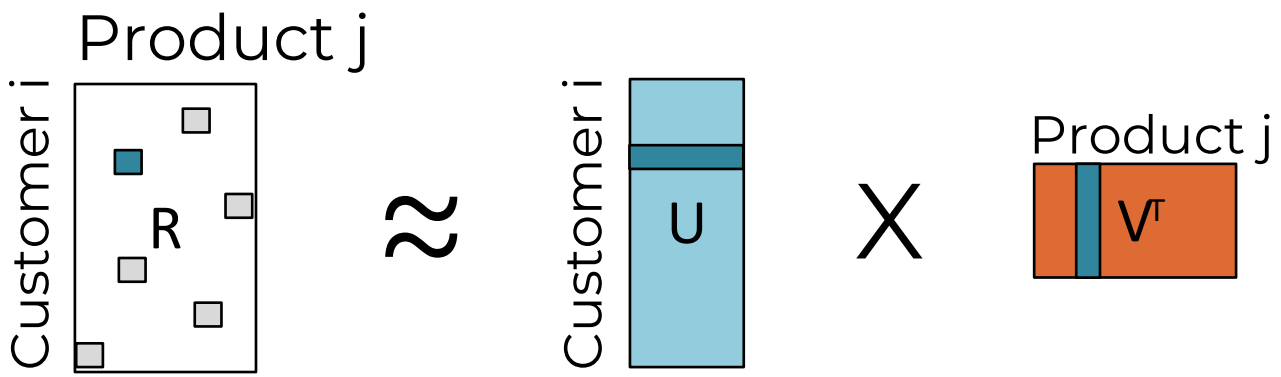
For customer i consider factors F

- #views product j
- #purchases product j
- time spent viewing product j

Rate by weighting factors $w^T F$

2. Decide on a model

Ratings	Customer-topic	Topic-product



$$\underset{U,V}{\operatorname{argmin}} \left\| R - UV^T \right\|$$

$$R \in \mathbb{R}^{N \times k}$$

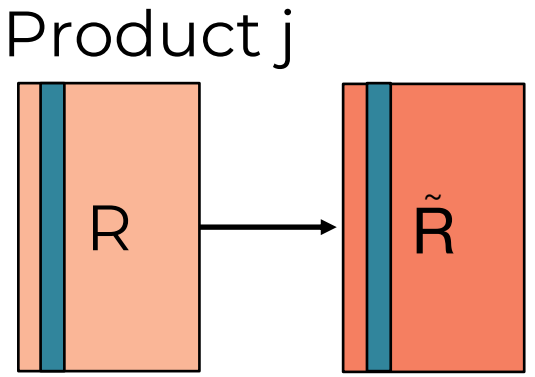
$$U \in \mathbb{R}^{N \times p}$$

$$V \in \mathbb{R}^{k \times p}$$

3. Decide how to rank

Ratings can be scaled per product to reflect business priorities

- Monetization
- Retention
- Virality
- Novelty
- (….)



$\tilde{R}(:,j) = R(:,j)*w(j)$

Recommend based on the scaled ratings

The product recommendation model

Historical purchases, product properties and customer details

Rec. model

Customer specific recommendations

Example

- Product 1
- Product 2
- Product 3

- Needs lots of data to work well
- Data biased by (lack of) previous offers
- Customers' taste preferences can be complex and therefore difficult to capture

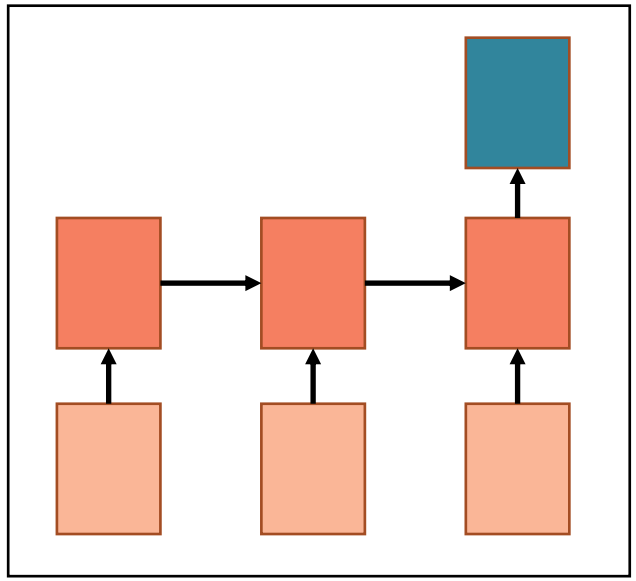
- Provides personalization and increases customer satisfaction

Responsible gaming (specific to i-gaming)

Find customers at risk of developing problematic gaming habits and use tools to prevent that from happening

Responsible gaming

Many to one recurrent neural network



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Boosted classification trees

$$\gamma_m = \underset{\gamma}{\operatorname{argmin}} \sum_{i=1}^{N} L\left(y_i, f_{m-1}(x_i) + b(x_i, \gamma)\right)$$

$$f_m(x) = f_{m-1}(x) + b(x, \gamma_m)$$

Responsible gaming

Customer behavior and description

RG model

Customer risk score and explanation

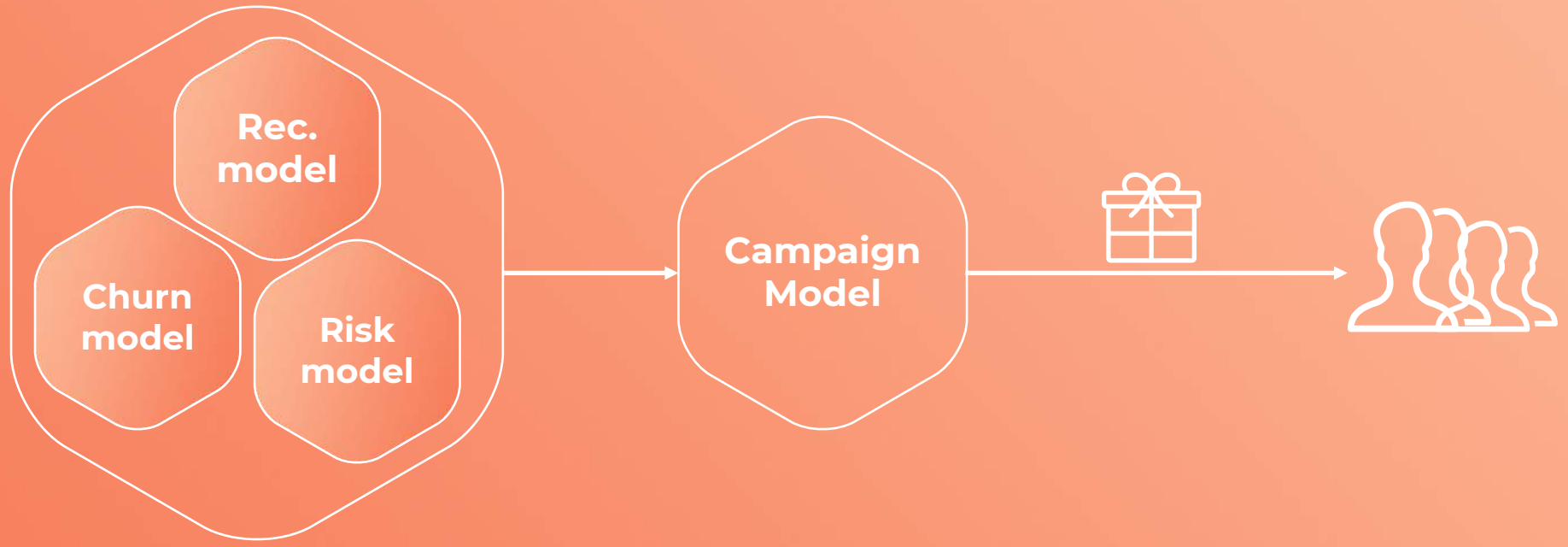
Example

40% chance of becoming problem gamer. Main reason is the high amount of bets placed during live games.

- Definition of problem gaming?
- Assessments biased by staff and self exclusions inherently biased

- Make sure our products are sustainable
- Safety yields better user experience
- Use as intervention tool and to stay compliant

Campaign management



Use campaigns to steer retention

Summary

Lessons learned from applying AI to business problems

01| Applying AI to business problems is all about modeling customer-product behavior

02| Evolving products and a large and heterogenous customer base with noisy and changing customer behavior adds complexity

03| Bias and incomplete data introduces additional complexity

04| The sheer volume of data calls for robust data tech as an enabler of successful business

05| Having models and suitable tech is not enough. Constant improvement, experimentation and innovation is needed

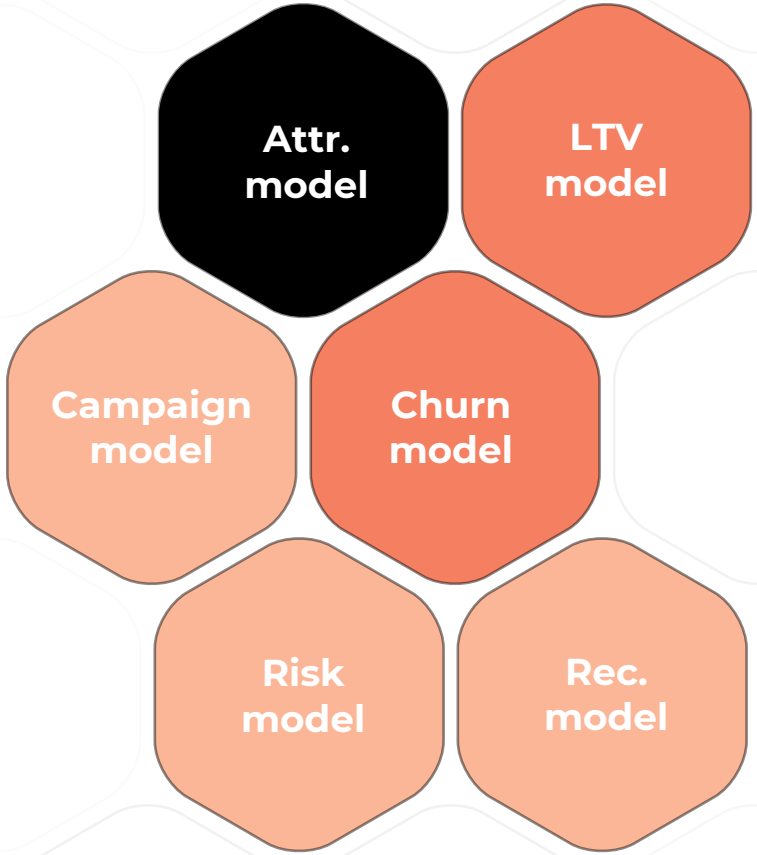
Overview of acquisition and retention

Acquisition

Understand which channels bring customers

Assess long term value of customers based on their interactions with the products

Control acquisition by scaling up profitable channels



Retention

Personal recommendations of products based on customers tastes

Sustainable products and services by having checks and balances in place

Control retention by campaigns based on customer behavior and customer tastes