Churn Antipattern

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Decrease customer churn on mobile contracts by ML

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- Justifiable costs per customer for churn prevention

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- Calculated costs per churn
- Corporate investment for strategy against churn
- Necessary actions in the team, the infrastructure and the data acquisition strategy
- Monitoring of business use case profitability

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From Customer Data to Customer Value and Classification

Sample

Feature

Label

Classification
(Model Training & Prediction Task)

customerID	tenure	MonthlyCharges	TotalCharges	Churn
7590-VHVEG	1	29.85	29.85	No
5575-GNVDE	34	56.95	1889.5	No
3668-QPYBK	2	53.85	108.15	Yes
7795-CFOCW	45	42.3	1840.75	No
9237-HQITU	2	70.7	151.65	Yes
9305-CDSKC	8	99.65	820.5	Yes
1452-KIOVK	22	89.1	1949.4	No
6713-OKOMC	10	29.75	301.9	No
7892-POOKP	28	104.8	3046.05	Yes
6388-TABGU	62	56.15	3487.95	No
9763-GRSKD	13	49.95	587.45	No
...	...	...	...	...

Database with Customers, [1]

The Train-Test-Split shall be 70% vs. 30%

Result:
- Probability of churn in next month
- Customer will churn [Yes/No]

$$Customer\,[customerID]_{value} = \frac{tenure}{12} * \alpha + MonthlyCharges * \beta$$

$$\alpha, \beta = [0.0 \ldots 1.0]$$

Parametric estimate of individual customer value

Evaluating the Classification Model

Given a churn-rate of 30% the model is evaluated by the F1-Score

- **True Positive**: A customer who is likely to churn gets incentivised
- **False Negative**: A customer who is likely to churn does not get incentivised, s. *„Type I Error“*
- **False Positive**: A customer who is unlikely to churn gets incentivised, s. *„Type II Error“*

$$F_1 = 2 * \frac{precision * recall}{precision + recall} = \frac{tp}{tp + \frac{1}{2}(fp + fn)}$$

The F1-score should be in the interval [0.95…1.0]

From Customer Value to Customer Incentive

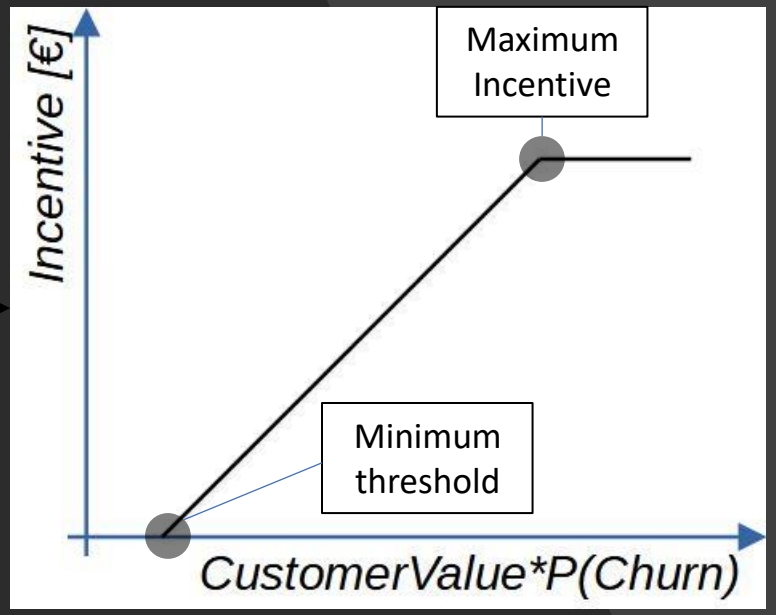
$$Customer[customerID]_{value} = \frac{tenure}{12} * \alpha + MonthlyCharges * \beta$$

$$\alpha, \beta = [0.0 \ldots 1.0]$$

$$Customer[customerID]_{incentive} = Customer[customerID]_{value} * P(Churn) + \gamma$$

$$P(Churn) = [0.0 \ldots 1.0]$$

Customer_Value -> Customer_Incentive



Reward principle: Customer churn prevention

Investment, cost and estimated value proposition

Expenditure	One time investment	Annually operating cost
MS-AZURE Cloud Plattform	10.000,00 €	2.000,00 €
Terraform-Infrastructure	5.000,00 €	- €
Snowplow-Aggregator	5.000,00 €	1.000,00 €
GitHub-CI/CD	- €	1.000,00 €
Customer Churn Service Team	- €	250.000,00 €
Staff (Agile DevOps-Team)	- €	250.000,00 €
GitHub-Codespace	- €	1.000,00 €
Sum of infrastructure and staff	**20.000,00 €**	**505.000,00 €**

Item	Description	Value
Number of Customers	(Active paying customers)	2978684
Aquisition of 1 customer	(Attraction of one customer, avg.)	10,00 €
Average incentiveCost	(Make one customer stay, avg.)	6,00 €
ChurnCost p.Y. = Aquisition * ChurnedCustomers (30%)	(How expensive Churn is at given rate)	8.936.052,00 €
IncentiveCost = ChurnedCustomers (30%)* Incentive_avg	(Make all churning customers stay)	5.361.631,20 €
Generated Value = ChurnCost - IncentiveCost-OperatingCost	**(Value Proposition, annually)**	**3.069.420,80 €**

Decisions

How are predictions used to make decisions that provide the proposed value to the end-user?

Every customer is incentivised for his loyalty so that he does not leave. The amount of the incentive depends on the customer value and the probability of churn.

ML task

Input, output to predict, type of problem.

For each customer: "How high is the probability of churn for this customer"

Input: Features
Output:

- Churn Probability with a distribution from 0%-100%
- Yes/No Churn prediction

Value Propositions

What are we trying to do for the end-user(s) of the predictive system? What objectives are we serving?

Context:
Company sells mobile telephone contracts with variable subscription

Prevent customer churn by identifying those and incentivizing dynamically

Data Sources

Which raw data sources can we use (internal and external)?

User database with features and label

Collecting Data

How do we get new data to learn from (inputs and outputs)?

Every week to see which customers have churned or not. Automatic labelling. The data entries with already churned customers are anonymized, acc. GDPR.

Making Predictions

When do we make predictions on new inputs? How long do we have to featurize a new input and make a prediction?

The prediction is made once a week. New features undergo manual review. The delay shall less than one day

Offline Evaluation

Methods and metrics to evaluate the system before deployment.

It can only be tested if the customer has churned or not, based on the task.
The F1-score calculated

Features

Input representations extracted from raw data sources.

Numerical features: Tenure, MonthlyCharges, TotalCharges

Factorial label: Churn

Building Models

When do we create/update models with new training data? How long do we have to featurize training inputs and create a model?

Every week and one model per region with offline evaluation

Live Evaluation and Monitoring

Methods and metrics to evaluate the system after deployment, and to quantify value creation.

The contract termination cases should minimize
The ROI of the proposed investment should be positive

Summary: ML-Canvas

The Machine Learning Canvas (v0.4), [2]

Bibliography

- **Dataset**
  BlastChar (2018): Telco Customer Churn.
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