



Report for Advanced Analytics in Business

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Contents

Assignment 1	2
Feature engineering	2
Missing values	2
Date features	3
Data quality issue	3
Data binning	3
Exploratory data analysis	4
Model building	4
Interpretation	4
Reflection	4
Assignment 2	4
Assignment 3	4
Assignment 4	4

Date features

Some features are available in form of date. In the dataset, the following features are in terms of date: `claim_date_registered`, `claim_date_occured`, `claim_vehicle_date_inuse`, `policy_date_start`, `policy_date_next_expiry` and `policy_date_last_renewed`. However, date itself is not suitable to serve as an input for some machine learning models. Hence, as summarized in table 1, we construct another set of features which are more interpretable and meaningful based on these date features.

Apart from the aforementioned features, features related to birth year are also considered as date features. They are `policy_holder_year_birth`, `driver_year_birth`, `third_party_1_year_birth`, `third_party_2_year_birth`, `third_party_3_year_birth` and `repair_year_birth` in the dataset. By subtracting them from the year of `claim_date_occured`, we obtain age-related features.

Constructed features	Descriptions
<code>days.before.registered</code>	The number of days between <code>claim_date_registered</code> and <code>claim_date_occured</code> .
<code>days.before.occured</code>	The number of days between <code>claim_date_occured</code> and <code>claim_vehicle_date_inuse</code> .
<code>policy_length</code>	The number of days between <code>policy_date_last_renewed</code> and <code>policy_date_start</code> .
<code>policy_claim_length</code>	The number of days between <code>policy_date_next_expiry</code> and <code>claim_date_occured</code> .

Table 1: Featurization of date features

Data quality issue

During data cleaning process, we discovered some problems with regards to data quality. For example, the instance with claim id 62780 has an invalid value for the year of `claim_vehicle_date_inuse`. Such observations may be due to input error in manual data entering process. However, they can be hard to observe in general.

```
[15]: # Input error in year of claim_vehicle_date_inuse
      data[data['claim_vehicle_date_inuse'] > 202012]
```

```
[15]: n_vehicle_id  claim_vehicle_brand  claim_vehicle_type  claim_vehicle_date_inuse  claim_ve
      J5ZWJmMjQ      CITROEN          car                270505.0
```

<

Figure 2: Invalid value of `claim_vehicle_date_inuse`

Data binning

Binning continuous features can help incorporating missing values and extreme values in a more natural way as they can be reformulated as categorical features. It is useful for those continuous features with a high proportion of missing values or highly right-skewed. For age-related features, they are binned by age groups with equal intervals, referencing to their histograms.

Exploratory data analysis

Model building

Interpretation

Reflection

Assignment 2

Assignment 3

Assignment 4