

Credit Risk Scorecard

Group 2

11709460 Arnhold Lukas,
01610291 Schmiedmayer Michael,
51833439 Schwab Tobias,
51834603 Vigl Laura Maria

Overview



Binning

| Default Bins | | |
|--------------|--------|--------|
| | Tree | Chi |
| WOE | | |
| AIC | 686.56 | 692.69 |
| GRP | | |
| AIC | 718.65 | 744.45 |



Fine-tune tree-based binning

Improve Tree-Binning

- Separate Bins by Semantics

- purpose: education%,%others
- Savings.account.and.bonds: 500 <= ... < 1000 DM%,%... >= 1000 DM%,%unknown/ no savings account
- other.debtors.or.guarantors: none%,%co-applicant
- other.installment.plans: bank%,%stores

| | Tree | Change |
|------------|--------|--------|
| WOE | | |
| AIC | 686.6 | +0.04 |
| GRP | | |
| AIC | 726.46 | +7.81 |

Parameter Testing - WOE

| variable <chr> | info_value <dbl> |
|---|---------------------|
| status.of.existing.checking.account | 0.670885673 |
| duration.in.month | 0.374915860 |
| age.in.years | 0.333046200 |
| credit.history | 0.331527725 |
| purpose | 0.197310968 |
| savings.account.and.bonds | 0.159755734 |
| present.employment.since | 0.094729485 |
| property | 0.079993897 |
| housing | 0.067756976 |
| other.debtors.or.guarantors | 0.047719305 |
| other.installment.plans | 0.029132680 |
| credit.amount | 0.028294397 |
| installment.rate.in.percentage.of.disposable.income | 0.003635227 |

| | Df | Deviance | Resid. Df | Resid. Dev |
|---|----|----------|-----------|------------|
| NULL | | | 726 | 886.32 |
| status.of.existing.checking.account_woe | 1 | 92.489 | 725 | 793.84 |
| duration.in.month_woe | 1 | 39.868 | 724 | 753.97 |
| credit.history_woe | 1 | 23.016 | 723 | 730.95 |
| purpose_woe | 1 | 17.614 | 722 | 713.34 |
| credit.amount_woe | 1 | 10.404 | 721 | 702.93 |
| savings.account.and.bonds_woe | 1 | 12.786 | 720 | 690.15 |
| present.employment.since_woe | 1 | 6.850 | 719 | 683.30 |
| installment.rate.in.percentage.of.disposable.income_woe | 1 | 2.006 | 718 | 681.29 |
| other.debtors.or.guarantors_woe | 1 | 5.511 | 717 | 675.78 |
| property_woe | 1 | 0.115 | 716 | 675.67 |
| age.in.years_woe | 1 | 15.448 | 715 | 660.22 |
| other.installment.plans_woe | 1 | 0.880 | 714 | 659.34 |
| housing_woe | 1 | 0.740 | 713 | 658.60 |

Call:

```
glm(formula = creditability ~ ., family = binomial(), data = data_woe_tree_opt$train)
```

Deviance Residuals:

| Min | 1Q | Median | 3Q | Max |
|---------|---------|---------|--------|--------|
| -2.2121 | -0.6993 | -0.3780 | 0.7520 | 2.4669 |

Coefficients:

| | Estimate | Std. Error | z value | Pr(> z) | |
|---|----------|------------|---------|----------|-----|
| (Intercept) | -0.85412 | 0.09949 | -8.585 | < 2e-16 | *** |
| status.of.existing.checking.account_woe | 0.81053 | 0.12738 | 6.363 | 1.97e-10 | *** |
| duration.in.month_woe | 0.75696 | 0.19609 | 3.860 | 0.000113 | *** |
| credit.history_woe | 0.67785 | 0.18097 | 3.746 | 0.000180 | *** |
| purpose_woe | 0.97945 | 0.23327 | 4.199 | 2.68e-05 | *** |
| credit.amount_woe | 0.72113 | 0.21859 | 3.299 | 0.000970 | *** |
| savings.account.and.bonds_woe | 0.78679 | 0.25880 | 3.040 | 0.002365 | ** |
| present.employment.since_woe | 0.58633 | 0.33073 | 1.773 | 0.076254 | . |
| installment.rate.in.percentage.of.disposable.income_woe | 2.86724 | 1.62629 | 1.763 | 0.077891 | . |
| other.debtors.or.guarantors_woe | 1.00355 | 0.44167 | 2.272 | 0.023078 | * |
| property_woe | 0.14173 | 0.39706 | 0.357 | 0.721121 | |
| age.in.years_woe | 0.97846 | 0.26132 | 3.744 | 0.000181 | *** |
| other.installment.plans_woe | 0.59294 | 0.58173 | 1.019 | 0.308068 | |
| housing_woe | 0.34542 | 0.40067 | 0.862 | 0.388625 | |

Parameter Testing - GRP

| variable <chr> | info_value <dbl> |
|---|---------------------|
| status.of.existing.checking.account | 0.670885673 |
| duration.in.month | 0.374915860 |
| age.in.years | 0.333046200 |
| credit.history | 0.331527725 |
| purpose | 0.197310968 |
| savings.account.and.bonds | 0.159755734 |
| present.employment.since | 0.094729485 |
| property | 0.079993897 |
| housing | 0.067756976 |
| other.debtors.or.guarantors | 0.047719305 |
| other.installment.plans | 0.029132680 |
| credit.amount | 0.028294397 |
| installment.rate.in.percentage.of.disposable.income | 0.003635227 |

| | Df | Deviance | Resid. | Df | Resid. Dev |
|---|----|----------|--------|-----|------------|
| NULL | | | | 726 | 886.32 |
| status.of.existing.checking.account_bin | 2 | 92.489 | | 724 | 793.84 |
| duration.in.month_bin | 4 | 40.292 | | 720 | 753.54 |
| credit.history_bin | 3 | 23.344 | | 717 | 730.20 |
| purpose_bin | 5 | 19.724 | | 712 | 710.48 |
| credit.amount_bin | 4 | 18.020 | | 708 | 692.45 |
| savings.account.and.bonds_bin | 4 | 14.789 | | 704 | 677.67 |
| present.employment.since_bin | 2 | 5.935 | | 702 | 671.73 |
| installment.rate.in.percentage.of.disposable.income_bin | 3 | 2.010 | | 699 | 669.72 |
| other.debtors.or.guarantors_bin | 2 | 6.264 | | 697 | 663.46 |
| property_bin | 3 | 0.624 | | 694 | 662.83 |
| age.in.years_bin | 4 | 15.531 | | 690 | 647.30 |
| other.installment.plans_bin | 2 | 1.439 | | 688 | 645.86 |
| housing_bin | 2 | 1.403 | | 686 | 644.46 |

Fitting Process – Train / Test Split

- General linear regression model for splitting data
- Split by creditability
- Ratio 75/25%

```
dt_woe_list_sel <- split_df(dt_f_woe_sel, y = "creditability", ratios = c(0.75, 0.25))
```

Results

WOE

```
woe_gini_train_sel

## $binomial_metric
## $binomial_metric$train
##      Gini
## 1: 0.6197524
##
## $binomial_metric$test
##      Gini
## 1: 0.5618897
```

GRP

```
grp_gini_train_sel

## $binomial_metric
## $binomial_metric$test
##      Gini
## 1: 0.580279
##
## $binomial_metric$train
##      Gini
## 1: 0.6368483
```

Maximum Gini Coefficient 0.6368483