

# Credit Risk Scorecard

Group 2

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# Overview



# Binning

Default Bins		
	Tree	Chi
<b>WOE</b>		
AIC	686.56	692.69
<b>GRP</b>		
AIC	718.65	744.45



Fine-tune tree-based binning

# Improve Tree-Binning

- Separate Bins by Semantics

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

	Tree	Change
<b>WOE</b>		
AIC	686.6	+0.04
<b>GRP</b>		
AIC	726.46	+7.81

# Parameter Testing - WOE

variable	info_value
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

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

(Intercept)	Estimate	Std. Error	z value	Pr(> z )
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	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