Using target to generate features

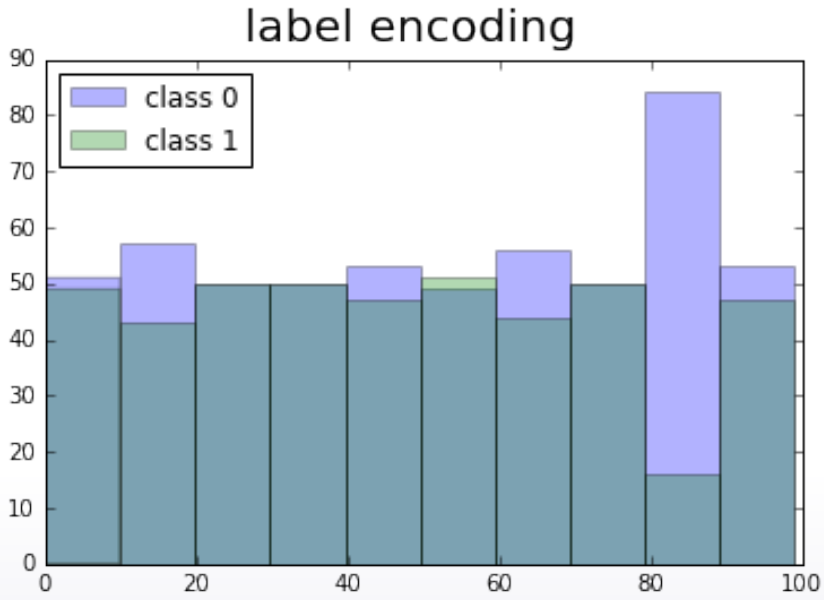
Simple example

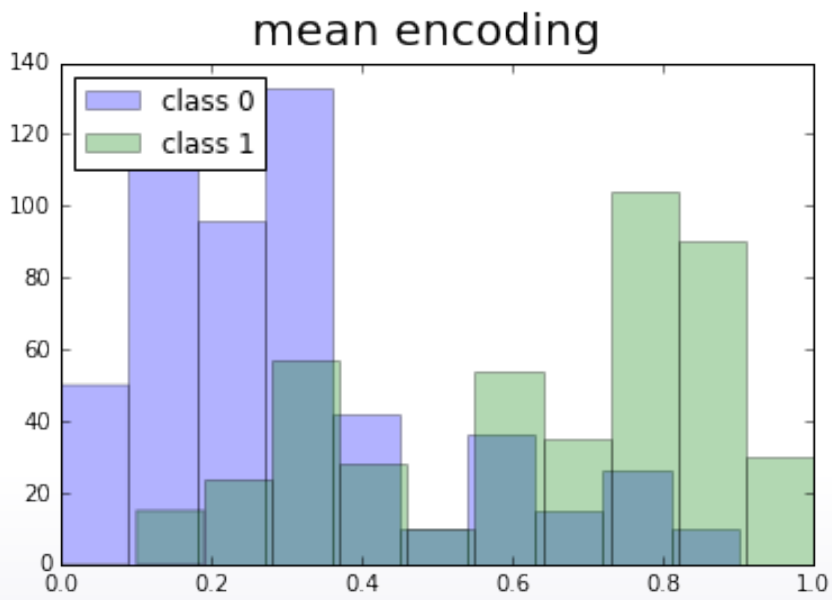
- Categorical feature
  - some city
- Binary classification

	feature	feature_label	feature_mean	target
0	Moscow	1	0.4	0
1	Moscow	1	0.4	1
2	Moscow	1	0.4	1
3	Moscow	1	0.4	0
4	Moscow	1	0.4	0
5	Tver	2	0.8	1
6	Tver	2	0.8	1
7	Tver	2	0.8	1
8	Tver	2	0.8	0
9	Klin	0	0.0	0
10	Klin	0	0.0	0
11	Tver	2	0.8	1

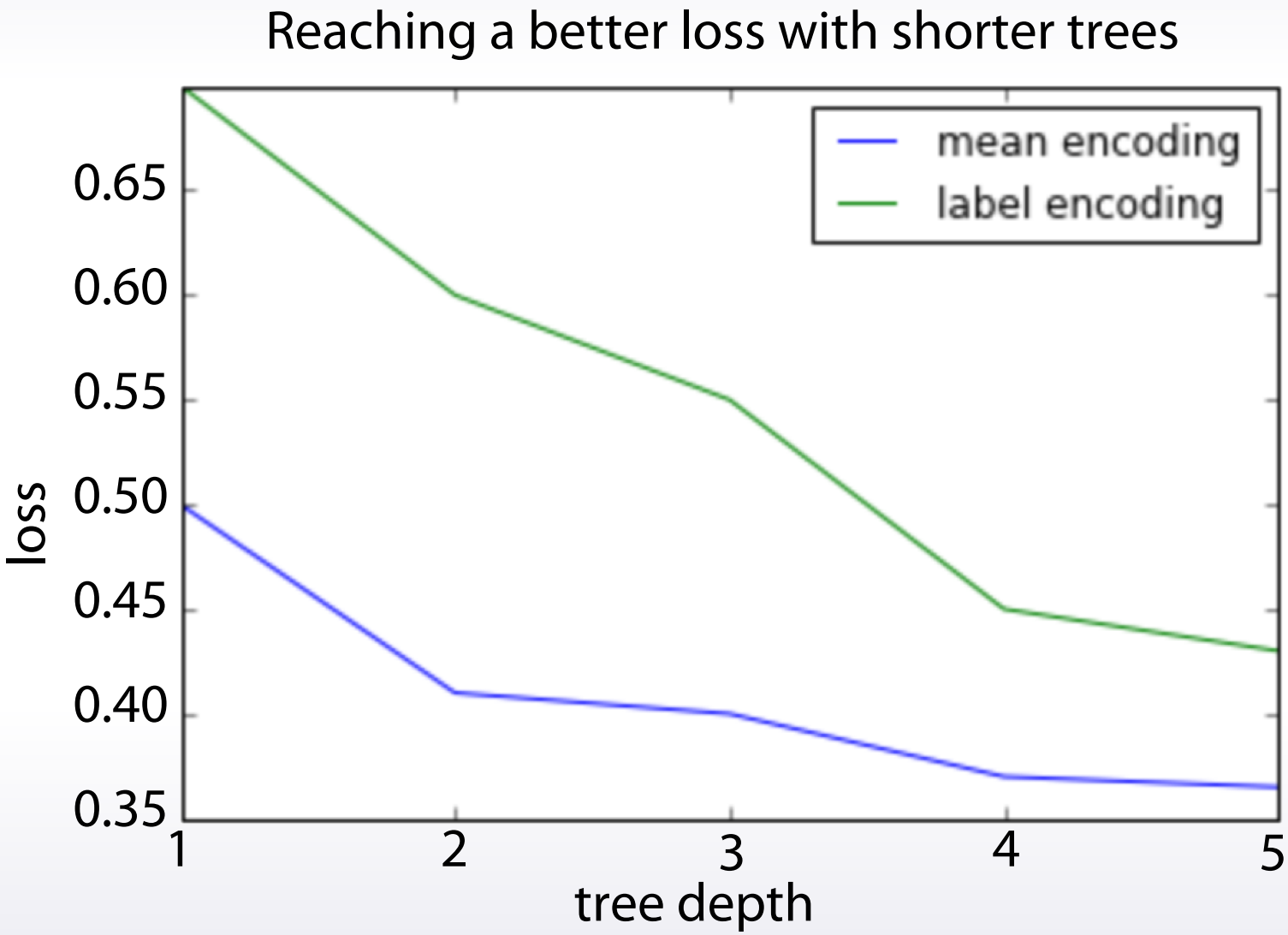
Why does it work?

1. Label encoding gives random order. No correlation with target
2. Mean encoding helps to separate zeros from ones





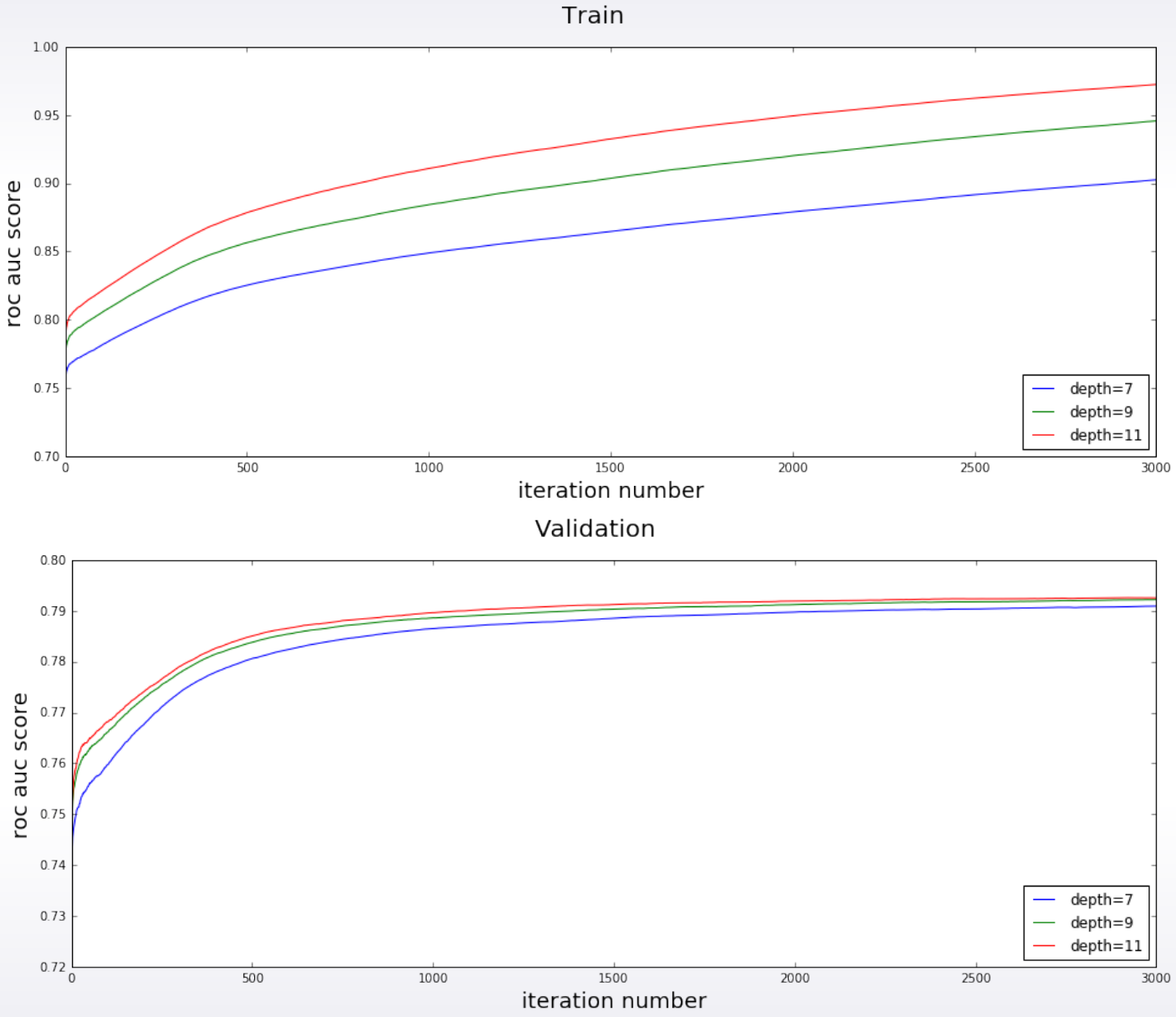
Why does it work?



What will you learn?

- ✓ Construct encodings
- ✓ Correctly validate them
- ✓ Extend them

Indicators of usefulness



Ways to use target variable

Goods - number of ones in a group,

Bads - number of zeros

- $Likelihood = \frac{Goods}{Goods+Bads} = mean(target)$
- $Weight\ of\ Evidence = \ln\left(\frac{Goods}{Bads}\right) * 100$
- $Count = Goods = sum(target)$
- $Diff = Goods - Bads$

Springleaf example

In [4]:

```
means = X_tr.groupby(col).target.mean()
train_new[col+'_mean_target'] = train_new[col].map(means)
val_new[col+'_mean_target'] = val_new[col].map(means)

means
```

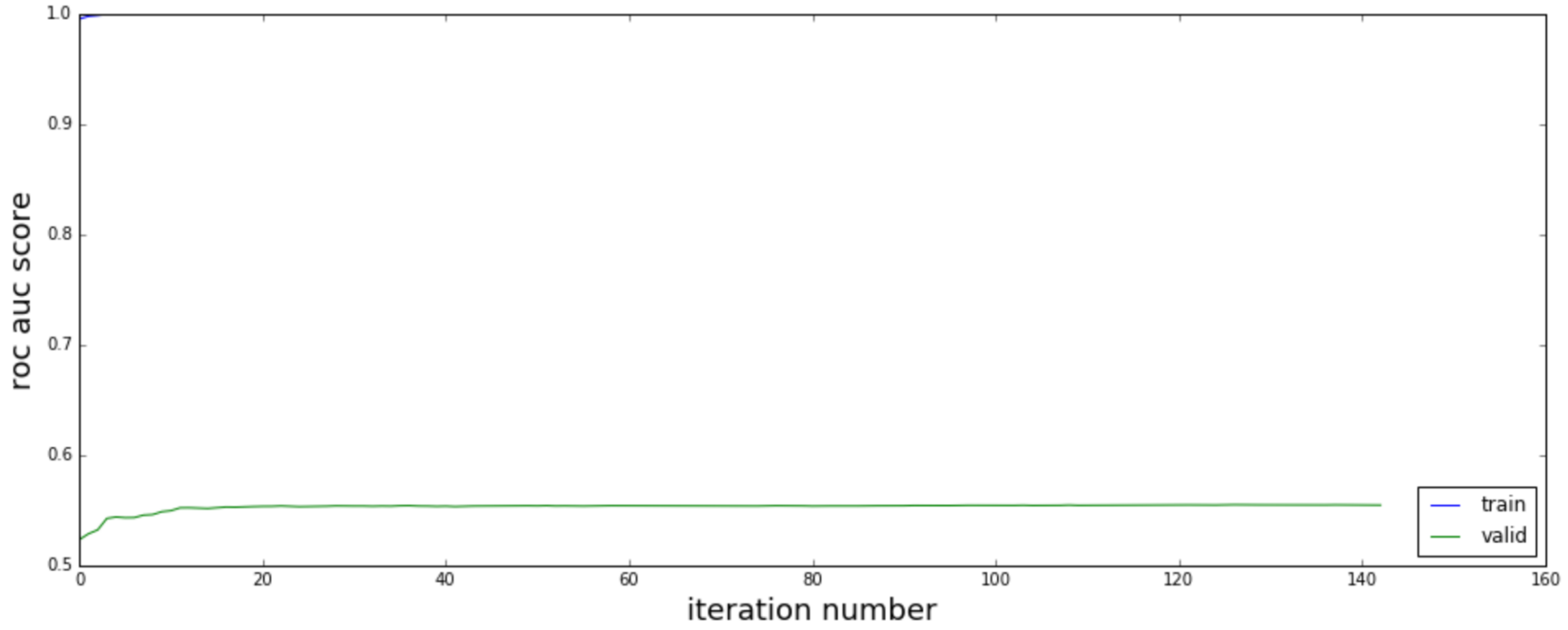
Out[4]:

VAR_1277	
0.0	0.358965
1.0	0.219249
2.0	0.193671
3.0	0.191143
4.0	0.191080
5.0	0.185694

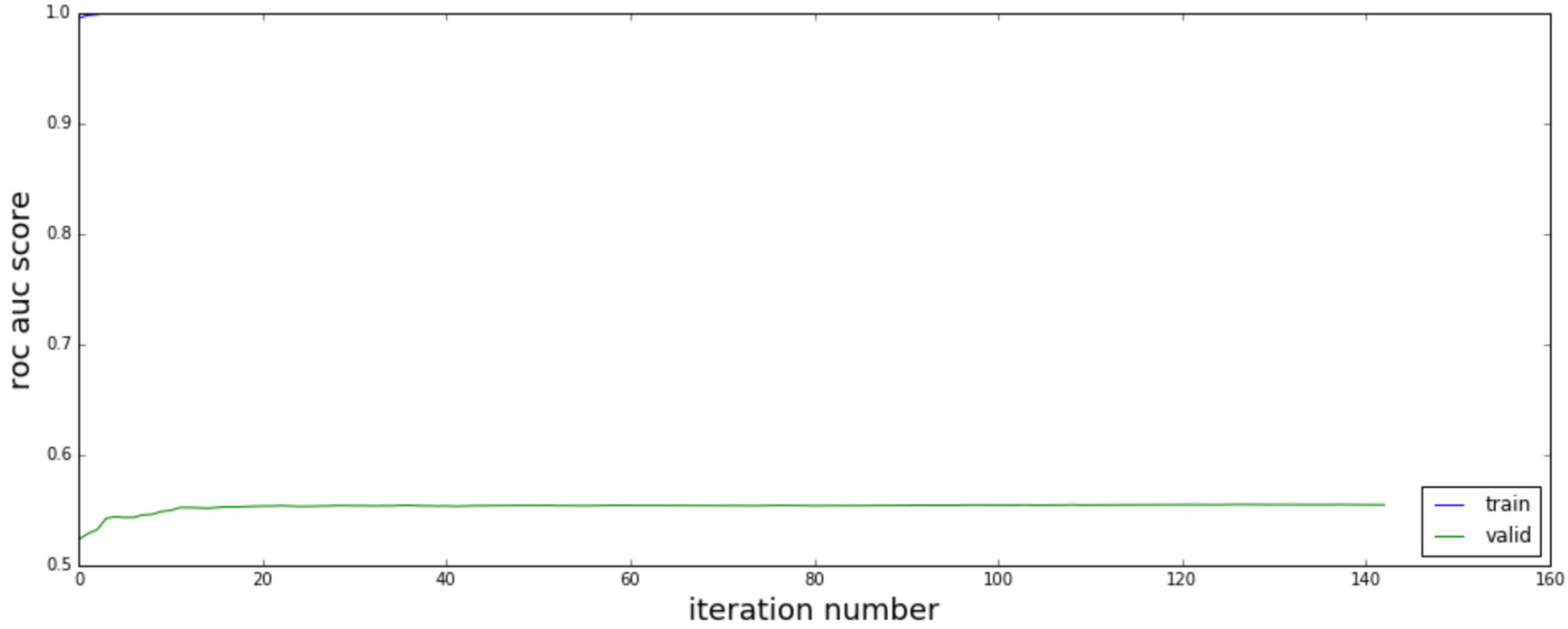
Springleaf example

```
dtrain = xgb.DMatrix(train_new, label=y_tr)
dvalid = xgb.DMatrix(val_new, label=y_val)

evallist = [(dtrain, 'train'),(dvalid, 'eval')]
evals_result3 = {}
model = xgb.train( xgb_par, dtrain,3000,evals=evallist,
verbose_eval=30,evals_result=evals_result3,early_stopping_rounds=50)
```



Overfit



Train

	feature	feature_label	feature_mean	target
8	Tver	2	0	0
9	Klin	0	0	0

Validation

	feature	feature_label	feature_mean	target
10	Klin	0	1	1
11	Tver	2	1	1