

Hyperparameter tuning part II

Plan for the video

- Tree-based models
 - GBDT: XGBoost, LightGBM, CatBoost
 - RandomForest/ExtraTrees
- Neural nets
 - Pytorch, Tensorflow, Keras...
- Linear models
 - SVM, logistic regression
 - Vowpal Wabbit, FTRL
- Factorization Machines (out of scope)
 - libFM, libFFM

Tree-based models

| Model | Where |
|--------------------------|--|
| GBDT | <i>XGBoost</i> (dmlc/xgboost) <i>LightGBM</i> (Mictrosoft/LighGBM) <i>CatBoost</i> (catboost/catboost) |
| RandomForest, ExtraTrees | <i>scikit-learn</i> |
| Others | <i>RGF</i> (baidu/fast_rgf) |

GBDT

XGBoost

LightGBM

GBDT

XGBoost

- `max_depth`

LightGBM

- `max_depth/num_leaves`

GBDT

XGBoost

- max_depth
- subsample

LightGBM

- max_depth/num_leaves
- bagging_fraction

GBDT

XGBoost

- max_depth
- subsample
- colsample_bytree,
colsample_bylevel

LightGBM

- max_depth/num_leaves
- bagging_fraction
- feature_fraction

GBDT

XGBoost

- max_depth
- subsample
- colsample_bytree,
colsample_bylevel
- min_child_weight,
lambda, alpha

LightGBM

- max_depth/num_leaves
- bagging_fraction
- feature_fraction
- min_data_in_leaf,
lambda_l1, lambda_l2

GBDT

XGBoost

- max_depth
- subsample
- colsample_bytree,
colsample_bylevel
- min_child_weight,
lambda, alpha
- eta
num_round

LightGBM

- max_depth/num_leaves
- bagging_fraction
- feature_fraction
- min_data_in_leaf,
lambda_l1, lambda_l2
- learning_rate
num_iterations

GBDT

XGBoost

- max_depth
- subsample
- colsample_bytree,
colsample_bylevel
- min_child_weight,
lambda, alpha
- eta
num_round

Others:

- seed

LightGBM

- max_depth/num_leaves
- bagging_fraction
- feature_fraction
- min_data_in_leaf,
lambda_l1, lambda_l2
- learning_rate
num_iterations

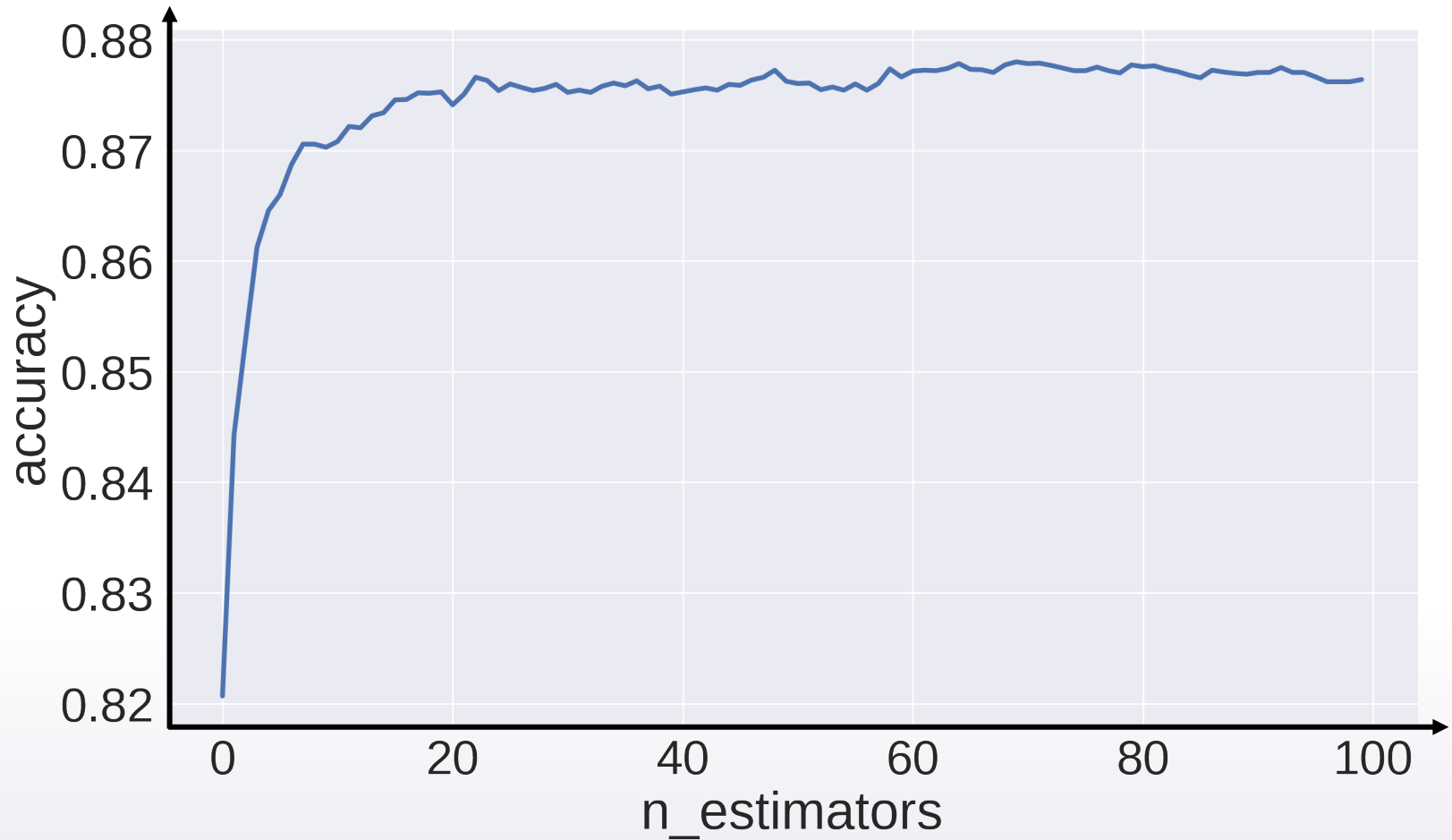
Others:

- *_seed

sklearn.RandomForest/ExtraTrees

sklearn.RandomForest/ExtraTrees

- `N_estimators` (the higher the better)



sklearn.RandomForest/ExtraTrees

- N_estimators (the higher the better)
- max_depth

sklearn.RandomForest/ExtraTrees

- `N_estimators` (the higher the better)
- `max_depth`
- `max_features`

sklearn.RandomForest/ExtraTrees

- N_estimators (the higher the better)
- max_depth
- max_features
- min_samples_leaf

sklearn.RandomForest/ExtraTrees

- N_estimators (the higher the better)
- max_depth
- max_features
- min_samples_leaf

Others:

- *criterion*

sklearn.RandomForest/ExtraTrees

- N_estimators (the higher the better)
- max_depth
- max_features
- min_samples_leaf

Others:

- *criterion*
- **random_state**
- **n_jobs**

Conclusion

- Tree-based models
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 - RandomForest/ExtraTrees
- Neural nets
 - Pytorch, Tensorflow, Keras...
- Linear models
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Conclusion

- Hyperparameter tuning in general
 - General pipeline
 - Manual and automatic tuning
 - What should we understand about hyperparameters?
- Models, libraries and hyperparameter optimization
 - Tree-based models
 - Neural networks
 - Linear models