Final project

2024-04-24

##Question As the main means of transportation, cars important for almost every family, therefore there exists a large market for car trading, especially the used car trading market. Because families with a small budget usually choose to buy a used car to find value for money. My research objective in this project is to analyze the importance of factors that influence the price of used cars. The dataset I chose is from Kaggle (https://www.kaggle.com/datasets/adityadesai13/used-car-dataset-ford-and-mercedes/data) It is a data of used cars in the UK and I chose the Toyota brand as the the target brand for the project.The data set contains information of price, transmission, mileage, fuel type, road tax, miles per gallon (mpg), and engine size.

##Method/approach In this project, I aim to use gradient boosting to analyze the factors that influence the price of used Toyota cars in the UK, specifically using the XGBoost algorithm as it is efficient and effective in processing structured data. My approach included an in-depth study of the feature import values generated by the gradient boosting model, as I recognized that tree-based methods, while useful, do not always provide a completely reliable interpretation of feature importance. To address possible discrepancies in feature importance, I will employ LIME as an additional method for validating and comparing the results obtained from XGBoost. This dual approach allows for a more reliable validation of the importance of each feature such as mileage, fuel type, and engine size. Additionally, to enhance my understanding of model robustness and interpretability, I will perform a sensitivity analysis on the hyperparameters. After establishing a baseline of optimized parameters through cross-validation, I will intentionally vary these parameters slightly to observe their impact on model performance and feature import stability. This approach will not only help to identify the most influential factors affecting used car prices, but also test the reliability and interpretability of the model under different configurations, leading to a deeper understanding of the dynamics of model behavior and the relevance of the features in predicting used car prices.

##Result

```
#code categorical variable & normalize continuous variables
library(data.table)
```

```
## Warning: package 'data.table' was built under R version 4.3.1
```

```
library(caret)
```

```
## Loading required package: ggplot2
```

```
## Warning: package 'ggplot2' was built under R version 4.3.1
```

```
## Loading required package: lattice
```

```
## Warning: package 'lattice' was built under R version 4.3.1
```

```r
data <- read.csv("toyota.csv")

#data cleaning
data$model <- NULL
data$transmission <- as.numeric(factor(data$transmission))
data$fuelType <- as.numeric(factor(data$fuelType))
features <- data[, !(names(data) %in% 'price')]
target <- data$price
```

```r
#split dataset
set.seed(5293)
indexes <- createDataPartition(target, p = 0.8, list = FALSE)
train_features <- features[indexes, ]
train_target <- target[indexes]
test_features <- features[-indexes, ]
test_target <- target[-indexes]
```

#Training the XGBoost Model and Feature Importance Analysis

```r
library(xgboost)
```

```
## Warning: package 'xgboost' was built under R version 4.3.1
```

```r
dtrain <- xgb.DMatrix(data = as.matrix(train_features), label = train_target)
dtest <- xgb.DMatrix(data = as.matrix(test_features), label = test_target)

params <- list(
  booster = "gbtree",
  objective = "reg:squarederror",
  eta = 0.1,
  gamma = 0,
  max_depth = 6,
  min_child_weight = 1,
  subsample = 0.5,
  colsample_bytree = 0.5
)

set.seed(5293)
xgb_model <- xgb.train(
  params = params,
  data = dtrain,
  nrounds = 100,
  watchlist = list(train = dtrain, test = dtest),
  print.every.n = 10,
  early_stopping_rounds = 10,
  maximize = FALSE
)
```

```
## Warning: 'print.every.n' is deprecated.
## Use 'print_every_n' instead.
## See help("Deprecated") and help("xgboost-deprecated").
```

```
## [20:14:15] WARNING: src/learner.cc:767:
## Parameters: { "print_every_n" } are not used.
##
## [1]  train-rmse:12763.120500 test-rmse:12561.047439
## Multiple eval metrics are present. Will use test_rmse for early stopping.
## Will train until test_rmse hasn't improved in 10 rounds.
##
## [11] train-rmse:5021.398983  test-rmse:4892.118061
## [21] train-rmse:2353.994606  test-rmse:2335.157947
## [31] train-rmse:1526.126857  test-rmse:1573.913511
## [41] train-rmse:1273.074778  test-rmse:1378.798766
## [51] train-rmse:1183.682227  test-rmse:1320.317450
## [61] train-rmse:1129.460684  test-rmse:1279.039346
## [71] train-rmse:1086.120047  test-rmse:1251.158799
## [81] train-rmse:1055.988263  test-rmse:1223.606863
## [91] train-rmse:1029.069033  test-rmse:1204.715096
## [100]    train-rmse:1009.526730  test-rmse:1190.305512
```

```
importance_matrix <- xgb.importance(feature_names = colnames(train_features), model = xgb_model)
print(importance_matrix)
```

```
##         Feature       Gain      Cover  Frequency
##          <char>      <num>      <num>      <num>
## 1:   engineSize 0.33069023 0.16362493 0.09339159
## 2:           mpg 0.21749025 0.30924923 0.25204806
## 3:     fuelType 0.13269964 0.06783332 0.06389951
## 4:          year 0.10936157 0.10693739 0.12261060
## 5:       mileage 0.10131542 0.20997884 0.28590934
## 6:           tax 0.07596451 0.09597737 0.12097215
## 7: transmission 0.03247840 0.04639892 0.06116876
```

#explain: Gain: This measures the average gain of the feature when it is used in trees. A higher value indicates the feature is more important for generating a split. Cover: This measures the relative quantity of observations concerned by a feature. Frequency: This is the percentage representing the relative number of times a particular feature occurs in the trees of the model. In my output, I found : EngineSize has the highest gain, which suggests that it contributes most to the model's predictions per split, meaning changes in engine size heavily influence the predicted price. mpg (miles per gallon) is second in gain, but has the highest cover, implying that it affects a large number of observations and is also quite influential. fuelType, year, and mileage have relatively lower gain scores, suggesting they have a lesser impact on the model's prediction per split compared to engineSize and mpg. However, mileage has a relatively high frequency, indicating it's used often in the trees. tax and transmission seem to be the least important in terms of gain but still have a decent cover and frequency, suggesting they affect a reasonable number of observations and are used quite regularly in the model.

#Validate Feature Importance with LIME

```
library(lime)

predict_model <- function(model, newdata) {
  if (!is.matrix(newdata)) {
    newdata <- as.matrix(newdata)
  }
  preds <- predict(model, xgb.DMatrix(newdata))
```

```
  return(data.frame(Price = preds))
}

explainer <- lime::lime(
  x = as.data.frame(as.matrix(train_features)),
  model = xgb_model,
  bin_continuous = FALSE,
  preprocess = NULL
)

explanations <- lime::explain(
  as.data.frame(as.matrix(test_features[1:10,])),
  explainer = explainer,
  n_features = 5,
  fun = predict_model
)

print(explanations)
```

```
## # A tibble: 50 x 11
##    model_type case  model_r2 model_intercept model_prediction feature
##    <chr>      <chr>    <dbl>           <dbl>            <dbl> <chr>
##  1 regression 15       0.663       -1047214.           16243. engineSize
##  2 regression 15       0.663       -1047214.           16243. fuelType
##  3 regression 15       0.663       -1047214.           16243. year
##  4 regression 15       0.663       -1047214.           16243. mileage
##  5 regression 15       0.663       -1047214.           16243. mpg
##  6 regression 22       0.663       -1126921.           18652. engineSize
##  7 regression 22       0.663       -1126921.           18652. year
##  8 regression 22       0.663       -1126921.           18652. fuelType
##  9 regression 22       0.663       -1126921.           18652. mileage
## 10 regression 22       0.663       -1126921.           18652. mpg
## # i 40 more rows
## # i 5 more variables: feature_value <dbl>, feature_weight <dbl>,
## #   feature_desc <chr>, data <list>, prediction <dbl>
```

#explain My XGBoost model finds engineSize and mpg to be very important in determining the price of a car, and LIME suggests similar importance at the individual prediction level. This indicates a strong influence of these features on the model across both global (model-level) and local (individual prediction) scales.

#Sensitivity Analysis on Hyperparameters

```
library(caret)

tune_grid <- expand.grid(
  nrounds = c(50, 100, 150),
  eta = c(0.05, 0.1),
  max_depth = c(4, 6, 8),
  gamma = c(0, 0.1),
  colsample_bytree = c(0.5, 0.7),
  min_child_weight = c(1, 2),
  subsample = c(0.5, 0.7)
```

```
)

train_control <- trainControl(
  method = "cv",
  number = 5,
  verboseIter = TRUE,
  returnData = FALSE
)

tune_results <- train(
  x = as.matrix(train_features),
  y = train_target,
  method = "xgbTree",
  trControl = train_control,
  tuneGrid = tune_grid
)
```

```
## + Fold1: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## [20:14:16] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, r
## [20:14:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, r
## + Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, r
## [20:14:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, r
## + Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, r
## [20:14:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, r
## + Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## [20:14:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## + Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, r
## [20:14:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, r
## + Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, r
## [20:14:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, r
## + Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, r
## [20:14:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, r
## + Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, r
## [20:14:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, r
## + Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, r
## [20:14:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, r
## + Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, r
## [20:14:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, r
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## + Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, n
## [20:14:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, n
## + Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, n
## [20:14:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, n
## + Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, n
## [20:14:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, n
## + Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## [20:14:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## + Fold1: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## [20:14:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## + Fold1: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, n
## [20:14:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold1: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, n
## [20:14:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold1: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, n
## [20:14:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold1: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, n
## [20:14:24] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold1: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, n
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## + Fold1: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## [20:14:24] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## + Fold1: eta=0.10, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## [20:14:24] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:14:25] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.10, max_depth=4, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, r
## + Fold1: eta=0.10, max_depth=4, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## [20:14:25] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.10, max_depth=4, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, r
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## + Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, r
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## + Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, r
## [20:14:25] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, r
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## - Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, r
## + Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, r
## [20:14:25] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, r
## + Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, r
## [20:14:26] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:14:26] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, r
## + Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## [20:14:26] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:14:26] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, r
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## + Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## [20:14:26] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.10, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## + Fold1: eta=0.10, max_depth=6, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## [20:14:26] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold1: eta=0.10, max_depth=6, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, n
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## [20:14:30] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold2: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
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## - Fold2: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
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## + Fold2: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, n
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## + Fold2: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
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## - Fold2: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## + Fold3: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## [20:14:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, r
## [20:15:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, r
## + Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, r
## [20:15:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, r
## + Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, r
## [20:15:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, r
## + Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, r
## [20:15:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, r
## + Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, r
## [20:15:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, r
## + Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## [20:15:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## + Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, r
## [20:15:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, r
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## + Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## [20:15:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## + Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## [20:15:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## + Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, n
## [20:15:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, n
## + Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, n
## [20:15:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, n
## + Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, n
## [20:15:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, n
## + Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, n
## [20:15:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, n
## + Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, n
## [20:15:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, n
## + Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, n
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, n
## + Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## + Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## + Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, n
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, n
## + Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, n
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, n
## + Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, n
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, n
## + Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, n
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, r
## + Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## + Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, r
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, r
## + Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, r
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, r
## + Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, r
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, r
## + Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, r
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, r
## + Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, r
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, r
## + Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, r
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, r
## + Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, r
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, r
## + Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## + Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, r
## [20:15:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, r
## + Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, r
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=4, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, r
## + Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, r
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, r
## + Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, r
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, r
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## + Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, n
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, n
## + Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, n
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, n
## + Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, n
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, n
## + Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, n
## [20:15:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, n
## + Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, n
## [20:15:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, n
## + Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## [20:15:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=6, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## + Fold4: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## [20:15:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## + Fold4: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, n
## [20:15:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, n
## + Fold4: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, n
## [20:15:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold4: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, n
## + Fold4: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, n
## [20:15:09] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, n
## [20:15:09] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, n
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## + Fold4: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, n
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## [20:15:09] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold4: eta=0.05, max_depth=6, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, r
## + Fold4: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, r
## [20:15:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, r
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## + Fold4: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.5, r
## [20:15:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.5, min_child_weight=2, subsample=0.7, r
## [20:15:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.5, r
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## + Fold4: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## [20:15:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, r
## + Fold4: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, r
## [20:15:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.05, max_depth=8, gamma=0.0, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, r
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## + Fold4: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, r
## [20:15:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.5, min_child_weight=1, subsample=0.7, r
## [20:15:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.05, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, n
## [20:15:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.10, max_depth=4, gamma=0.0, colsample_bytree=0.5, min_child_weight=1, subsample=0.5, n
## [20:15:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:15:37] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=1, subsample=0.7, n
## + Fold5: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, n
## [20:15:37] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:37] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.5, n
## + Fold5: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## [20:15:37] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.10, max_depth=8, gamma=0.1, colsample_bytree=0.7, min_child_weight=2, subsample=0.7, n
## Aggregating results
## Selecting tuning parameters
## Fitting nrounds = 150, max_depth = 6, eta = 0.05, gamma = 0, colsample_bytree = 0.7, min_child_weight
```

```
print(tune_results$bestTune)
```

```
##    nrounds max_depth  eta gamma colsample_bytree min_child_weight subsample
## 66     150         6 0.05     0              0.7                1       0.7
```

#explain I use Sensitivity Analysis on Hyperparameters to find the ones that give the best performance according to some evaluation metric.

#output: nrounds: The number of boosting rounds or trees to build. A higher number of rounds increases the potential for learning complex patterns but also increases the risk of overfitting.

max_depth: This controls the maximum depth of the trees. Deep trees can model more complex relationships by creating more specific rules, but too much depth can lead to overfitting. A depth of 150 is extremely high for typical XGBoost applications and might suggest overfitting unless the dataset is very complex.

eta: Also known as the learning rate, this determines the step size at each iteration while moving toward a minimum of a loss function. A smaller value makes the model more robust to overfitting but requires more rounds (nrounds).

gamma: This is the minimum loss reduction required to make a further partition on a leaf node. It acts as a regularization parameter. A higher value leads to more conservative models.

colsample_bytree: This parameter sets the fraction of features to randomly sample from before creating each tree. Subsampling occurs once every boosting iteration.

min_child_weight: It determines the minimum sum of instance weight (hessian) needed in a child. It is used to control overfitting; higher values prevent the model from learning relations which might be highly specific to the particular sample selected for a tree.

subsample: This parameter controls the fraction of the total number of instances trained on during each iteration. A lower value can prevent overfitting; it's like row sampling in random forest.

To explain the results: nrounds: 150 - This indicates the number of gradient boosting rounds. It's the number of trees that the model will use. max_depth: 6 - This is a much more typical value for the maximum depth of a tree. It allows the model to learn complex patterns but is not so deep that it should automatically lead to overfitting. eta: 0.05 - A common and conservative learning rate that helps prevent overfitting by making the boosting process more gradual. gamma: 0 - Specifies the minimum loss reduction required to make a split on a tree's leaf. A value of 0 means that no regularization is applied via this method. colsample_bytree: 0.7 - Each tree uses 70% of the features, which provides a good balance between making the individual trees robust and allowing them to benefit from all the features. min_child_weight: 1 - This is the minimum sum of instance weight (hessian) needed in a child node and is the default value. It is conservative in that it allows for children that cover very few instances. subsample: 0.7 - Each tree is trained on 70% of the data instances, reducing the risk of overfitting by injecting randomness into the dataset each tree sees.

#refit the XGBoost Model by using suggested parameter

```r
# Update parameters with the tuned values
tuned_params <- list(
  booster = "gbtree",
  objective = "reg:squarederror",
  eta = 0.05,               # Same as before
  gamma = 0,              # Tuned value
  max_depth = 6,
  min_child_weight = 1,    # Same as before
  subsample = 0.7,         # Tuned value
  colsample_bytree = 0.7   # Tuned value
)

# Train the model with the tuned parameters
set.seed(5293)
```

```r
xgb_model_tuned <- xgb.train(
  params = tuned_params,
  data = dtrain,
  nrounds = 150,           # Tuned value
  watchlist = list(train = dtrain, test = dtest),
  print.every.n = 10,
  early_stopping_rounds = 10,
  maximize = FALSE
)
```

```
## Warning: 'print.every.n' is deprecated.
## Use 'print_every_n' instead.
## See help("Deprecated") and help("xgboost-deprecated").
```

```
## [20:15:38] WARNING: src/learner.cc:767:
## Parameters: { "print_every_n" } are not used.
##
## [1]  train-rmse:13405.723484 test-rmse:13207.732649
## Multiple eval metrics are present. Will use test_rmse for early stopping.
## Will train until test_rmse hasn't improved in 10 rounds.
##
## [11] train-rmse:8284.097027  test-rmse:8152.507786
## [21] train-rmse:5189.972661  test-rmse:5105.799799
## [31] train-rmse:3358.396341  test-rmse:3309.205321
## [41] train-rmse:2298.655324  test-rmse:2282.793861
## [51] train-rmse:1715.849213  test-rmse:1738.676481
## [61] train-rmse:1406.263393  test-rmse:1447.948774
## [71] train-rmse:1242.105167  test-rmse:1315.370718
## [81] train-rmse:1151.550067  test-rmse:1246.337831
## [91] train-rmse:1096.492653  test-rmse:1211.451567
## [101]    train-rmse:1065.598554  test-rmse:1188.362167
## [111]    train-rmse:1039.805725  test-rmse:1171.526769
## [121]    train-rmse:1023.236153  test-rmse:1162.827688
## [131]    train-rmse:1004.832855  test-rmse:1152.294976
## [141]    train-rmse:990.607979   test-rmse:1145.619577
## [150]    train-rmse:976.613424   test-rmse:1141.911438
```

```r
importance_matrix_tuned <- xgb.importance(feature_names = colnames(train_features), model = xgb_model_tu
print(importance_matrix_tuned)
```

```
##         Feature       Gain      Cover  Frequency
##          <char>      <num>      <num>      <num>
## 1:   engineSize 0.40502983 0.22830099 0.10640732
## 2:         year 0.17358795 0.13946897 0.15331808
## 3:          mpg 0.15897042 0.27347796 0.22703498
## 4:      mileage 0.08765874 0.17929624 0.30630925
## 5:     fuelType 0.08429237 0.04764603 0.04887218
## 6:          tax 0.04660256 0.07893543 0.09921543
## 7: transmission 0.04385813 0.05287438 0.05884276
```

```r
summary(xgb_model_tuned)
```

```
##                 Length Class              Mode
## handle               1 xgb.Booster.handle externalptr
## raw             523816 -none-             raw
## best_iteration       1 -none-             numeric
## best_ntreelimit      1 -none-             numeric
## best_score           1 -none-             numeric
## best_msg             1 -none-             character
## niter                1 -none-             numeric
## evaluation_log       3 data.table         list
## call                 8 -none-             call
## params              10 -none-             list
## callbacks            3 -none-             list
## feature_names        7 -none-             character
## nfeatures            1 -none-             numeric
```

#Analysis and Comparison: #engineSize: The tuned model shows a slight increase in gain, suggesting a greater impact on the model's predictions. The cover also increases, indicating this feature is affecting more observations after tuning. #mpg: There's a noticeable decrease in gain, meaning its influence on the model's predictions has diminished slightly after tuning. The cover for mpg decreased as well, suggesting it's now affecting fewer observations in the model. #year: Year has a higher gain after tuning, indicating an increase in its importance for the model's predictions. Year's frequency also increased, showing it's being used more often in the trees. #mileage: Mileage's gain has decreased slightly in the tuned model, but it remains significant. However, mileage's frequency increased substantially, making it the most frequent splitter in the tuned model. #fuelType: FuelType's gain increased in the tuned model, suggesting it has become a more significant predictor. Its cover and frequency have decreased, though, which implies it's being used in fewer splits. #tax and transmission: Both features show a small increase in gain in the tuned model, indicating a slightly higher impact on model predictions.

Overall Interpretation: The tuning process has altered the contribution of the various features to the model. Notably, engineSize and year have become more influential, while mpg and mileage have seen a decrease in their relative gain. However, mileage has become the most frequent feature used for splitting, which suggests it's still a very relevant predictor in the tuned model.

#compare the accuracy

```r
# Predictions on the test set
preds <- predict(xgb_model, dtest)

# Calculate MSE
mse <- mean((test_target - preds)^2)
print(paste("MSE:", mse))
```

```
## [1] "MSE: 1416827.21112521"
```

```r
# Calculate RMSE
rmse <- sqrt(mse)
print(paste("RMSE:", rmse))
```

```
## [1] "RMSE: 1190.30551167556"
```

```r
# Calculate MAE
mae <- mean(abs(test_target - preds))
print(paste("MAE:", mae))
```

```
## [1] "MAE: 828.065655689892"
```

```r
# Calculate R-squared
rss <- sum((test_target - preds)^2)
tss <- sum((test_target - mean(test_target))^2)
r_squared <- 1 - rss/tss
print(paste("R-squared:", r_squared))
```

```
## [1] "R-squared: 0.962104874815247"
```

```r
# Predictions on the test set
preds <- predict(xgb_model_tuned, dtest)

# Calculate MSE
mse <- mean((test_target - preds)^2)
print(paste("MSE:", mse))
```

```
## [1] "MSE: 1303961.73470204"
```

```r
# Calculate RMSE
rmse <- sqrt(mse)
print(paste("RMSE:", rmse))
```

```
## [1] "RMSE: 1141.91143908013"
```

```r
# Calculate MAE
mae <- mean(abs(test_target - preds))
print(paste("MAE:", mae))
```

```
## [1] "MAE: 792.129516329491"
```

```r
# Calculate R-squared
rss <- sum((test_target - preds)^2)
tss <- sum((test_target - mean(test_target))^2)
r_squared <- 1 - rss/tss
print(paste("R-squared:", r_squared))
```

```
## [1] "R-squared: 0.965123627789857"
```

#Analysis and Comparison: Overall, all four metrics indicate that the tuned model performs better than the original model. The errors (MSE, RMSE, MAE) are lower, and the explanatory power (R-squared) is higher. This suggests that the tuning process has led to a more accurate model.

#Sensitivity Analysis on Hyperparameters again with different parameter choice in this time, I try larger range of parameters than before

```r
library(caret)

tune_grid2 <- expand.grid(
  nrounds = c(25,100,200),
  eta = c(0.025, 0.2),
  max_depth = c(3, 9, 15),
  gamma = c(0.5, 1),
  colsample_bytree = c(0.2, 0.9),
  min_child_weight = c(0, 3),
  subsample = c(0.2, 0.9)
)

train_control2 <- trainControl(
  method = "cv",
  number = 5,
  verboseIter = TRUE,
  returnData = FALSE
)

tune_results2 <- train(
  x = as.matrix(train_features),
  y = train_target,
  method = "xgbTree",
  trControl = train_control2,
  tuneGrid = tune_grid2
)
```

```
## + Fold1: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:15:38] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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```

```
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```

```
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## [20:15:41] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:15:41] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:41] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:15:41] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:41] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:15:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:15:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:15:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:15:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:15:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:15:43] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:43] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:15:43] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:43] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:15:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:15:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:15:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:15:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:15:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:15:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:15:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:15:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:15:46] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:46] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:15:46] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:46] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:15:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:15:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:15:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:15:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:15:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:15:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:15:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
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## + Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:15:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:15:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:15:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:15:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:15:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:15:52] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:52] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:15:52] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:15:52] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:15:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:15:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:15:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
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## + Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:15:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:15:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:15:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:15:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:15:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:15:55] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:15:55] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:55] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:15:55] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:15:55] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:15:55] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:15:56] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:56] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:15:57] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:57] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:15:57] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:57] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:15:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:15:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:15:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:15:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:15:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:15:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:15:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:15:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold1: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
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## + Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
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## + Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:09] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:09] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:09] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:09] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:16:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold2: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold2: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold2: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold2: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold2: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
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## + Fold2: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
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## + Fold2: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
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## [20:16:18] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:16:19] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold2: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
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## [20:16:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:16:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold2: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold2: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
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## - Fold2: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold3: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:24] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold3: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
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## [20:16:26] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold3: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:30] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold3: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:31] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold3: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:32] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold3: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:33] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:16:42] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:43] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:43] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:44] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:45] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:46] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:46] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:47] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold3: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
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## + Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold4: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold4: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold4: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:48] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold4: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:16:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:16:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:49] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:50] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:51] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:52] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:52] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:52] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:52] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
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## + Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:52] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:52] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:53] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:54] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:55] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:55] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:55] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:55] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:56] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:56] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:56] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:56] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:56] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:56] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:56] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:16:56] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:57] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:57] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:57] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:57] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:16:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:16:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:58] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:16:59] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
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## + Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:00] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:01] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:02] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:03] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:04] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
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## + Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:05] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:17:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:06] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:07] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:08] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:17:09] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:09] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:10] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold4: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:11] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
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## + Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:12] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold5: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold5: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
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## [20:17:13] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:14] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:14] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.025, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:14] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:15] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:15] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:15] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:15] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:15] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:16] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:16] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.025, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:17] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
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## - Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:17] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:17] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:17] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:17:18] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:18] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:18] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:18] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:19] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:19] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:19] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.025, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
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## + Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:17:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:20] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:21] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.025, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold5: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:22] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.200, max_depth= 3, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold5: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:23] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:17:24] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:24] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.200, max_depth= 3, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
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## + Fold5: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
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```

```
## + Fold5: eta=0.200, max_depth= 9, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
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## [20:17:26] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:26] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:27] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## [20:17:27] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:28] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:28] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.200, max_depth= 9, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:28] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:28] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
```

```
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## [20:17:28] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:28] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## + Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## [20:17:29] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:29] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## [20:17:30] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:30] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=0, subsample=0.9
## + Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## [20:17:30] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
## + Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:31] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:31] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.200, max_depth=15, gamma=0.5, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## + Fold5: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## [20:17:31] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.2
## + Fold5: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## [20:17:31] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:31] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=0, subsample=0.9
## + Fold5: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.2
## [20:17:31] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## + Fold5: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
## [20:17:32] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
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## - Fold5: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.2, min_child_weight=3, subsample=0.9
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## - Fold5: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.2
```

```
## + Fold5: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## [20:17:34] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## [20:17:34] WARNING: src/c_api/c_api.cc:935: `ntree_limit` is deprecated, use `iteration_range` instea
## - Fold5: eta=0.200, max_depth=15, gamma=1.0, colsample_bytree=0.9, min_child_weight=3, subsample=0.9
## Aggregating results
## Selecting tuning parameters
## Fitting nrounds = 200, max_depth = 9, eta = 0.025, gamma = 0.5, colsample_bytree = 0.9, min_child_wei
```

```
print(tune_results2$bestTune)
```

```
##    nrounds max_depth   eta gamma colsample_bytree min_child_weight subsample
## 66     200         9 0.025   0.5              0.9                0       0.9
```

#refit the XGBoost Model by using suggested parameter

```
tuned_params <- list(
  booster = "gbtree",
  objective = "reg:squarederror",
  eta = 0.025,
  gamma = 1,
  max_depth = 9,
  min_child_weight = 0,
  subsample = 0.9,
  colsample_bytree = 0.9
)

# Train the model with the tuned parameters
set.seed(5293)
xgb_model_tuned <- xgb.train(
  params = tuned_params,
  data = dtrain,
  nrounds = 200,
  watchlist = list(train = dtrain, test = dtest),
  print.every.n = 10,
  early_stopping_rounds = 10,
  maximize = FALSE
)
```

```
## Warning: 'print.every.n' is deprecated.
## Use 'print_every_n' instead.
## See help("Deprecated") and help("xgboost-deprecated").

## [20:17:35] WARNING: src/learner.cc:767:
## Parameters: { "print_every_n" } are not used.
##
## [1]  train-rmse:13736.490196 test-rmse:13530.106057
## Multiple eval metrics are present. Will use test_rmse for early stopping.
## Will train until test_rmse hasn't improved in 10 rounds.
##
## [11] train-rmse:10755.647208 test-rmse:10585.964802
## [21] train-rmse:8434.612703  test-rmse:8295.072725
## [31] train-rmse:6633.832024  test-rmse:6522.836029
```

```
## [41] train-rmse:5238.821640  test-rmse:5152.134988
## [51] train-rmse:4160.769740  test-rmse:4099.473023
## [61] train-rmse:3327.200932  test-rmse:3287.226344
## [71] train-rmse:2689.629098  test-rmse:2673.861318
## [81] train-rmse:2199.043701  test-rmse:2210.494261
## [91] train-rmse:1829.001552  test-rmse:1870.846616
## [101]    train-rmse:1550.783730  test-rmse:1625.420026
## [111]    train-rmse:1342.661530  test-rmse:1453.439201
## [121]    train-rmse:1186.043637  test-rmse:1334.476924
## [131]    train-rmse:1069.759324  test-rmse:1252.167578
## [141]    train-rmse:984.794197   test-rmse:1198.147672
## [151]    train-rmse:921.796706   test-rmse:1163.718847
## [161]    train-rmse:875.183826   test-rmse:1140.308017
## [171]    train-rmse:837.632609   test-rmse:1123.084389
## [181]    train-rmse:810.190799   test-rmse:1112.981542
## [191]    train-rmse:788.488389   test-rmse:1106.829255
## [200]    train-rmse:772.180518   test-rmse:1101.485722
```

```
importance_matrix_tuned <- xgb.importance(feature_names = colnames(train_features), model = xgb_model_tu
print(importance_matrix_tuned)
```

```
##         Feature        Gain      Cover  Frequency
##          <char>       <num>      <num>      <num>
## 1:   engineSize 0.526767728 0.24228887 0.06059300
## 2:         year 0.223722983 0.15354252 0.15673919
## 3:          mpg 0.094029966 0.20993136 0.17959008
## 4:      mileage 0.076731945 0.26417778 0.44657071
## 5:     fuelType 0.057545873 0.03018180 0.02659857
## 6:          tax 0.011424514 0.03341176 0.08016052
## 7: transmission 0.009776991 0.06646591 0.04974794
```

```
summary(xgb_model_tuned)
```

```
##                 Length  Class              Mode
## handle               1 xgb.Booster.handle externalptr
## raw            2192798 -none-             raw
## best_iteration       1 -none-             numeric
## best_ntreelimit      1 -none-             numeric
## best_score           1 -none-             numeric
## best_msg             1 -none-             character
## niter                1 -none-             numeric
## evaluation_log       3 data.table         list
## call                 8 -none-             call
## params              10 -none-             list
## callbacks            3 -none-             list
## feature_names        7 -none-             character
## nfeatures            1 -none-             numeric
```

```
preds <- predict(xgb_model_tuned, dtest)

mse <- mean((test_target - preds)^2)
print(paste("MSE:", mse))
```

```
## [1] "MSE: 1213270.79745579"
```

```
rmse <- sqrt(mse)
print(paste("RMSE:", rmse))
```

```
## [1] "RMSE: 1101.4857227653"
```

```
mae <- mean(abs(test_target - preds))
print(paste("MAE:", mae))
```

```
## [1] "MAE: 751.357663476272"
```

```
rss <- sum((test_target - preds)^2)
tss <- sum((test_target - mean(test_target))^2)
r_squared <- 1 - rss/tss
print(paste("R-squared:", r_squared))
```

```
## [1] "R-squared: 0.967549290138154"
```

#compared with the orginal one: Feature Importance: There is a significant increase in the importance of engineSize and year in the tuned model, indicating that the tuning process might have highlighted the relevance of these features to the model's predictions. mpg, fuelType, mileage, tax, and transmission all see a decrease in importance in the tuned model. This suggests that the tuning process could have deprioritized these features or the model found better splits with engineSize and year.

Model Performance: The tuned model has a lower MSE and RMSE, indicating better performance in terms of prediction error. The MAE is also lower, which means that on average, the tuned model has a smaller prediction error per data point. The R-squared value is higher for the tuned model, which means it explains a higher proportion of the variance in the target variable. Interpretation: The tuning process has led to a model that is more precise in its predictions. The model has become more confident about the impact of engineSize and year on the target variable after tuning. Lower error metrics and a higher R-squared value suggest that the tuned model is likely to generalize better to unseen data compared to the original model. Conclusion The tuning has improved the model's predictive accuracy and has shifted the importance towards engineSize and year, indicating these features are possibly more predictive for the target variable in the context of the model's task (which, based on the features, seems to be related to vehicle price prediction).

#compared with the 1st tuned one: Feature Importance: Engine Size remains the most important feature in both models, but its importance is slightly reduced in the second tuned model. Year also sees a decrease in importance in the second tuned model compared to the first tuned model. MPG has become more important in the second tuned model, indicating that the second tuned model may be capturing more nuanced relationships between MPG and the target variable. Mileage and Fuel Type have both seen increases in their importance scores in the second tuned model. Tax and Transmission show an increase in importance in the second tuned model, suggesting that the tuning altered the model's sensitivity to these features. Model Performance: The MSE and RMSE have increased from the first to the second tuned model, which means that the second model, on average, makes larger errors in its predictions. The MAE is also higher in the second model, indicating that average errors are larger. The R-squared value, which represents the proportion of the variance for the dependent variable that's explained by the independent variables in the model, has decreased slightly in the second tuned model. This suggests that the first tuned model fits the data slightly better.

#conclusion: Why different parameter cause different result?

Learning Rate (eta) First Model: 0.05 Second Model: 0.025 The learning rate, (eta), controls the step size at each iteration while moving toward a minimum of a loss function. A smaller learning rate makes the

model more robust to overfitting but also requires more rounds to train. This can explain why second model might need more rounds to converge, which might also lead to different feature importance distributions as the model has more iterations to fine-tune the importance of each feature.

Gamma First Model: 0 Second Model: 1 Gamma specifies the minimum loss reduction required to make a further partition on a leaf node of the tree. A higher gamma value leads to more conservative models. The second model's higher gamma value may result in fewer splits, thereby focusing the model's attention on the features with the most significant splits. This can make certain features appear more important.

Max Depth First Model: 6 Second Model: 9 The maximum depth of a tree controls how deep the tree can grow during any boosting round. A deeper tree can model more complex relationships by creating more specific rules, but it also risks overfitting. The increased depth in the second model allows it to capture more nuanced patterns which can change feature importances.

Minimum Child Weight First Model: 1 Second Model: 0 Minimum child weight is the minimum sum of instance weight needed in a child. If the tree partition step results in a leaf node with the sum of instance weight less than min_child_weight, then the building process will give up further partitioning. A lower value is more complex and can overfit, so setting this to 0 in the second model could allow the model to learn more specific leaf nodes, thus affecting the importance scores.

Subsample & Colsample_bytree Both Models: Decreased from the first to the second model (subsample: 0.7 to 0.9, colsample_bytree: 0.7 to 0.9) Subsample and colsample_bytree control the fraction of the sample and features that are randomly sampled to grow trees. Increasing these values makes the algorithm use more of the data, which can capture more feature interactions but can also lead to overfitting.

Number of Rounds (nrounds) First Model: 150 Second Model: 200 More rounds give more opportunity for the model to adjust weights on features, which changes the importance rankings.

Seed Both models use the same random seed, which ensures that the randomness in the training process is consistent between the two models.

#Summary The second model has been tuned to be more conservative (higher gamma) and complex (higher max_depth and lower min_child_weight), with more data utilized in each tree (higher subsample and colsample_bytree) and more iterations to learn from (higher nrounds). These changes can lead to a model that captures the data's nuances differently, hence the change in feature importance and performance metrics.

#overall summary: Through different model selection and factor selection, I get that for the UK Toyota used car market, price is most affected by engine size, followed by vehicle year, MPG and mileage are also important predictors. Fuel type, tax rate and transmission are less influential. In the study of this project, I also learned deeply about the changes in modeling results brought about by adjusting parameters. I think it is necessary to conduct Sensitivity Analysis on Hyperparameters because this process can help us to choose the best model, for example, I have shown that the both tuned model generally performs better than the original model, with less error and more accuracy. I also realized that when there is a deep understanding of what each parameter stands for, we can go ahead and set different metrics according to the research objectives, for example after I changed the range of parameter selection, the best parametric model was different and gave different results (refer to the results of tuned model 1 and tuned model 2). Even though the accuracy of Tuning Model 2 is not as high as that of Tuning Model 1, I cannot say that Tuning Model 2 is inferior to Tuning Model 1. When faced with a choice between these two models, if the primary goal is predictive accuracy, then the first model is preferable. However, if the primary goal is to understand the impact of different characteristics, the second model provides a different perspective, especially by giving more weight to MPG, mileage, and fuel type. So we need to carefully consider the model application context when making the final decision on which model to use.