Random Forest Upload Rate Prediction

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```
library(mlr3)
library(mlr3learners)
library(tidyverse)
library(ggplot2)
```

```
data_dir = "../datasets/"
dataset_ul = read_csv(str_c(data_dir, "dataset_ul.csv"), col_types = cols())
dataset_ul_prediction = dataset_ul %>% select(
  scenario,
  provider,
  velocity_mps,
  acceleration_mpss,
  rsrp_dbm,
  rsrq_db,
  rssnr_db,
  cqi,
  ta,
  throughput_mbits
)

# remove missing values
dataset_ul_prediction = dataset_ul_prediction %>% drop_na()
glimpse(dataset_ul_prediction)
```

```
## Rows: 6,168
## Columns: 10
## $ scenario          <chr> "campus", "campus", "campus", "campus", "campus",...
## $ provider          <chr> "o2", "tmobile", "vodafone", "tmobile", "o2", "o2...
## $ velocity_mps      <dbl> 11.80, 11.83, 11.70, 11.45, 11.49, 7.93, 8.15, 8....
## $ acceleration_mpss <dbl> 0.13, 0.03, 0.06, -0.32, -0.26, 0.23, 0.24, 0.32,...
## $ rsrp_dbm          <dbl> -99, -85, -121, -84, -97, -96, -74, -108, -111, -...
## $ rsrq_db           <dbl> -9, -5, -15, -6, -12, -12, -5, -9, -13, -11, -6, ...
## $ rssnr_db          <dbl> -1, 22, -8, 11, -2, 5, 29, 2, 6, 11, 13, 16, -3, ...
## $ cqi               <dbl> 8, 10, 4, 13, 9, 5, 15, 2, 6, 15, 12, 9, 6, 11, 1...
## $ ta                <dbl> 9, 7, 63, 4, 7, 7, 4, 21, 16, 7, 4, 4, 7, 16, 4, ...
## $ throughput_mbits  <dbl> 4.66, 24.52, 1.29, 14.86, 3.97, 6.52, 16.27, 3.18...
```

```
task = TaskRegr$new(
  id = "ul_prediction",
  backend = dataset_ul_prediction,
  target = "throughput_mbits"
)
task
```

```
## <TaskRegr:ul_prediction> (6168 x 10)
## * Target: throughput_mbits
## * Properties: -
## * Features (9):
##   - dbl (7): acceleration_mpss, cqi, rsrp_dbm, rsrq_db, rssnr_db, ta,
##     velocity_mps
##   - chr (2): provider, scenario
```

```
learner_random_forest = mlr_learners$get("regr.ranger")
```

```
resampling = rsmp("holdout", ratio = 0.8)
result = resample(
  task = task,
  learner = learner_random_forest,
  resampling = resampling
)
```

```
## INFO  [15:18:47.037] Applying learner 'regr.ranger' on task 'ul_prediction' (iter 1/1)
```

```
result
```

```
## <ResampleResult> of 1 iterations
## * Task: ul_prediction
## * Learner: regr.ranger
## * Warnings: 0 in 0 iterations
## * Errors: 0 in 0 iterations
```

```
# get r^2
result$aggregate(msr("regr.rsq"))
```

```
##  regr.rsq
## 0.4773433
```

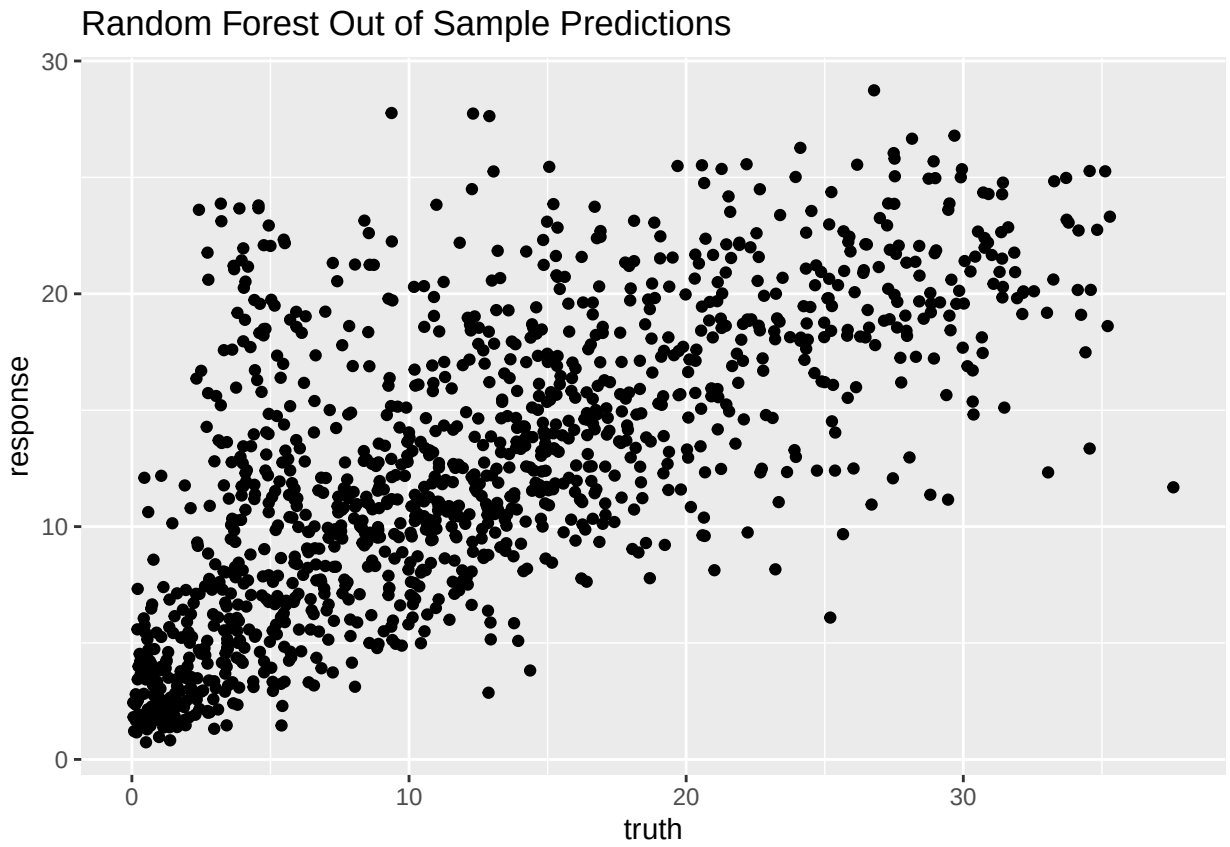
```
# get MSE
result$aggregate(msr("regr.mse"))
```

```
## regr.mse
## 40.23858
```

```
# get MAE
result$aggregate(msr("regr.mae"))
```

```
## regr.mae
## 4.732326
```

```
predictions = as.data.table(result$prediction())
ggplot(predictions) +
  geom_point(aes(x=truth, y=response)) +
  ggtitle("Random Forest Out of Sample Predictions")
```


Random Forest Out of Sample Predictions
response
truth
0
10
20
30