Joanna Wojtukiewicz AutoML

Libraries

```
library(h2o)
```

```
##
## ----------------------------------------------------------------------
##
## Your next step is to start H2O:
##     > h2o.init()
##
## For H2O package documentation, ask for help:
##     > ??h2o
##
## After starting H2O, you can use the Web UI at http://localhost:54321
## For more information visit https://docs.h2o.ai
##
## ----------------------------------------------------------------------
```

```
##
## Attaching package: 'h2o'
```

```
## The following objects are masked from 'package:stats':
##
##     cor, sd, var
```

```
## The following objects are masked from 'package:base':
##
##     %*%, %in%, &&, ||, apply, as.factor, as.numeric, colnames,
##     colnames<-, ifelse, is.character, is.factor, is.numeric, log,
##     log10, log1p, log2, round, signif, trunc
```

```
library(mlbench)

h2o.init(nthreads = -1, max_mem_size = '4G')
```

```
##  Connection successful!
##
## R is connected to the H2O cluster:
##     H2O cluster uptime:         6 hours 48 minutes
##     H2O cluster timezone:       Europe/Belgrade
##     H2O data parsing timezone:  UTC
##     H2O cluster version:        3.32.0.1
```

```
##     H2O cluster version age:    3 months and 22 days !!!
##     H2O cluster name:           H2O_started_from_R_oskak_fsa833
##     H2O cluster total nodes:    1
##     H2O cluster total memory:   3.11 GB
##     H2O cluster total cores:    4
##     H2O cluster allowed cores:  4
##     H2O cluster healthy:        TRUE
##     H2O Connection ip:          localhost
##     H2O Connection port:        54321
##     H2O Connection proxy:       NA
##     H2O Internal Security:      FALSE
##     H2O API Extensions:         Amazon S3, Algos, AutoML, Core V3, TargetEncoder, Core V4
##     R Version:                  R version 4.0.3 (2020-10-10)

## Warning in h2o.clusterInfo():
## Your H2O cluster version is too old (3 months and 22 days)!
## Please download and install the latest version from http://h2o.ai/download/
```

Data loading

```
sonar.data = Sonar
sonar.hex = as.h2o(sonar.data, destination_frame = 'sonar.hex')
```

```
##   |                                                                              |
```

```
sonar.split <- h2o.splitFrame(data = sonar.hex,
                              ratios = 0.8)
sonar.train <- sonar.split[[1]]
sonar.test <- sonar.split[[2]]
y = 'Class'
x = setdiff(names(sonar.train), y)
```

Model construct

```
sonar.automl <- h2o.automl(y = y,
                           x = x,
                           training_frame = sonar.train,
                           validation_frame = sonar.test,
                           nfolds = 0,
                           max_runtime_secs = 300)
```

```
##   |                                                                              |
## 17:04:34.657: AutoML: XGBoost is not available; skipping it.  |
## 17:04:40.760: Skipping training of model GBM_5_AutoML_20210131_170434 due to exception: water.except
##   |                                                                              |==================
```

Model test

```
sonar.automl@leader
```

```
## Model Details:
## ==============
##
## H2OBinomialModel: gbm
## Model ID:  GBM_grid__1_AutoML_20210131_170434_model_121
## Model Summary:
##   number_of_trees number_of_internal_trees model_size_in_bytes min_depth
## 1              65                       65               10131         3
##   max_depth mean_depth min_leaves max_leaves mean_leaves
## 1         3    3.00000          5          8     7.76923
##
##
## H2OBinomialMetrics: gbm
## ** Reported on training data. **
##
## MSE:  0.001510226
## RMSE:  0.03886163
## LogLoss:  0.03377098
## Mean Per-Class Error:  0
## AUC:  1
## AUCPR:  1
## Gini:  1
## R^2:  0.9938403
##
## Confusion Matrix (vertical: actual; across: predicted) for F1-optimal threshold:
##         M  R    Error    Rate
## M      82  0 0.000000   =0/82
## R       0 62 0.000000   =0/62
## Totals 82 62 0.000000  =0/144
##
## Maximum Metrics: Maximum metrics at their respective thresholds
##                         metric threshold     value idx
## 1                       max f1  0.899866  1.000000  61
## 2                       max f2  0.899866  1.000000  61
## 3                 max f0point5  0.899866  1.000000  61
## 4                 max accuracy  0.899866  1.000000  61
## 5                max precision  0.992823  1.000000   0
## 6                   max recall  0.899866  1.000000  61
## 7              max specificity  0.992823  1.000000   0
## 8             max absolute_mcc  0.899866  1.000000  61
## 9   max min_per_class_accuracy  0.899866  1.000000  61
## 10 max mean_per_class_accuracy  0.899866  1.000000  61
## 11                      max tns  0.992823 82.000000   0
## 12                      max fns  0.992823 61.000000   0
## 13                      max fps  0.006202 82.000000 143
## 14                      max tps  0.899866 62.000000  61
## 15                      max tnr  0.992823  1.000000   0
## 16                      max fnr  0.992823  0.983871   0
## 17                      max fpr  0.006202  1.000000 143
## 18                      max tpr  0.899866  1.000000  61
##
```

```
## Gains/Lift Table: Extract with `h2o.gainsLift(<model>, <data>)` or `h2o.gainsLift(<model>, valid=<T/
## H2OBinomialMetrics: gbm
## ** Reported on validation data. **
##
## MSE:  0.09591817
## RMSE:  0.3097066
## LogLoss:  0.310082
## Mean Per-Class Error:  0.08630952
## AUC:  0.9464286
## AUCPR:  0.9558672
## Gini:  0.8928571
## R^2:  0.6146145
##
## Confusion Matrix (vertical: actual; across: predicted) for F1-optimal threshold:
##         M  R    Error   Rate
## M      20  1 0.047619  =1/21
## R       3 21 0.125000  =3/24
## Totals 23 22 0.088889  =4/45
##
## Maximum Metrics: Maximum metrics at their respective thresholds
##                         metric threshold     value idx
## 1                        max f1  0.612021  0.913043  21
## 2                        max f2  0.293833  0.930233  32
## 3                  max f0point5  0.612021  0.937500  21
## 4                  max accuracy  0.612021  0.911111  21
## 5                 max precision  0.992511  1.000000   0
## 6                    max recall  0.293833  1.000000  32
## 7               max specificity  0.992511  1.000000   0
## 8              max absolute_mcc  0.612021  0.825744  21
## 9   max min_per_class_accuracy  0.612021  0.875000  21
## 10 max mean_per_class_accuracy  0.612021  0.913690  21
## 11                      max tns  0.992511 21.000000   0
## 12                      max fns  0.992511 23.000000   0
## 13                      max fps  0.009056 21.000000  44
## 14                      max tps  0.293833 24.000000  32
## 15                      max tnr  0.992511  1.000000   0
## 16                      max fnr  0.992511  0.958333   0
## 17                      max fpr  0.009056  1.000000  44
## 18                      max tpr  0.293833  1.000000  32
##
## Gains/Lift Table: Extract with `h2o.gainsLift(<model>, <data>)` or `h2o.gainsLift(<model>, valid=<T/
```

```
as.data.frame(sonar.automl@leaderboard)
```

```
##                                                model_id       auc   logloss
## 1          GBM_grid__1_AutoML_20210131_170434_model_121 1.0000000 0.2147389
## 2           GBM_grid__1_AutoML_20210131_170434_model_35 1.0000000 0.1951391
## 3           GBM_grid__1_AutoML_20210131_170434_model_54 1.0000000 0.2317524
## 4          GBM_grid__1_AutoML_20210131_170434_model_182 1.0000000 0.2028327
## 5           GBM_grid__1_AutoML_20210131_170434_model_88 1.0000000 0.2142181
## 6           GBM_grid__1_AutoML_20210131_170434_model_55 1.0000000 0.1805701
## 7          GBM_grid__1_AutoML_20210131_170434_model_146 1.0000000 0.2527429
## 8          GBM_grid__1_AutoML_20210131_170434_model_186 1.0000000 0.2726102
## 9           GBM_grid__1_AutoML_20210131_170434_model_67 0.9886364 0.3184554
```

```
## 10         GBM_grid__1_AutoML_20210131_170434_model_238 0.9886364 0.2726148
## 11          GBM_grid__1_AutoML_20210131_170434_model_25 0.9886364 0.2694921
## 12         GBM_grid__1_AutoML_20210131_170434_model_222 0.9886364 0.2686868
## 13         GBM_grid__1_AutoML_20210131_170434_model_236 0.9886364 0.2529502
## 14         GBM_grid__1_AutoML_20210131_170434_model_135 0.9886364 0.3320931
## 15         GBM_grid__1_AutoML_20210131_170434_model_140 0.9886364 0.2289920
## 16         GBM_grid__1_AutoML_20210131_170434_model_107 0.9886364 0.2240451
## 17         GBM_grid__1_AutoML_20210131_170434_model_226 0.9886364 0.2526089
## 18         GBM_grid__1_AutoML_20210131_170434_model_100 0.9886364 0.1919592
## 19         GBM_grid__1_AutoML_20210131_170434_model_181 0.9886364 0.2911486
## 20          GBM_grid__1_AutoML_20210131_170434_model_92 0.9886364 0.2091330
## 21         GBM_grid__1_AutoML_20210131_170434_model_185 0.9886364 0.2573511
## 22         GBM_grid__1_AutoML_20210131_170434_model_101 0.9772727 0.2041481
## 23           GBM_grid__1_AutoML_20210131_170434_model_9 0.9772727 0.3091294
## 24         GBM_grid__1_AutoML_20210131_170434_model_217 0.9772727 0.2706070
## 25         GBM_grid__1_AutoML_20210131_170434_model_112 0.9772727 0.2880377
## 26          GBM_grid__1_AutoML_20210131_170434_model_74 0.9772727 0.2593309
## 27         GBM_grid__1_AutoML_20210131_170434_model_251 0.9772727 0.2569711
## 28         GBM_grid__1_AutoML_20210131_170434_model_202 0.9772727 0.2627943
## 29         GBM_grid__1_AutoML_20210131_170434_model_199 0.9772727 0.2627943
## 30         GBM_grid__1_AutoML_20210131_170434_model_109 0.9772727 0.1762301
## 31         GBM_grid__1_AutoML_20210131_170434_model_141 0.9772727 0.2484448
## 32          GBM_grid__1_AutoML_20210131_170434_model_27 0.9772727 0.2524206
## 33          GBM_grid__1_AutoML_20210131_170434_model_18 0.9772727 0.2967168
## 34         GBM_grid__1_AutoML_20210131_170434_model_147 0.9772727 0.2931775
## 35         GBM_grid__1_AutoML_20210131_170434_model_150 0.9772727 0.2623397
## 36          GBM_grid__1_AutoML_20210131_170434_model_62 0.9772727 0.2752478
## 37         GBM_grid__1_AutoML_20210131_170434_model_130 0.9772727 0.2734786
## 38         GBM_grid__1_AutoML_20210131_170434_model_224 0.9772727 0.2643232
## 39         GBM_grid__1_AutoML_20210131_170434_model_103 0.9772727 0.2810388
## 40         GBM_grid__1_AutoML_20210131_170434_model_257 0.9772727 0.2863764
## 41         GBM_grid__1_AutoML_20210131_170434_model_125 0.9772727 0.2574333
## 42          GBM_grid__1_AutoML_20210131_170434_model_57 0.9772727 0.2586843
## 43           GBM_grid__1_AutoML_20210131_170434_model_2 0.9772727 0.2993789
## 44          GBM_grid__1_AutoML_20210131_170434_model_21 0.9772727 0.2460174
## 45          GBM_grid__1_AutoML_20210131_170434_model_30 0.9772727 0.2513287
## 46          GBM_grid__1_AutoML_20210131_170434_model_45 0.9772727 0.2979729
## 47         GBM_grid__1_AutoML_20210131_170434_model_249 0.9772727 0.2579889
## 48         GBM_grid__1_AutoML_20210131_170434_model_117 0.9772727 0.2756895
## 49         GBM_grid__1_AutoML_20210131_170434_model_246 0.9659091 0.2810913
## 50          GBM_grid__1_AutoML_20210131_170434_model_87 0.9659091 0.2715335
## 51         GBM_grid__1_AutoML_20210131_170434_model_110 0.9659091 0.3516962
## 52          GBM_grid__1_AutoML_20210131_170434_model_22 0.9659091 0.3407900
## 53         GBM_grid__1_AutoML_20210131_170434_model_143 0.9659091 0.2738490
## 54         GBM_grid__1_AutoML_20210131_170434_model_220 0.9659091 0.2721933
## 55         GBM_grid__1_AutoML_20210131_170434_model_104 0.9659091 0.2881697
## 56         GBM_grid__1_AutoML_20210131_170434_model_208 0.9659091 0.2760019
## 57         GBM_grid__1_AutoML_20210131_170434_model_119 0.9659091 0.3140385
## 58         GBM_grid__1_AutoML_20210131_170434_model_229 0.9659091 0.3072363
## 59          GBM_grid__1_AutoML_20210131_170434_model_16 0.9659091 0.3336462
## 60          GBM_grid__1_AutoML_20210131_170434_model_34 0.9659091 0.2797433
## 61         GBM_grid__1_AutoML_20210131_170434_model_233 0.9659091 0.3233567
## 62         GBM_grid__1_AutoML_20210131_170434_model_111 0.9659091 0.2601199
## 63          GBM_grid__1_AutoML_20210131_170434_model_91 0.9659091 0.3412001
```

```
## 64           GBM_grid__1_AutoML_20210131_170434_model_7 0.9659091 0.2689346
## 65         GBM_grid__1_AutoML_20210131_170434_model_154 0.9659091 0.2997551
## 66                         GBM_1_AutoML_20210131_170434 0.9659091 0.3306783
## 67         GBM_grid__1_AutoML_20210131_170434_model_235 0.9659091 0.3627493
## 68          GBM_grid__1_AutoML_20210131_170434_model_40 0.9659091 0.2680700
## 69         GBM_grid__1_AutoML_20210131_170434_model_151 0.9659091 0.2994154
## 70         GBM_grid__1_AutoML_20210131_170434_model_167 0.9659091 0.2972583
## 71          GBM_grid__1_AutoML_20210131_170434_model_60 0.9659091 0.2346301
## 72         GBM_grid__1_AutoML_20210131_170434_model_116 0.9659091 0.3097315
## 73         GBM_grid__1_AutoML_20210131_170434_model_209 0.9659091 0.2570130
## 74          GBM_grid__1_AutoML_20210131_170434_model_33 0.9659091 0.3071197
## 75          GBM_grid__1_AutoML_20210131_170434_model_83 0.9659091 0.2426034
## 76         GBM_grid__1_AutoML_20210131_170434_model_148 0.9659091 0.2235489
## 77          GBM_grid__1_AutoML_20210131_170434_model_84 0.9659091 0.2955110
## 78         GBM_grid__1_AutoML_20210131_170434_model_124 0.9659091 0.2920669
## 79         GBM_grid__1_AutoML_20210131_170434_model_178 0.9659091 0.3025577
## 80          GBM_grid__1_AutoML_20210131_170434_model_44 0.9659091 0.3104039
## 81         GBM_grid__1_AutoML_20210131_170434_model_184 0.9659091 0.3033818
## 82          GBM_grid__1_AutoML_20210131_170434_model_51 0.9659091 0.3182232
## 83          GBM_grid__1_AutoML_20210131_170434_model_36 0.9659091 0.2872770
## 84          GBM_grid__1_AutoML_20210131_170434_model_29 0.9659091 0.3413450
## 85           GBM_grid__1_AutoML_20210131_170434_model_1 0.9659091 0.2918567
## 86          GBM_grid__1_AutoML_20210131_170434_model_75 0.9659091 0.2771147
## 87         GBM_grid__1_AutoML_20210131_170434_model_194 0.9659091 0.2578447
## 88         GBM_grid__1_AutoML_20210131_170434_model_162 0.9659091 0.2993132
## 89         GBM_grid__1_AutoML_20210131_170434_model_219 0.9659091 0.3662057
## 90         GBM_grid__1_AutoML_20210131_170434_model_213 0.9659091 0.3049654
## 91         GBM_grid__1_AutoML_20210131_170434_model_215 0.9659091 0.3671563
## 92          GBM_grid__1_AutoML_20210131_170434_model_79 0.9545455 0.3411290
## 93         GBM_grid__1_AutoML_20210131_170434_model_164 0.9545455 0.3252562
## 94          GBM_grid__1_AutoML_20210131_170434_model_90 0.9545455 0.3246324
## 95          GBM_grid__1_AutoML_20210131_170434_model_59 0.9545455 0.3374505
## 96         GBM_grid__1_AutoML_20210131_170434_model_193 0.9545455 0.3441958
## 97          GBM_grid__1_AutoML_20210131_170434_model_43 0.9545455 0.3099755
## 98         GBM_grid__1_AutoML_20210131_170434_model_228 0.9545455 0.3125381
## 99         GBM_grid__1_AutoML_20210131_170434_model_190 0.9545455 0.3589940
## 100        GBM_grid__1_AutoML_20210131_170434_model_127 0.9545455 0.3157896
## 101        GBM_grid__1_AutoML_20210131_170434_model_230 0.9545455 0.2619286
## 102        GBM_grid__1_AutoML_20210131_170434_model_188 0.9545455 0.3611713
## 103        GBM_grid__1_AutoML_20210131_170434_model_210 0.9545455 0.3460659
## 104         GBM_grid__1_AutoML_20210131_170434_model_63 0.9545455 0.3563320
## 105        GBM_grid__1_AutoML_20210131_170434_model_165 0.9545455 0.3033207
## 106         GBM_grid__1_AutoML_20210131_170434_model_48 0.9545455 0.3398119
## 107         GBM_grid__1_AutoML_20210131_170434_model_13 0.9545455 0.3152892
## 108        GBM_grid__1_AutoML_20210131_170434_model_134 0.9545455 0.3037989
## 109        GBM_grid__1_AutoML_20210131_170434_model_138 0.9545455 0.3127198
## 110         GBM_grid__1_AutoML_20210131_170434_model_41 0.9545455 0.3354882
## 111                        GBM_2_AutoML_20210131_170434 0.9545455 0.3080224
## 112        GBM_grid__1_AutoML_20210131_170434_model_221 0.9545455 0.3101235
## 113        GBM_grid__1_AutoML_20210131_170434_model_118 0.9545455 0.3765861
## 114         GBM_grid__1_AutoML_20210131_170434_model_71 0.9545455 0.3497077
## 115         GBM_grid__1_AutoML_20210131_170434_model_89 0.9545455 0.3357394
## 116         GBM_grid__1_AutoML_20210131_170434_model_68 0.9545455 0.3932843
## 117        GBM_grid__1_AutoML_20210131_170434_model_126 0.9545455 0.3133732
```

```
## 118        GBM_grid__1_AutoML_20210131_170434_model_239 0.9545455 0.3330866
## 119        GBM_grid__1_AutoML_20210131_170434_model_205 0.9545455 0.3389613
## 120        GBM_grid__1_AutoML_20210131_170434_model_163 0.9545455 0.3712488
## 121        GBM_grid__1_AutoML_20210131_170434_model_170 0.9545455 0.4019254
## 122        GBM_grid__1_AutoML_20210131_170434_model_196 0.9545455 0.3058140
## 123        GBM_grid__1_AutoML_20210131_170434_model_180 0.9545455 0.3301615
## 124        GBM_grid__1_AutoML_20210131_170434_model_183 0.9545455 0.3510594
## 125        GBM_grid__1_AutoML_20210131_170434_model_131 0.9545455 0.3511273
## 126         GBM_grid__1_AutoML_20210131_170434_model_98 0.9545455 0.3092080
## 127        GBM_grid__1_AutoML_20210131_170434_model_115 0.9545455 0.3690267
## 128        GBM_grid__1_AutoML_20210131_170434_model_201 0.9545455 0.2819152
## 129        GBM_grid__1_AutoML_20210131_170434_model_169 0.9545455 0.3688771
## 130         GBM_grid__1_AutoML_20210131_170434_model_46 0.9545455 0.2944426
## 131         GBM_grid__1_AutoML_20210131_170434_model_97 0.9545455 0.3280106
## 132         GBM_grid__1_AutoML_20210131_170434_model_66 0.9545455 0.3132124
## 133         GBM_grid__1_AutoML_20210131_170434_model_85 0.9545455 0.3364267
## 134        GBM_grid__1_AutoML_20210131_170434_model_198 0.9545455 0.3708243
## 135        GBM_grid__1_AutoML_20210131_170434_model_132 0.9545455 0.2785906
## 136         GBM_grid__1_AutoML_20210131_170434_model_20 0.9545455 0.3184973
## 137        GBM_grid__1_AutoML_20210131_170434_model_168 0.9545455 0.3312456
## 138        GBM_grid__1_AutoML_20210131_170434_model_232 0.9545455 0.3700456
## 139        GBM_grid__1_AutoML_20210131_170434_model_139 0.9545455 0.3464205
## 140         GBM_grid__1_AutoML_20210131_170434_model_11 0.9545455 0.3597954
## 141        GBM_grid__1_AutoML_20210131_170434_model_195 0.9545455 0.2637457
## 142                        GBM_3_AutoML_20210131_170434 0.9545455 0.3023537
## 143         GBM_grid__1_AutoML_20210131_170434_model_28 0.9545455 0.3479965
## 144         GBM_grid__1_AutoML_20210131_170434_model_69 0.9545455 0.3710796
## 145        GBM_grid__1_AutoML_20210131_170434_model_200 0.9545455 0.3493037
## 146        GBM_grid__1_AutoML_20210131_170434_model_252 0.9545455 0.3377661
## 147         GBM_grid__1_AutoML_20210131_170434_model_47 0.9545455 0.2904701
## 148         GBM_grid__1_AutoML_20210131_170434_model_94 0.9431818 0.3634582
## 149         GBM_grid__1_AutoML_20210131_170434_model_37 0.9431818 0.3776182
## 150        GBM_grid__1_AutoML_20210131_170434_model_153 0.9431818 0.3016905
## 151         GBM_grid__1_AutoML_20210131_170434_model_70 0.9431818 0.3342884
## 152        GBM_grid__1_AutoML_20210131_170434_model_177 0.9431818 0.4188606
## 153        GBM_grid__1_AutoML_20210131_170434_model_176 0.9431818 0.3220151
## 154        GBM_grid__1_AutoML_20210131_170434_model_113 0.9431818 0.3735642
## 155        GBM_grid__1_AutoML_20210131_170434_model_242 0.9431818 0.3444827
## 156        GBM_grid__1_AutoML_20210131_170434_model_120 0.9431818 0.3970114
## 157         GBM_grid__1_AutoML_20210131_170434_model_26 0.9431818 0.3134116
## 158         GBM_grid__1_AutoML_20210131_170434_model_53 0.9431818 0.3132170
## 159        GBM_grid__1_AutoML_20210131_170434_model_128 0.9431818 0.3024514
## 160        GBM_grid__1_AutoML_20210131_170434_model_254 0.9431818 0.3921730
## 161                        XRT_1_AutoML_20210131_170434 0.9431818 0.3799315
## 162        GBM_grid__1_AutoML_20210131_170434_model_133 0.9431818 0.3179212
## 163        GBM_grid__1_AutoML_20210131_170434_model_231 0.9431818 0.3827081
## 164        GBM_grid__1_AutoML_20210131_170434_model_173 0.9431818 0.3746855
## 165        GBM_grid__1_AutoML_20210131_170434_model_216 0.9431818 0.4037241
## 166         GBM_grid__1_AutoML_20210131_170434_model_39 0.9431818 0.3828773
## 167        GBM_grid__1_AutoML_20210131_170434_model_158 0.9431818 0.3898787
## 168                        GBM_4_AutoML_20210131_170434 0.9431818 0.3683024
## 169         GBM_grid__1_AutoML_20210131_170434_model_56 0.9431818 0.3474827
## 170         GBM_grid__1_AutoML_20210131_170434_model_82 0.9431818 0.4045518
## 171        GBM_grid__1_AutoML_20210131_170434_model_204 0.9431818 0.3469376
```

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## 172        GBM_grid__1_AutoML_20210131_170434_model_172 0.9431818 0.3256369
## 173        GBM_grid__1_AutoML_20210131_170434_model_212 0.9431818 0.3456506
## 174        GBM_grid__1_AutoML_20210131_170434_model_191 0.9431818 0.3009747
## 175         GBM_grid__1_AutoML_20210131_170434_model_77 0.9431818 0.3251540
## 176        GBM_grid__1_AutoML_20210131_170434_model_174 0.9318182 0.3228543
## 177        GBM_grid__1_AutoML_20210131_170434_model_189 0.9318182 0.3738340
## 178        GBM_grid__1_AutoML_20210131_170434_model_192 0.9318182 0.3204788
## 179          GBM_grid__1_AutoML_20210131_170434_model_3 0.9318182 0.3423536
## 180          GBM_grid__1_AutoML_20210131_170434_model_8 0.9318182 0.3205991
## 181         GBM_grid__1_AutoML_20210131_170434_model_52 0.9318182 0.3929996
## 182        GBM_grid__1_AutoML_20210131_170434_model_218 0.9318182 0.4639003
## 183        GBM_grid__1_AutoML_20210131_170434_model_157 0.9318182 0.4116574
## 184         GBM_grid__1_AutoML_20210131_170434_model_42 0.9318182 0.3854546
## 185        GBM_grid__1_AutoML_20210131_170434_model_159 0.9318182 0.4289062
## 186 DeepLearning_grid__1_AutoML_20210131_170434_model_2 0.9318182 0.3121473
## 187        GBM_grid__1_AutoML_20210131_170434_model_114 0.9318182 0.4197676
## 188        GBM_grid__1_AutoML_20210131_170434_model_245 0.9318182 0.3285416
## 189          GBM_grid__1_AutoML_20210131_170434_model_4 0.9318182 0.4090226
## 190         GBM_grid__1_AutoML_20210131_170434_model_81 0.9318182 0.2948982
## 191        GBM_grid__1_AutoML_20210131_170434_model_187 0.9318182 0.3625340
## 192        GBM_grid__1_AutoML_20210131_170434_model_137 0.9318182 0.3373539
## 193        GBM_grid__1_AutoML_20210131_170434_model_123 0.9318182 0.4569198
## 194         GBM_grid__1_AutoML_20210131_170434_model_10 0.9318182 0.3428829
## 195         GBM_grid__1_AutoML_20210131_170434_model_38 0.9318182 0.3995579
## 196         GBM_grid__1_AutoML_20210131_170434_model_80 0.9318182 0.3853271
## 197        GBM_grid__1_AutoML_20210131_170434_model_105 0.9318182 0.3610534
## 198         GBM_grid__1_AutoML_20210131_170434_model_99 0.9318182 0.3234134
## 199         GBM_grid__1_AutoML_20210131_170434_model_96 0.9318182 0.3652107
## 200        GBM_grid__1_AutoML_20210131_170434_model_171 0.9318182 0.3226179
## 201        GBM_grid__1_AutoML_20210131_170434_model_255 0.9318182 0.4029373
## 202         GBM_grid__1_AutoML_20210131_170434_model_50 0.9318182 0.3421672
## 203         GBM_grid__1_AutoML_20210131_170434_model_78 0.9318182 0.4007478
## 204         GBM_grid__1_AutoML_20210131_170434_model_14 0.9204545 0.3773153
## 205        GBM_grid__1_AutoML_20210131_170434_model_206 0.9204545 0.4526366
## 206        GBM_grid__1_AutoML_20210131_170434_model_227 0.9204545 0.4592054
## 207         GBM_grid__1_AutoML_20210131_170434_model_23 0.9204545 0.3785293
## 208        GBM_grid__1_AutoML_20210131_170434_model_197 0.9204545 0.3735237
## 209        GBM_grid__1_AutoML_20210131_170434_model_142 0.9204545 0.4425500
## 210         GBM_grid__1_AutoML_20210131_170434_model_76 0.9204545 0.3914914
## 211 DeepLearning_grid__1_AutoML_20210131_170434_model_5 0.9204545 1.3912873
## 212                         DRF_1_AutoML_20210131_170434 0.9147727 0.3964678
## 213 DeepLearning_grid__1_AutoML_20210131_170434_model_7 0.9090909 1.4012793
## 214         GBM_grid__1_AutoML_20210131_170434_model_32 0.9090909 0.3780141
## 215          GBM_grid__1_AutoML_20210131_170434_model_5 0.9090909 0.4453181
## 216 DeepLearning_grid__1_AutoML_20210131_170434_model_6 0.9090909 2.0586293
## 217        GBM_grid__1_AutoML_20210131_170434_model_214 0.9090909 0.4592113
## 218        GBM_grid__1_AutoML_20210131_170434_model_136 0.9090909 0.4140269
## 219        GBM_grid__1_AutoML_20210131_170434_model_234 0.8977273 0.4666294
## 220        GBM_grid__1_AutoML_20210131_170434_model_241 0.8977273 0.4031227
## 221        GBM_grid__1_AutoML_20210131_170434_model_207 0.8977273 0.4885817
## 222        GBM_grid__1_AutoML_20210131_170434_model_122 0.8977273 0.4822259
## 223         GBM_grid__1_AutoML_20210131_170434_model_73 0.8977273 0.3743505
## 224        GBM_grid__1_AutoML_20210131_170434_model_108 0.8977273 0.4743758
## 225         GBM_grid__1_AutoML_20210131_170434_model_72 0.8863636 0.4881467
```

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## 226 DeepLearning_grid__2_AutoML_20210131_170434_model_1 0.8863636 1.5672165
## 227 DeepLearning_grid__3_AutoML_20210131_170434_model_1 0.8806818 2.8996763
## 228 DeepLearning_grid__2_AutoML_20210131_170434_model_4 0.8806818 2.4011886
## 229 DeepLearning_grid__1_AutoML_20210131_170434_model_8 0.8750000 0.7787876
## 230        GBM_grid__1_AutoML_20210131_170434_model_253 0.8750000 0.4247498
## 231 DeepLearning_grid__2_AutoML_20210131_170434_model_5 0.8750000 3.6905844
## 232 DeepLearning_grid__2_AutoML_20210131_170434_model_3 0.8750000 2.3298664
## 233 DeepLearning_grid__1_AutoML_20210131_170434_model_4 0.8522727 1.0481071
## 234 DeepLearning_grid__1_AutoML_20210131_170434_model_9 0.8409091 1.4723088
## 235 DeepLearning_grid__1_AutoML_20210131_170434_model_3 0.8181818 1.3712758
## 236                          GLM_1_AutoML_20210131_170434 0.8181818 0.5403305
## 237 DeepLearning_grid__2_AutoML_20210131_170434_model_2 0.7954545 1.8846152
## 238 DeepLearning_grid__1_AutoML_20210131_170434_model_1 0.7613636 1.8217720
## 239               DeepLearning_1_AutoML_20210131_170434 0.6931818 0.8176505
##         aucpr mean_per_class_error      rmse        mse
## 1   1.0000000           0.00000000 0.2469236 0.06097129
## 2   1.0000000           0.00000000 0.2466120 0.06081748
## 3   1.0000000           0.00000000 0.2708835 0.07337789
## 4   1.0000000           0.00000000 0.2416273 0.05838375
## 5   1.0000000           0.00000000 0.2631356 0.06924036
## 6   1.0000000           0.00000000 0.2229004 0.04968461
## 7   1.0000000           0.00000000 0.2721221 0.07405044
## 8   1.0000000           0.00000000 0.2955033 0.08732221
## 9   0.9920899           0.06250000 0.3348069 0.11209564
## 10  0.9920899           0.06250000 0.2980899 0.08885759
## 11  0.9920899           0.06250000 0.3000046 0.09000277
## 12  0.9920899           0.06250000 0.2997499 0.08985000
## 13  0.9920899           0.06250000 0.2904639 0.08436925
## 14  0.9920899           0.06250000 0.3360009 0.11289661
## 15  0.9920899           0.06250000 0.2692400 0.07249017
## 16  0.9920899           0.06250000 0.2622783 0.06878992
## 17  0.9920899           0.06250000 0.2968795 0.08813742
## 18  0.9920899           0.06250000 0.2491159 0.06205875
## 19  0.9920899           0.06250000 0.3082747 0.09503330
## 20  0.9920899           0.06250000 0.2582469 0.06669146
## 21  0.9920899           0.06250000 0.2874104 0.08260472
## 22  0.9854468           0.04545455 0.2470717 0.06104445
## 23  0.9834253           0.06250000 0.3285172 0.10792356
## 24  0.9854468           0.04545455 0.3037531 0.09226595
## 25  0.9834253           0.06250000 0.3093609 0.09570419
## 26  0.9834253           0.06250000 0.2807183 0.07880278
## 27  0.9834253           0.06250000 0.2971429 0.08829392
## 28  0.9834253           0.06250000 0.2993186 0.08959165
## 29  0.9834253           0.06250000 0.2993186 0.08959165
## 30  0.9834253           0.06250000 0.2278659 0.05192285
## 31  0.9854468           0.04545455 0.2782366 0.07741563
## 32  0.9834253           0.06250000 0.2800609 0.07843411
## 33  0.9854468           0.04545455 0.3171863 0.10060712
## 34  0.9854468           0.04545455 0.3085577 0.09520787
## 35  0.9854468           0.04545455 0.2889628 0.08349952
## 36  0.9854468           0.04545455 0.2943536 0.08664405
## 37  0.9834253           0.06250000 0.2892166 0.08364626
## 38  0.9834253           0.06250000 0.2977929 0.08868058
## 39  0.9854468           0.04545455 0.2994700 0.08968229
```

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## 40  0.9854468           0.04545455 0.2857766 0.08166829
## 41  0.9834253           0.06250000 0.2877974 0.08282737
## 42  0.9854468           0.04545455 0.2876499 0.08274244
## 43  0.9854468           0.04545455 0.3128593 0.09788092
## 44  0.9854468           0.04545455 0.2797323 0.07825014
## 45  0.9854468           0.04545455 0.2905582 0.08442407
## 46  0.9854468           0.04545455 0.2993746 0.08962515
## 47  0.9854468           0.04545455 0.2850630 0.08126089
## 48  0.9834253           0.06250000 0.2966687 0.08801233
## 49  0.9738471           0.06250000 0.3007531 0.09045242
## 50  0.9767822           0.12500000 0.2976478 0.08859421
## 51  0.9767822           0.12500000 0.3269583 0.10690173
## 52  0.9767822           0.12500000 0.3291906 0.10836647
## 53  0.9767822           0.12500000 0.3066948 0.09406170
## 54  0.9767822           0.12500000 0.3074280 0.09451197
## 55  0.9797887           0.04545455 0.2989764 0.08938690
## 56  0.9767822           0.12500000 0.3053124 0.09321564
## 57  0.9797887           0.04545455 0.3138757 0.09851795
## 58  0.9797887           0.04545455 0.3132299 0.09811296
## 59  0.9767822           0.12500000 0.3322660 0.11040069
## 60  0.9738471           0.06250000 0.3139675 0.09857557
## 61  0.9767822           0.12500000 0.3176787 0.10091974
## 62  0.9797887           0.04545455 0.2818700 0.07945070
## 63  0.9767822           0.12500000 0.3406167 0.11601971
## 64  0.9767822           0.12500000 0.3012089 0.09072680
## 65  0.9797887           0.04545455 0.2980070 0.08880817
## 66  0.9797887           0.04545455 0.3277578 0.10742519
## 67  0.9767822           0.12500000 0.3327350 0.11071258
## 68  0.9767822           0.12500000 0.2988826 0.08933079
## 69  0.9797887           0.04545455 0.3031742 0.09191461
## 70  0.9738471           0.06250000 0.3271249 0.10701068
## 71  0.9767822           0.12500000 0.2816410 0.07932168
## 72  0.9767822           0.12500000 0.3175430 0.10083356
## 73  0.9797887           0.04545455 0.2784753 0.07754847
## 74  0.9767822           0.12500000 0.3140872 0.09865077
## 75  0.9797887           0.04545455 0.2760878 0.07622445
## 76  0.9767822           0.12500000 0.2700793 0.07294284
## 77  0.9738471           0.06250000 0.2961237 0.08768925
## 78  0.9767822           0.12500000 0.3032532 0.09196251
## 79  0.9767822           0.12500000 0.3131537 0.09806524
## 80  0.9767822           0.12500000 0.3219391 0.10364480
## 81  0.9767822           0.12500000 0.3097847 0.09596655
## 82  0.9738471           0.06250000 0.3283781 0.10783220
## 83  0.9767822           0.12500000 0.3047756 0.09288814
## 84  0.9767822           0.12500000 0.3251654 0.10573256
## 85  0.9767822           0.12500000 0.3116943 0.09715333
## 86  0.9738471           0.06250000 0.3043916 0.09265427
## 87  0.9797887           0.04545455 0.2760391 0.07619758
## 88  0.9738471           0.06250000 0.3123046 0.09753417
## 89  0.9767822           0.12500000 0.3419933 0.11695943
## 90  0.9797887           0.04545455 0.2832980 0.08025777
## 91  0.9767822           0.12500000 0.3485486 0.12148614
## 92  0.9696265           0.12500000 0.3339289 0.11150854
## 93  0.9631395           0.06250000 0.3359386 0.11285475
```

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## 94  0.9696265          0.12500000 0.3271542 0.10702986
## 95  0.9711242          0.10795455 0.3455572 0.11940977
## 96  0.9696265          0.12500000 0.3301703 0.10901242
## 97  0.9711242          0.10795455 0.3176797 0.10092039
## 98  0.9696265          0.12500000 0.3206992 0.10284799
## 99  0.9696265          0.12500000 0.3395518 0.11529544
## 100 0.9696265          0.12500000 0.3280849 0.10763968
## 101 0.9711242          0.10795455 0.2855914 0.08156247
## 102 0.9696265          0.12500000 0.3456608 0.11948140
## 103 0.9711242          0.10795455 0.3331419 0.11098352
## 104 0.9696265          0.12500000 0.3377589 0.11408107
## 105 0.9711242          0.10795455 0.3089824 0.09547012
## 106 0.9696265          0.12500000 0.3293439 0.10846742
## 107 0.9672040          0.12500000 0.3241139 0.10504980
## 108 0.9711242          0.10795455 0.3109179 0.09666991
## 109 0.9711242          0.10795455 0.3194959 0.10207762
## 110 0.9696265          0.12500000 0.3337238 0.11137161
## 111 0.9672040          0.12500000 0.3160163 0.09986628
## 112 0.9711242          0.10795455 0.3121676 0.09744863
## 113 0.9696265          0.12500000 0.3429394 0.11760742
## 114 0.9711242          0.10795455 0.3288484 0.10814126
## 115 0.9696265          0.12500000 0.3357311 0.11271535
## 116 0.9696265          0.12500000 0.3546651 0.12578736
## 117 0.9672040          0.12500000 0.3251902 0.10574865
## 118 0.9696265          0.12500000 0.3326697 0.11066912
## 119 0.9696265          0.12500000 0.3267908 0.10679225
## 120 0.9696265          0.12500000 0.3526929 0.12439227
## 121 0.9696265          0.12500000 0.3564715 0.12707194
## 122 0.9696265          0.12500000 0.3194073 0.10202105
## 123 0.9696265          0.12500000 0.3276994 0.10738690
## 124 0.9672040          0.12500000 0.3345401 0.11191706
## 125 0.9696265          0.12500000 0.3403880 0.11586398
## 126 0.9696265          0.12500000 0.3152155 0.09936078
## 127 0.9672040          0.12500000 0.3476857 0.12088533
## 128 0.9696265          0.12500000 0.3031983 0.09192921
## 129 0.9631395          0.06250000 0.3653138 0.13345418
## 130 0.9696265          0.12500000 0.3115043 0.09703493
## 131 0.9696265          0.12500000 0.3346230 0.11197258
## 132 0.9696265          0.12500000 0.3202791 0.10257873
## 133 0.9696265          0.12500000 0.3252054 0.10575854
## 134 0.9696265          0.12500000 0.3520471 0.12393713
## 135 0.9672040          0.12500000 0.3073705 0.09447665
## 136 0.9696265          0.12500000 0.3289192 0.10818785
## 137 0.9711242          0.10795455 0.3336427 0.11131742
## 138 0.9696265          0.12500000 0.3419328 0.11691804
## 139 0.9696265          0.12500000 0.3405091 0.11594644
## 140 0.9696265          0.12500000 0.3339212 0.11150334
## 141 0.9711242          0.10795455 0.2864638 0.08206149
## 142 0.9711242          0.10795455 0.3058817 0.09356361
## 143 0.9696265          0.12500000 0.3382769 0.11443123
## 144 0.9696265          0.12500000 0.3372808 0.11375832
## 145 0.9696265          0.12500000 0.3354619 0.11253467
## 146 0.9696265          0.12500000 0.3358191 0.11277450
## 147 0.9696265          0.12500000 0.3129790 0.09795584
```

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## 148 0.9639685          0.09090909 0.3369421 0.11352997
## 149 0.9600483          0.12500000 0.3531409 0.12470853
## 150 0.9564964          0.12500000 0.3241529 0.10507511
## 151 0.9639685          0.09090909 0.3274216 0.10720490
## 152 0.9639685          0.09090909 0.3618382 0.13092686
## 153 0.9600483          0.12500000 0.3352030 0.11236102
## 154 0.9600483          0.12500000 0.3477603 0.12093720
## 155 0.9600483          0.12500000 0.3384249 0.11453144
## 156 0.9600483          0.12500000 0.3663595 0.13421925
## 157 0.9615459          0.10795455 0.3257280 0.10609873
## 158 0.9639685          0.09090909 0.3185933 0.10150166
## 159 0.9639685          0.09090909 0.3181455 0.10121659
## 160 0.9510003          0.06250000 0.3731083 0.13920983
## 161 0.9639685          0.09090909 0.3451258 0.11911184
## 162 0.9600483          0.12500000 0.3252598 0.10579396
## 163 0.9639685          0.09090909 0.3435909 0.11805473
## 164 0.9600483          0.12500000 0.3502390 0.12266739
## 165 0.9639685          0.09090909 0.3564286 0.12704136
## 166 0.9639685          0.09090909 0.3443397 0.11856984
## 167 0.9639685          0.09090909 0.3468479 0.12030350
## 168 0.9639685          0.09090909 0.3507928 0.12305561
## 169 0.9600483          0.12500000 0.3390988 0.11498802
## 170 0.9639685          0.09090909 0.3542171 0.12546976
## 171 0.9564964          0.12500000 0.3482789 0.12129819
## 172 0.9600483          0.12500000 0.3284034 0.10784881
## 173 0.9662471          0.10795455 0.3284435 0.10787514
## 174 0.9615459          0.10795455 0.3196345 0.10216624
## 175 0.9600483          0.12500000 0.3264868 0.10659360
## 176 0.9443572          0.12500000 0.3345657 0.11193423
## 177 0.9493408          0.12500000 0.3565606 0.12713547
## 178 0.9579589          0.09090909 0.3321034 0.11029267
## 179 0.9508384          0.10795455 0.3456698 0.11948763
## 180 0.9522974          0.12500000 0.3238659 0.10488912
## 181 0.9543903          0.18750000 0.3558662 0.12664072
## 182 0.9590914          0.09090909 0.3852337 0.14840501
## 183 0.9590914          0.09090909 0.3589120 0.12881782
## 184 0.9590914          0.09090909 0.3501049 0.12257346
## 185 0.9543903          0.18750000 0.3724249 0.13870030
## 186 0.9543903          0.18750000 0.3251340 0.10571214
## 187 0.9543903          0.18750000 0.3667180 0.13448211
## 188 0.9369866          0.06250000 0.3320050 0.11022733
## 189 0.9493408          0.12500000 0.3709512 0.13760480
## 190 0.9522974          0.12500000 0.3186310 0.10152572
## 191 0.9543903          0.18750000 0.3471124 0.12048705
## 192 0.9522974          0.12500000 0.3366718 0.11334787
## 193 0.9590914          0.09090909 0.3805768 0.14483871
## 194 0.9579589          0.09090909 0.3353506 0.11246004
## 195 0.9590914          0.09090909 0.3502192 0.12265347
## 196 0.9543903          0.18750000 0.3546918 0.12580626
## 197 0.9508384          0.10795455 0.3458685 0.11962504
## 198 0.9443572          0.12500000 0.3336137 0.11129813
## 199 0.9543903          0.18750000 0.3490410 0.12182962
## 200 0.9443572          0.12500000 0.3338062 0.11142656
## 201 0.9590914          0.09090909 0.3571197 0.12753449
```

```
## 202 0.9522974           0.12500000 0.3478376 0.12099099
## 203 0.9579589           0.09090909 0.3511133 0.12328057
## 204 0.9386992           0.10795455 0.3504270 0.12279909
## 205 0.9466394           0.18750000 0.3804449 0.14473835
## 206 0.9548441           0.09090909 0.3859716 0.14897404
## 207 0.9415899           0.12500000 0.3657884 0.13380117
## 208 0.9483807           0.18750000 0.3525318 0.12427868
## 209 0.9466394           0.18750000 0.3787088 0.14342036
## 210 0.9372015           0.12500000 0.3660243 0.13397382
## 211 0.9204119           0.06250000 0.3674418 0.13501346
## 212 0.9350586           0.18750000 0.3598544 0.12949517
## 213 0.9294506           0.12500000 0.3954455 0.15637712
## 214 0.9359318           0.18750000 0.3655069 0.13359530
## 215 0.9511118           0.09090909 0.3745371 0.14027805
## 216 0.9315435           0.18750000 0.3950317 0.15605007
## 217 0.9479633           0.09090909 0.3834199 0.14701083
## 218 0.9331409           0.12500000 0.3770071 0.14213439
## 219 0.9375149           0.17045455 0.3886355 0.15103757
## 220 0.9210017           0.12500000 0.3817113 0.14570349
## 221 0.9451022           0.09090909 0.3951818 0.15616863
## 222 0.9375149           0.17045455 0.3946248 0.15572871
## 223 0.9342285           0.18750000 0.3612253 0.13048369
## 224 0.9375149           0.17045455 0.3932163 0.15461905
## 225 0.9337827           0.17045455 0.3984243 0.15874190
## 226 0.8863274           0.12500000 0.4472392 0.20002289
## 227 0.8489279           0.10795455 0.4580847 0.20984157
## 228 0.8489279           0.10795455 0.4481911 0.20087527
## 229 0.9118288           0.10795455 0.4724334 0.22319332
## 230 0.9150721           0.18750000 0.3911421 0.15299214
## 231 0.8536214           0.18750000 0.4084370 0.16682079
## 232 0.8977122           0.12500000 0.3920761 0.15372367
## 233 0.8644695           0.18750000 0.3918169 0.15352047
## 234 0.8116464           0.18750000 0.4061383 0.16494832
## 235 0.7455181           0.17045455 0.3816682 0.14567058
## 236 0.8356501           0.15340909 0.4076191 0.16615337
## 237 0.7189021           0.18750000 0.4399450 0.19355164
## 238 0.7947912           0.21590909 0.4929413 0.24299108
## 239 0.7354982           0.29545455 0.4839819 0.23423845
```

```
automl.predict = h2o.predict(object = sonar.automl,
                             newdata = sonar.hex)
```

```
##   |                                                                              |
```

```
automl.predict
```

```
##   predict          M         R
## 1       M 0.58999558 0.4100044
## 2       R 0.04900902 0.9509910
## 3       R 0.02911824 0.9708818
## 4       R 0.02816151 0.9718385
## 5       R 0.03477239 0.9652276
## 6       R 0.31465024 0.6853498
```

```
##
## [208 rows x 3 columns]
```