```
sbt:scalation> runMain project1.SimpleRegression
[info] running (fork) project1.SimpleRegression
[error] WARNING: A terminally deprecated method in sun.misc.Unsafe has been called
[error] WARNING: sun.misc.Unsafe::objectFieldOffset has been called by scala.runtime.LazyVals$
(file:/mnt/c/Libs/scalation_2.0/target/bg-jobs/sbt_c76850d4/target/21dbe174/563b310f/scala3-library_3-
3.7.2.jar)
[error] WARNING: Please consider reporting this to the maintainers of class scala.runtime.LazyVals$
[error] WARNING: sun.misc.Unsafe::objectFieldOffset will be removed in a future release
[info] DEBUG @ Predictor.trainNTest: b = VectorD(156.476,       187.572,        79.0176,        57.3810,
8.68939,        -15.9723)
[info] REPORT
[info]     ------------------------------------------------------------------------
[info]     modelName  mn  = Regression @dfm = 5.0
[info]     ------------------------------------------------------------------------
[info]     hparameter hp  = HyperParameter(factorization -> (Fac_QR,Fac_QR))
[info]     ------------------------------------------------------------------------
[info]     features   fn  = Array(x0, x1, x2, x3, x4, x5)
[info]     ------------------------------------------------------------------------
[info]     parameter  b   = VectorD(156.476,    187.572,        79.0176,        57.3810,        8.68939,
-15.9723)
[info]     ------------------------------------------------------------------------
[info]     fitMap     qof = LinkedHashMap(rSq -> 0.945747, rSqBar -> 0.945044, sst -> 4281593.713648, sse ->
232291.405597, sde -> 24.334133, mse0 -> 592.580116, rmse -> 24.342969, mae -> 17.857727, smape -> 9.982629,
m -> 392.000000, dfm -> 5.000000, df -> 386.000000, fStat -> 1345.749910, aic -> -1795.584233, bic ->
-1771.756662, mape -> 10.000989, mase -> 1.026261, smapeC -> 10.013241, picp -> -1.000000, pinc ->
-1.000000, ace -> -1.000000, pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info]     ------------------------------------------------------------------------
[info]
[info] Run + title
[info] --------------
[info] | Validation |
[info] --------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.942957, rSqBar -> 0.942218, sst -> 842741.346154, sse -> 48072.430145, sde ->
24.981931, mse0 -> 616.313207, rmse -> 24.825656, mae -> 17.328262, smape -> 9.330545, m -> 78.000000, dfm -
> 5.000000, df -> 386.000000, fStat -> 1276.166820, aic -> -349.239472, bic -> -335.099219, mape ->
9.352022, mase -> 1.009684, smapeC -> 9.484391, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
[info] %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
[info] --------------------------
[info] | Forward Selection Test |
[info] --------------------------
[info] ------------------------------------------------------------
[info] | crossValidate: fold 0: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.847325, rSqBar -> 0.847325, sst -> 842741.346154, sse -> 128665.612319, sde ->
37.566178, mse0 -> 1649.559132, rmse -> 40.614765, mae -> 33.367742, smape -> 25.792448, m -> 78.000000, dfm
-> 0.000000, df -> 391.000000, fStat -> 0.000000, aic -> -397.618911, bic -> -395.262202, mape -> 21.059110,
mase -> 1.137689, smapeC -> 25.818089, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000, pinaw ->
-1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 0: qof = VectorD(0.847325, 0.847325,       842741, 128666,
37.5662,        1649.56,        40.6148,        33.3677,        25.7924,        78.0000,        0.00000,
391.000,        0.00000,        -397.619,       -395.262,21.0591,       1.13769,        25.8181,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ------------------------------------------------------------
[info] | crossValidate: fold 1: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.776622, rSqBar -> 0.776622, sst -> 723406.717949, sse -> 161592.925208, sde ->
41.225952, mse0 -> 2071.704169, rmse -> 45.515977, mae -> 38.998384, smape -> 29.223432, m -> 78.000000, dfm
-> 0.000000, df -> 391.000000, fStat -> 0.000000, aic -> -407.917967, bic -> -405.561259, mape -> 24.734355,
mase -> 1.221034, smapeC -> 29.249073, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000, pinaw ->
-1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 1: qof = VectorD(0.776622, 0.776622,       723407, 161593,
41.2260,        2071.70,        45.5160,        38.9984,        29.2234,        78.0000,        0.00000,
391.000,        0.00000,        -407.918,       -405.561,24.7344,       1.22103,        29.2491,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ------------------------------------------------------------
[info] | crossValidate: fold 2: train-test splits sizes = (314, 78) |
```

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[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.838675, rSqBar -> 0.838675, sst -> 981947.294872, sse -> 158413.079158, sde ->
39.864805, mse0 -> 2030.936912, rmse -> 45.065917, mae -> 39.507706, smape -> 31.082420, m -> 78.000000, dfm
-> 0.000000, df -> 391.000000, fStat -> 0.000000, aic -> -406.923370, bic -> -404.566661, mape -> 25.766717,
mase -> 1.146992, smapeC -> 31.108061, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000, pinaw ->
-1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 2: qof = VectorD(0.838675, 0.838675,       981947, 158413,
39.8648,        2030.94,        45.0659,        39.5077,        31.0824,        78.0000,        0.00000,
391.000,        0.00000,        -406.923,       -404.567,25.7667,       1.14699,        31.1081,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 3: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.820775, rSqBar -> 0.820775, sst -> 811184.708333, sse -> 145384.534488, sde ->
40.904588, mse0 -> 1863.904288, rmse -> 43.172958, mae -> 37.681604, smape -> 31.172151, m -> 78.000000, dfm
-> 0.000000, df -> 391.000000, fStat -> 0.000000, aic -> -402.848282, bic -> -400.491573, mape -> 25.664007,
mase -> 1.169109, smapeC -> 31.197792, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000, pinaw ->
-1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 3: qof = VectorD(0.820775, 0.820775,       811185, 145385,
40.9046,        1863.90,        43.1730,        37.6816,        31.1722,        78.0000,        0.00000,
391.000,        0.00000,        -402.848,       -400.492,25.6640,       1.16911,        31.1978,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 4: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.847783, rSqBar -> 0.847783, sst -> 880383.794872, sse -> 134008.967241, sde ->
40.600031, mse0 -> 1718.063683, rmse -> 41.449532, mae -> 34.279130, smape -> 22.930926, m -> 78.000000, dfm
-> 0.000000, df -> 391.000000, fStat -> 0.000000, aic -> -399.290214, bic -> -396.933505, mape -> 20.439573,
mase -> 1.106861, smapeC -> 22.956567, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000, pinaw ->
-1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 4: qof = VectorD(0.847783, 0.847783,       880384, 134009,
40.6000,        1718.06,        41.4495,        34.2791,        22.9309,        78.0000,        0.00000,
391.000,        0.00000,        -399.290,       -396.934,20.4396,       1.10686,        22.9566,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------------------
[info] | forwardSelAll: (l = 0) INITIAL variable (0, x0) => cols = LinkedHashSet(0) |
[info] ----------------------------------------------------------------------------
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 0: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.896841, rSqBar -> 0.896576, sst -> 842741.346154, sse -> 86936.595682, sde ->
32.717474, mse0 -> 1114.571740, rmse -> 33.385202, mae -> 27.565097, smape -> 18.735411, m -> 78.000000, dfm
-> 1.000000, df -> 390.000000, fStat -> 3390.561252, aic -> -380.711028, bic -> -375.997610, mape ->
16.870202, mase -> 1.113833, smapeC -> 18.786693, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 0: qof = VectorD(0.896841, 0.896576,       842741, 86936.6,
32.7175,        1114.57,        33.3852,        27.5651,        18.7354,        78.0000,        1.00000,
390.000,        3390.56,        -380.711,       -375.998,       16.8702,        1.11383,        18.7867,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 1: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.874055, rSqBar -> 0.873732, sst -> 723406.717949, sse -> 91109.613941, sde ->
31.860328, mse0 -> 1168.071974, rmse -> 34.177068, mae -> 28.907503, smape -> 21.011489, m -> 78.000000, dfm
-> 1.000000, df -> 390.000000, fStat -> 2706.584518, aic -> -382.864500, bic -> -378.151082, mape ->
18.809406, mase -> 1.105439, smapeC -> 21.062771, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 1: qof = VectorD(0.874055, 0.873732,       723407, 91109.6,
31.8603,        1168.07,        34.1771,        28.9075,        21.0115,        78.0000,        1.00000,
390.000,        2706.58,        -382.864,       -378.151,       18.8094,        1.10544,        21.0628,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 2: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.880702, rSqBar -> 0.880396, sst -> 981947.294872, sse -> 117144.398967, sde ->
35.161066, mse0 -> 1501.851269, rmse -> 38.753726, mae -> 30.395633, smape -> 22.557026, m -> 78.000000, dfm
-> 1.000000, df -> 390.000000, fStat -> 2879.122966, aic -> -396.299665, bic -> -391.586248, mape ->
20.070985, mase -> 1.096371, smapeC -> 22.608308, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
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pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 2: qof = VectorD(0.880702, 0.880396,       981947, 117144,
35.1611,        1501.85,        38.7537,        30.3956,        22.5570,        78.0000,        1.00000,
390.000,        2879.12,        -396.300,       -391.586,20.0710,        1.09637,        22.6083,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ---------------------------------------------------------------
[info] | crossValidate: fold 3: train-test splits sizes = (314, 78) |
[info] ---------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.920293, rSqBar -> 0.920089, sst -> 811184.708333, sse -> 64656.899769, sde ->
28.202770, mse0 -> 828.934612, rmse -> 28.791225, mae -> 25.541167, smape -> 18.387402, m -> 78.000000, dfm
-> 1.000000, df -> 390.000000, fStat -> 4502.935439, aic -> -369.213664, bic -> -364.500246, mape ->
16.816254, mase -> 1.088702, smapeC -> 18.438684, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 3: qof = VectorD(0.920293, 0.920089,       811185, 64656.9,
28.2028,        828.935,        28.7912,        25.5412,        18.3874,        78.0000,        1.00000,
390.000,        4502.94,        -369.214,       -364.500,        16.8163,        1.08870,        18.4387,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ---------------------------------------------------------------
[info] | crossValidate: fold 4: train-test splits sizes = (314, 78) |
[info] ---------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.929620, rSqBar -> 0.929439, sst -> 880383.794872, sse -> 61961.674620, sde ->
26.991971, mse0 -> 794.380444, rmse -> 28.184756, mae -> 23.490604, smape -> 18.587401, m -> 78.000000, dfm
-> 1.000000, df -> 390.000000, fStat -> 5151.323441, aic -> -367.822801, bic -> -363.109384, mape ->
16.399328, mase -> 1.091506, smapeC -> 18.638683, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 4: qof = VectorD(0.929620, 0.929439,       880384, 61961.7,
26.9920,        794.380,        28.1848,        23.4906,        18.5874,        78.0000,        1.00000,
390.000,        5151.32,        -367.823,       -363.109,        16.3993,        1.09151,        18.6387,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ---------------------------------------------------------------------------------------------------
[info] | forwardSelAll: (l = 1) ADD variable (2, x2) => cols = LinkedHashSet(0, 2) @ 0.9012388808919509 |
[info] ---------------------------------------------------------------------------------------------------
[info] ---------------------------------------------------------------
[info] | crossValidate: fold 0: train-test splits sizes = (314, 78) |
[info] ---------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.911927, rSqBar -> 0.911474, sst -> 842741.346154, sse -> 74223.062282, sde ->
30.304061, mse0 -> 951.577722, rmse -> 30.847653, mae -> 24.598643, smape -> 16.543146, m -> 78.000000, dfm
-> 2.000000, df -> 389.000000, fStat -> 2013.886272, aic -> -372.797724, bic -> -365.727597, mape ->
15.107739, mase -> 1.100077, smapeC -> 16.620069, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 0: qof = VectorD(0.911927, 0.911474,       842741, 74223.1,
30.3041,        951.578,        30.8477,        24.5986,        16.5431,        78.0000,        2.00000,
389.000,        2013.89,        -372.798,       -365.728,        15.1077,        1.10008,        16.6201,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ---------------------------------------------------------------
[info] | crossValidate: fold 1: train-test splits sizes = (314, 78) |
[info] ---------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.884226, rSqBar -> 0.883630, sst -> 723406.717949, sse -> 83751.978397, sde ->
30.455377, mse0 -> 1073.743313, rmse -> 32.768023, mae -> 27.479179, smape -> 19.383842, m -> 78.000000, dfm
-> 2.000000, df -> 389.000000, fStat -> 1485.491438, aic -> -378.778206, bic -> -371.708079, mape ->
17.519822, mase -> 1.105838, smapeC -> 19.460765, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 1: qof = VectorD(0.884226, 0.883630,       723407, 83752.0,
30.4554,        1073.74,        32.7680,        27.4792,        19.3838,        78.0000,        2.00000,
389.000,        1485.49,        -378.778,       -371.708,        17.5198,        1.10584,        19.4608,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ---------------------------------------------------------------
[info] | crossValidate: fold 2: train-test splits sizes = (314, 78) |
[info] ---------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.911169, rSqBar -> 0.910712, sst -> 981947.294872, sse -> 87227.645689, sde ->
30.334404, mse0 -> 1118.303150, rmse -> 33.441040, mae -> 27.343351, smape -> 20.364218, m -> 78.000000, dfm
-> 2.000000, df -> 389.000000, fStat -> 1995.043778, aic -> -380.959583, bic -> -373.889457, mape ->
18.207480, mase -> 1.077956, smapeC -> 20.441141, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 2: qof = VectorD(0.911169, 0.910712,       981947, 87227.6,
30.3344,        1118.30,        33.4410,        27.3434,        20.3642,        78.0000,        2.00000,
389.000,        1995.04,        -380.960,       -373.889,        18.2075,        1.07796,        20.4411,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ---------------------------------------------------------------
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[info] | crossValidate: fold 3: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.933757, rSqBar -> 0.933416, sst -> 811184.708333, sse -> 53735.574630, sde ->
26.230343, mse0 -> 688.917623, rmse -> 26.247240, mae -> 22.057085, smape -> 14.849046, m -> 78.000000, dfm
-> 2.000000, df -> 389.000000, fStat -> 2741.644758, aic -> -359.939488, bic -> -352.869361, mape ->
14.160957, mase -> 1.066102, smapeC -> 14.925969, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 3: qof = VectorD(0.933757, 0.933416,       811185, 53735.6,
26.2303,        688.918,        26.2472,        22.0571,        14.8490,        78.0000,        2.00000,
389.000,        2741.64,        -359.939,       -352.869,        14.1610,        1.06610,        14.9260,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 4: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.943593, rSqBar -> 0.943303, sst -> 880383.794872, sse -> 49660.166550, sde ->
23.159956, mse0 -> 636.668802, rmse -> 25.232297, mae -> 21.712312, smape -> 17.956064, m -> 78.000000, dfm
-> 2.000000, df -> 389.000000, fStat -> 3253.628752, aic -> -357.381704, bic -> -350.311578, mape ->
15.813416, mase -> 1.079203, smapeC -> 18.032987, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 4: qof = VectorD(0.943593, 0.943303,       880384, 49660.2,
23.1600,        636.669,        25.2323,        21.7123,        17.9561,        78.0000,        2.00000,
389.000,        3253.63,        -357.382,       -350.312,        15.8134,        1.07920,        18.0330,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------------------------------------------
[info] | forwardSelAll: (l = 2) ADD variable (1, x1) => cols = LinkedHashSet(0, 2, 1) @ 0.9186837278359002 |
[info] ----------------------------------------------------------------------------------------------------
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 0: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.938578, rSqBar -> 0.938103, sst -> 842741.346154, sse -> 51762.820698, sde ->
25.903606, mse0 -> 663.625906, rmse -> 25.760938, mae -> 18.896442, smape -> 10.703619, m -> 78.000000, dfm
-> 3.000000, df -> 388.000000, fStat -> 1976.319836, aic -> -356.172599, bic -> -346.745764, mape ->
10.673790, mase -> 1.009197, smapeC -> 10.806183, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 0: qof = VectorD(0.938578, 0.938103,       842741, 51762.8,
25.9036,        663.626,        25.7609,        18.8964,        10.7036,        78.0000,        3.00000,
388.000,        1976.32,        -356.173,       -346.746,        10.6738,        1.00920,        10.8062,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 1: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.914622, rSqBar -> 0.913961, sst -> 723406.717949, sse -> 61763.329578, sde ->
28.098726, mse0 -> 791.837559, rmse -> 28.139608, mae -> 20.599200, smape -> 11.419868, m -> 78.000000, dfm
-> 3.000000, df -> 388.000000, fStat -> 1385.491124, aic -> -364.213883, bic -> -354.787048, mape ->
11.311565, mase -> 0.997379, smapeC -> 11.522432, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 1: qof = VectorD(0.914622, 0.913961,       723407, 61763.3,
28.0987,        791.838,        28.1396,        20.5992,        11.4199,        78.0000,        3.00000,
388.000,        1385.49,        -364.214,       -354.787,        11.3116,        0.997379,       11.5224,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 2: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.935768, rSqBar -> 0.935271, sst -> 981947.294872, sse -> 63072.897623, sde ->
28.174720, mse0 -> 808.626893, rmse -> 28.436366, mae -> 20.461106, smape -> 10.989688, m -> 78.000000, dfm
-> 3.000000, df -> 388.000000, fStat -> 1884.186286, aic -> -365.266891, bic -> -355.840055, mape ->
10.981703, mase -> 0.993184, smapeC -> 11.092252, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 2: qof = VectorD(0.935768, 0.935271,       981947, 63072.9,
28.1747,        808.627,        28.4364,        20.4611,        10.9897,        78.0000,        3.00000,
388.000,        1884.19,        -365.267,       -355.840,        10.9817,        0.993184,       11.0923,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 3: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.948464, rSqBar -> 0.948066, sst -> 811184.708333, sse -> 41804.877798, sde ->
22.858562, mse0 -> 535.959972, rmse -> 23.150809, mae -> 17.124220, smape -> 9.670710, m -> 78.000000, dfm -
> 3.000000, df -> 388.000000, fStat -> 2380.259513, aic -> -348.165541, bic -> -338.738706, mape ->
```

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10.173250, mase -> 0.996727, smapeC -> 9.773274, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 3: qof = VectorD(0.948464, 0.948066,       811185, 41804.9,
22.8586,        535.960,        23.1508,        17.1242,        9.67071,        78.0000,        3.00000,
388.000,        2380.26,        -348.166,       -338.739,        10.1733,        0.996727,       9.77327,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 4: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.964762, rSqBar -> 0.964490, sst -> 880383.794872, sse -> 31022.700121, sde ->
20.030609, mse0 -> 397.726925, rmse -> 19.943092, mae -> 15.453099, smape -> 8.778333, m -> 78.000000, dfm -
> 3.000000, df -> 388.000000, fStat -> 3540.978095, aic -> -339.495726, bic -> -330.068891, mape ->
8.858528, mase -> 0.966447, smapeC -> 8.880897, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 4: qof = VectorD(0.964762, 0.964490,       880384, 31022.7,
20.0306,        397.727,        19.9431,        15.4531,        8.77833,        78.0000,        3.00000,
388.000,        3540.98,        -339.496,       -330.069,        8.85853,        0.966447,       8.88090,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------------------------------------------
---
[info] | forwardSelAll: (l = 3) ADD variable (3, x3) => cols = LinkedHashSet(0, 2, 1, 3) @
0.9424662931713765 |
[info] ----------------------------------------------------------------------------------------------------
---
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 0: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.941142, rSqBar -> 0.940534, sst -> 842741.346154, sse -> 49601.903509, sde ->
25.372126, mse0 -> 635.921840, rmse -> 25.217491, mae -> 17.605364, smape -> 9.537925, m -> 78.000000, dfm -
> 4.000000, df -> 387.000000, fStat -> 1547.042263, aic -> -352.504646, bic -> -340.721101, mape ->
9.537003, mase -> 1.009850, smapeC -> 9.666130, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 0: qof = VectorD(0.941142, 0.940534,       842741, 49601.9,
25.3721,        635.922,        25.2175,        17.6054,        9.53792,        78.0000,        4.00000,
387.000,        1547.04,        -352.505,       -340.721,        9.53700,        1.00985,        9.66613,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 1: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.916527, rSqBar -> 0.915664, sst -> 723406.717949, sse -> 60385.157175, sde ->
27.789149, mse0 -> 774.168682, rmse -> 27.823887, mae -> 20.821070, smape -> 12.192181, m -> 78.000000, dfm
-> 4.000000, df -> 387.000000, fStat -> 1062.303039, aic -> -361.535988, bic -> -349.752443, mape ->
12.049679, mase -> 1.004992, smapeC -> 12.320386, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 1: qof = VectorD(0.916527, 0.915664,       723407, 60385.2,
27.7891,        774.169,        27.8239,        20.8211,        12.1922,        78.0000,        4.00000,
387.000,        1062.30,        -361.536,       -349.752,        12.0497,        1.00499,        12.3204,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 2: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.939306, rSqBar -> 0.938678, sst -> 981947.294872, sse -> 59598.659543, sde ->
27.353643, mse0 -> 764.085379, rmse -> 27.642094, mae -> 20.351033, smape -> 11.245368, m -> 78.000000, dfm
-> 4.000000, df -> 387.000000, fStat -> 1497.302643, aic -> -360.877269, bic -> -349.093725, mape ->
11.199130, mase -> 1.001813, smapeC -> 11.373574, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 2: qof = VectorD(0.939306, 0.938678,       981947, 59598.7,
27.3536,        764.085,        27.6421,        20.3510,        11.2454,        78.0000,        4.00000,
387.000,        1497.30,        -360.877,       -349.094,        11.1991,        1.00181,        11.3736,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 3: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.951608, rSqBar -> 0.951108, sst -> 811184.708333, sse -> 39254.619847, sde ->
22.369901, mse0 -> 503.264357, rmse -> 22.433554, mae -> 16.844555, smape -> 9.691792, m -> 78.000000, dfm -
> 4.000000, df -> 387.000000, fStat -> 1902.559147, aic -> -343.838443, bic -> -332.054899, mape ->
9.958163, mase -> 1.009557, smapeC -> 9.819997, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 3: qof = VectorD(0.951608, 0.951108,       811185, 39254.6,
```

```
22.3699,        503.264,        22.4336,        16.8446,        9.69179,        78.0000,        4.00000,
387.000,        1902.56,        -343.838,       -332.055,       9.95816,        1.00956,        9.82000,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 4: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.964660, rSqBar -> 0.964295, sst -> 880383.794872, sse -> 31112.708696, sde ->
20.045441, mse0 -> 398.880881, rmse -> 19.972002, mae -> 15.922825, smape -> 9.517474, m -> 78.000000, dfm -
> 4.000000, df -> 387.000000, fStat -> 2640.945807, aic -> -337.019315, bic -> -325.235771, mape ->
9.493010, mase -> 0.967569, smapeC -> 9.645680, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 4: qof = VectorD(0.964660, 0.964295,       880384, 31112.7,
20.0454,        398.881,        19.9720,        15.9228,        9.51747,        78.0000,        4.00000,
387.000,        2640.95,        -337.019,       -325.236,       9.49301,        0.967569,       9.64568,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------------------------------------------
------
[info] | forwardSelAll: (l = 4) ADD variable (5, x5) => cols = LinkedHashSet(0, 2, 1, 3, 5) @
0.9445524176505258 |
[info] ----------------------------------------------------------------------------------------------------
------
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 0: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.942957, rSqBar -> 0.942218, sst -> 842741.346154, sse -> 48072.430145, sde ->
24.981931, mse0 -> 616.313207, rmse -> 24.825656, mae -> 17.328262, smape -> 9.330545, m -> 78.000000, dfm -
> 5.000000, df -> 386.000000, fStat -> 1276.166820, aic -> -349.239472, bic -> -335.099219, mape ->
9.352022, mase -> 1.009684, smapeC -> 9.484391, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 0: qof = VectorD(0.942957, 0.942218,       842741, 48072.4,
24.9819,        616.313,        24.8257,        17.3283,        9.33055,        78.0000,        5.00000,
386.000,        1276.17,        -349.239,       -335.099,       9.35202,        1.00968,        9.48439,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 1: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.917809, rSqBar -> 0.916744, sst -> 723406.717949, sse -> 59457.769972, sde ->
27.661838, mse0 -> 762.279102, rmse -> 27.609402, mae -> 20.448087, smape -> 11.649669, m -> 78.000000, dfm
-> 5.000000, df -> 386.000000, fStat -> 862.071665, aic -> -358.877619, bic -> -344.737366, mape ->
11.608691, mase -> 1.007804, smapeC -> 11.803516, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 1: qof = VectorD(0.917809, 0.916744,       723407, 59457.8,
27.6618,        762.279,        27.6094,        20.4481,        11.6497,        78.0000,        5.00000,
386.000,        862.072,        -358.878,       -344.737,       11.6087,        1.00780,        11.8035,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 2: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.938026, rSqBar -> 0.937223, sst -> 981947.294872, sse -> 60854.967200, sde ->
27.511421, mse0 -> 780.191887, rmse -> 27.931915, mae -> 19.922121, smape -> 10.658154, m -> 78.000000, dfm
-> 5.000000, df -> 386.000000, fStat -> 1168.488473, aic -> -360.060403, bic -> -345.920150, mape ->
10.517492, mase -> 1.002315, smapeC -> 10.812000, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 2: qof = VectorD(0.938026, 0.937223,       981947, 60855.0,
27.5114,        780.192,        27.9319,        19.9221,        10.6582,        78.0000,        5.00000,
386.000,        1168.49,        -360.060,       -345.920,       10.5175,        1.00231,        10.8120,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------
[info] | crossValidate: fold 3: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.949630, rSqBar -> 0.948978, sst -> 811184.708333, sse -> 40859.387831, sde ->
22.790194, mse0 -> 523.838306, rmse -> 22.887514, mae -> 16.870997, smape -> 9.473818, m -> 78.000000, dfm -
> 5.000000, df -> 386.000000, fStat -> 1455.457801, aic -> -343.133342, bic -> -328.993089, mape ->
9.816001, mase -> 1.010998, smapeC -> 9.627664, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 3: qof = VectorD(0.949630, 0.948978,       811185, 40859.4,
22.7902,        523.838,        22.8875,        16.8710,        9.47382,        78.0000,        5.00000,
386.000,        1455.46,        -343.133,       -328.993,       9.81600,        1.01100,        9.62766,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
```

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[info] ----------------------------------------------------------------
[info] | crossValidate: fold 4: train-test splits sizes = (314, 78) |
[info] ----------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.965575, rSqBar -> 0.965129, sst -> 880383.794872, sse -> 30307.155786, sde ->
19.777560, mse0 -> 388.553279, rmse -> 19.711755, mae -> 15.610100, smape -> 9.088208, m -> 78.000000, dfm -
> 5.000000, df -> 386.000000, fStat -> 2165.360452, aic -> -334.200454, bic -> -320.060201, mape ->
9.062984, mase -> 0.968849, smapeC -> 9.242055, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 4: qof = VectorD(0.965575, 0.965129,       880384, 30307.2,
19.7776,        388.553,        19.7118,        15.6101,        9.08821,        78.0000,        5.00000,
386.000,        2165.36,        -334.200,       -320.060,        9.06298,        0.968849,       9.24205,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ----------------------------------------------------------------------------------------------------
--------
[info] | forwardSelAll: (l = 5) ADD variable (4, x4) => cols = LinkedHashSet(0, 2, 1, 3, 5, 4) @
0.945043743669959 |
[info] ----------------------------------------------------------------------------------------------------
--------
[info] Run + title
[info] x-axis: minX = 1.0, maxX = 6.0
[info] y-axis: minY = 9.0, maxY = 95.0
[info] rSq =
[info] MatrixD (82.9696,        82.9696,        27.9981,        82.6236,
[info]          90.1491,        90.1239,        19.8345,        90.0302,
[info]          91.9100,        91.8684,        17.7950,        91.6934,
[info]          94.2908,        94.2466,        10.2748,        94.0439,
[info]          94.5120,        94.4552,        10.3744,        94.2649,
[info]          94.5747,        94.5044,        9.98263,        94.2799)
[info] ----------------------
[info] | Feature Importance |
[info] ----------------------
[info] col = 0,          cylinders,      importance = -0.0
[info] col = 2,          weight,         importance = 0.9999999999999999
[info] col = 1,          horsepower,     importance = 0.245255961330995
[info] col = 3,          acceleration,   importance = 0.3316107507869982
[info] col = 5,          origin,         importance = 0.030808857140630013
[info] col = 4,          model_year,     importance = 0.008731123323153591
[info] %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
[info] %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
[info] ----------------------------
[info] | Backward Elimination Test |
[info] ----------------------------
[info] ----------------------------------------------------------------------------------------------------
--------------
[info] | backwardElimAll: (l = 0) INITIAL variables (all) => cols = LinkedHashSet(0, 1, 2, 3, 4, 5) @
0.9450437436699589 |
[info] ----------------------------------------------------------------------------------------------------
--------------
[info] ----------------------------------------------------------------------------------------------------
-----------
[info] | backwardElimAll: (l = 1) REMOVE variable (4, x4) => cols = LinkedHashSet(0, 1, 2, 3, 5) @
0.9445524176505258 |
[info] ----------------------------------------------------------------------------------------------------
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[info] ----------------------------------------------------------------------------------------------------
--------
[info] | backwardElimAll: (l = 2) REMOVE variable (5, x5) => cols = LinkedHashSet(0, 1, 2, 3) @
0.9424662931713765 |
[info] ----------------------------------------------------------------------------------------------------
--------
[info] ----------------------------------------------------------------------------------------------------
-----
[info] | backwardElimAll: (l = 3) REMOVE variable (2, x2) => cols = LinkedHashSet(0, 1, 3) @
0.9350700464972614 |
[info] ----------------------------------------------------------------------------------------------------
-----
[info] ----------------------------------------------------------------------------------------------------
[info] | backwardElimAll: (l = 4) REMOVE variable (3, x3) => cols = LinkedHashSet(0, 1) @ 0.89267727884989 |
[info] ----------------------------------------------------------------------------------------------------
[info] k = 6
[info] Run + title
[info] x-axis: minX = 0.0, maxX = 6.0
[info] y-axis: minY = -0.0, maxY = 95.0
```

```
[info] rSq =
[info] MatrixD (82.9696,        82.9696,        27.9981,        -0.00000,
[info]          89.2952,        89.2677,        19.6595,        -0.00000,
[info]          93.5402,        93.5070,        11.1885,        -0.00000,
[info]          94.2908,        94.2466,        10.2748,        -0.00000,
[info]          94.5120,        94.4552,        10.3744,        -0.00000,
[info]          94.5747,        94.5044,        9.98263,        -0.00000)
[info] ----------------------
[info] | Feature Importance |
[info] ----------------------
[info] col = 0,          cylinders,      importance = -0.0
[info] col = 1,          horsepower,     importance = 1.0
[info] col = 3,          acceleration,   importance = 0.6710943810552373
[info] col = 2,          weight,         importance = 0.1186546591328357
[info] col = 5,          origin,         importance = 0.034968156834683704
[info] col = 4,          model_year,     importance = 0.009909854439368114
[info] %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
[info] %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
[info] --------------------
[info] | Stepwise FS Test |
[info] --------------------
[info] ------------------------------------------------------------------------------
[info] | stepwiseSelAll: (l = 0) INITIAL variable (0, x0) => cols = LinkedHashSet(0) |
[info] ------------------------------------------------------------------------------
[info] ERROR @ Predictor.backwardElim: could not find a variable x_j to eliminate: best.col = -1
[info] DEBUG @ Predictor.stepwiseSelAll: bestf = BestStep(2,VectorD(0.901491,   0.901239,       4.28159e+06,
421774, 31.1670,        1075.95,        32.8017,        27.1653,        19.8345,        392.000,
1.00000,        390.000,        3569.05,        -1921.61,-1913.66,       17.7830,        1.16540,
19.8447,        -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,
-1.00000),scalation.modeling.Regression@2e1d27ba), bestb = BestStep(-1,null,null)
[info] ------------------------------------------------------------
[info] | crossValidate: fold 0: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.896841, rSqBar -> 0.896576, sst -> 842741.346154, sse -> 86936.595682, sde ->
32.717474, mse0 -> 1114.571740, rmse -> 33.385202, mae -> 27.565097, smape -> 18.735411, m -> 78.000000, dfm
-> 1.000000, df -> 390.000000, fStat -> 3390.561252, aic -> -380.711028, bic -> -375.997610, mape ->
16.870202, mase -> 1.113833, smapeC -> 18.786693, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 0: qof = VectorD(0.896841, 0.896576,       842741, 86936.6,
32.7175,        1114.57,        33.3852,        27.5651,        18.7354,        78.0000,        1.00000,
390.000,        3390.56,        -380.711,       -375.998,       16.8702,        1.11383,        18.7867,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ------------------------------------------------------------
[info] | crossValidate: fold 1: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.874055, rSqBar -> 0.873732, sst -> 723406.717949, sse -> 91109.613941, sde ->
31.860328, mse0 -> 1168.071974, rmse -> 34.177068, mae -> 28.907503, smape -> 21.011489, m -> 78.000000, dfm
-> 1.000000, df -> 390.000000, fStat -> 2706.584518, aic -> -382.864500, bic -> -378.151082, mape ->
18.809406, mase -> 1.105439, smapeC -> 21.062771, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 1: qof = VectorD(0.874055, 0.873732,       723407, 91109.6,
31.8603,        1168.07,        34.1771,        28.9075,        21.0115,        78.0000,        1.00000,
390.000,        2706.58,        -382.864,       -378.151,       18.8094,        1.10544,        21.0628,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ------------------------------------------------------------
[info] | crossValidate: fold 2: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.880702, rSqBar -> 0.880396, sst -> 981947.294872, sse -> 117144.398967, sde ->
35.161066, mse0 -> 1501.851269, rmse -> 38.753726, mae -> 30.395633, smape -> 22.557026, m -> 78.000000, dfm
-> 1.000000, df -> 390.000000, fStat -> 2879.122966, aic -> -396.299665, bic -> -391.586248, mape ->
20.070985, mase -> 1.096371, smapeC -> 22.608308, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 2: qof = VectorD(0.880702, 0.880396,       981947, 117144,
35.1611,        1501.85,        38.7537,        30.3956,        22.5570,        78.0000,        1.00000,
390.000,        2879.12,        -396.300,       -391.586,20.0710,        1.09637,        22.6083,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ------------------------------------------------------------
[info] | crossValidate: fold 3: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.920293, rSqBar -> 0.920089, sst -> 811184.708333, sse -> 64656.899769, sde ->
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28.202770, mse0 -> 828.934612, rmse -> 28.791225, mae -> 25.541167, smape -> 18.387402, m -> 78.000000, dfm
-> 1.000000, df -> 390.000000, fStat -> 4502.935439, aic -> -369.213664, bic -> -364.500246, mape ->
16.816254, mase -> 1.088702, smapeC -> 18.438684, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 3: qof = VectorD(0.920293, 0.920089,       811185, 64656.9,
28.2028,        828.935,        28.7912,        25.5412,        18.3874,        78.0000,        1.00000,
390.000,        4502.94,        -369.214,       -364.500,        16.8163,        1.08870,        18.4387,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ------------------------------------------------------------------
[info] | crossValidate: fold 4: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.929620, rSqBar -> 0.929439, sst -> 880383.794872, sse -> 61961.674620, sde ->
26.991971, mse0 -> 794.380444, rmse -> 28.184756, mae -> 23.490604, smape -> 18.587401, m -> 78.000000, dfm
-> 1.000000, df -> 390.000000, fStat -> 5151.323441, aic -> -367.822801, bic -> -363.109384, mape ->
16.399328, mase -> 1.091506, smapeC -> 18.638683, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 4: qof = VectorD(0.929620, 0.929439,       880384, 61961.7,
26.9920,        794.380,        28.1848,        23.4906,        18.5874,        78.0000,        1.00000,
390.000,        5151.32,        -367.823,       -363.109,        16.3993,        1.09151,        18.6387,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] stepwiseSelAll: (l = 1) ADD variable BestStep(2,VectorD(0.901491,        0.901239,       4.28159e+06,
421774, 31.1670,        1075.95,        32.8017,        27.1653,        19.8345,        392.000,
1.00000,        390.000,        3569.05,        -1921.61,-1913.66,       17.7830,        1.16540,
19.8447,        -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,
-1.00000),scalation.modeling.Regression@2e1d27ba)
[info] ------------------------------------------------------------------------------------------------
[info] | stepwiseSelAll: (l = 1) ADD variable (2, x2) => cols = LinkedHashSet(0, 2) @ 0.9012388808919509 |
[info] ------------------------------------------------------------------------------------------------
[info] REPORT
[info]     ---------------------------------------------------------------------------
[info]     modelName  mn  = Regression @dfm = 1.0
[info]     ---------------------------------------------------------------------------
[info]     hparameter hp  = HyperParameter(factorization -> (Fac_QR,Fac_QR))
[info]     ---------------------------------------------------------------------------
[info]     features   fn  = Array(x0, x2)
[info]     ---------------------------------------------------------------------------
[info]     parameter  b   = VectorD(180.076,    245.642)
[info]     ---------------------------------------------------------------------------
[info]     fitMap     qof = LinkedHashMap(rSq -> 0.901491, rSqBar -> 0.901239, sst -> 4281593.713648, sse ->
421773.516172, sde -> 31.167010, mse0 -> 1075.952847, rmse -> 32.801720, mae -> 27.165252, smape ->
19.834497, m -> 392.000000, dfm -> 1.000000, df -> 390.000000, fStat -> 3569.047888, aic -> -1921.607295,
bic -> -1913.664771, mape -> 17.783018, mase -> 1.165397, smapeC -> 19.844702, picp -> -1.000000, pinc ->
-1.000000, ace -> -1.000000, pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info]     ---------------------------------------------------------------------------
[info]
[info] DEBUG @ Predictor.stepwiseSelAll: bestf = BestStep(1,VectorD(0.919100,   0.918684,       4.28159e+06,
346382, 28.2614,        883.628,        29.7259,        24.5712,        17.7950,        392.000,
2.00000,        389.000,        2209.69,        -1880.98,-1869.07,       16.1330,        1.14846,
17.8103,        -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,
-1.00000),scalation.modeling.Regression@5939a379), bestb = BestStep(2,VectorD(0.829696, 0.829696,
4.28159e+06,    729171, 40.0331, 1860.13,       43.1292,        36.7321,        27.9981,        392.000,
0.00000,        391.000,        0.00000,        -2032.16,       -2028.19,       23.5068,        1.30256,
28.0032,        -1.00000,       -1.00000,       -1.00000,       -1.00000,-1.00000,
-1.00000),scalation.modeling.Regression@355ce81c)
[info] ------------------------------------------------------------
[info] | crossValidate: fold 0: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.911927, rSqBar -> 0.911474, sst -> 842741.346154, sse -> 74223.062282, sde ->
30.304061, mse0 -> 951.577722, rmse -> 30.847653, mae -> 24.598643, smape -> 16.543146, m -> 78.000000, dfm
-> 2.000000, df -> 389.000000, fStat -> 2013.886272, aic -> -372.797724, bic -> -365.727597, mape ->
15.107739, mase -> 1.100077, smapeC -> 16.620069, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 0: qof = VectorD(0.911927, 0.911474,       842741, 74223.1,
30.3041,        951.578,        30.8477,        24.5986,        16.5431,        78.0000,        2.00000,
389.000,        2013.89,        -372.798,       -365.728,        15.1077,        1.10008,        16.6201,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ------------------------------------------------------------
[info] | crossValidate: fold 1: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.884226, rSqBar -> 0.883630, sst -> 723406.717949, sse -> 83751.978397, sde ->
30.455377, mse0 -> 1073.743313, rmse -> 32.768023, mae -> 27.479179, smape -> 19.383842, m -> 78.000000, dfm
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-> 2.000000, df -> 389.000000, fStat -> 1485.491438, aic -> -378.778206, bic -> -371.708079, mape ->
17.519822, mase -> 1.105838, smapeC -> 19.460765, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 1: qof = VectorD(0.884226, 0.883630,       723407, 83752.0,
30.4554,        1073.74,        32.7680,        27.4792,        19.3838,        78.0000,        2.00000,
389.000,        1485.49,        -378.778,       -371.708,        17.5198,        1.10584,        19.4608,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ---------------------------------------------------------------
[info] | crossValidate: fold 2: train-test splits sizes = (314, 78) |
[info] ---------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.911169, rSqBar -> 0.910712, sst -> 981947.294872, sse -> 87227.645689, sde ->
30.334404, mse0 -> 1118.303150, rmse -> 33.441040, mae -> 27.343351, smape -> 20.364218, m -> 78.000000, dfm
-> 2.000000, df -> 389.000000, fStat -> 1995.043778, aic -> -380.959583, bic -> -373.889457, mape ->
18.207480, mase -> 1.077956, smapeC -> 20.441141, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 2: qof = VectorD(0.911169, 0.910712,       981947, 87227.6,
30.3344,        1118.30,        33.4410,        27.3434,        20.3642,        78.0000,        2.00000,
389.000,        1995.04,        -380.960,       -373.889,        18.2075,        1.07796,        20.4411,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ---------------------------------------------------------------
[info] | crossValidate: fold 3: train-test splits sizes = (314, 78) |
[info] ---------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.933757, rSqBar -> 0.933416, sst -> 811184.708333, sse -> 53735.574630, sde ->
26.230343, mse0 -> 688.917623, rmse -> 26.247240, mae -> 22.057085, smape -> 14.849046, m -> 78.000000, dfm
-> 2.000000, df -> 389.000000, fStat -> 2741.644758, aic -> -359.939488, bic -> -352.869361, mape ->
14.160957, mase -> 1.066102, smapeC -> 14.925969, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 3: qof = VectorD(0.933757, 0.933416,       811185, 53735.6,
26.2303,        688.918,        26.2472,        22.0571,        14.8490,        78.0000,        2.00000,
389.000,        2741.64,        -359.939,       -352.869,        14.1610,        1.06610,        14.9260,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ---------------------------------------------------------------
[info] | crossValidate: fold 4: train-test splits sizes = (314, 78) |
[info] ---------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.943593, rSqBar -> 0.943303, sst -> 880383.794872, sse -> 49660.166550, sde ->
23.159956, mse0 -> 636.668802, rmse -> 25.232297, mae -> 21.712312, smape -> 17.956064, m -> 78.000000, dfm
-> 2.000000, df -> 389.000000, fStat -> 3253.628752, aic -> -357.381704, bic -> -350.311578, mape ->
15.813416, mase -> 1.079203, smapeC -> 18.032987, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 4: qof = VectorD(0.943593, 0.943303,       880384, 49660.2,
23.1600,        636.669,        25.2323,        21.7123,        17.9561,        78.0000,        2.00000,
389.000,        3253.63,        -357.382,       -350.312,        15.8134,        1.07920,        18.0330,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] stepwiseSelAll: (l = 2) ADD variable BestStep(1,VectorD(0.919100,        0.918684,       4.28159e+06,
346382, 28.2614,        883.628,        29.7259,        24.5712,        17.7950,        392.000,
2.00000,        389.000,        2209.69,        -1880.98,-1869.07,       16.1330,        1.14846,
17.8103,        -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,
-1.00000),scalation.modeling.Regression@5939a379)
[info] ------------------------------------------------------------------------------------------------------
-
[info] | stepwiseSelAll: (l = 2) ADD variable (1, x1) => cols = LinkedHashSet(0, 2, 1) @ 0.9186837278359002
|
[info] ------------------------------------------------------------------------------------------------------
-
[info] REPORT
[info]     ------------------------------------------------------------------------
[info]     modelName  mn  = Regression @dfm = 2.0
[info]     ------------------------------------------------------------------------
[info]     hparameter hp  = HyperParameter(factorization -> (Fac_QR,Fac_QR))
[info]     ------------------------------------------------------------------------
[info]     features   fn  = Array(x0, x2, x1)
[info]     ------------------------------------------------------------------------
[info]     parameter  b   = VectorD(150.957,    172.792,        137.217)
[info]     ------------------------------------------------------------------------
[info]     fitMap     qof = LinkedHashMap(rSq -> 0.919100, rSqBar -> 0.918684, sst -> 4281593.713648, sse ->
346382.353578, sde -> 28.261377, mse0 -> 883.628453, rmse -> 29.725889, mae -> 24.571202, smape ->
17.794972, m -> 392.000000, dfm -> 2.000000, df -> 389.000000, fStat -> 2209.692848, aic -> -1880.984180,
bic -> -1869.070395, mape -> 16.132965, mase -> 1.148461, smapeC -> 17.810278, picp -> -1.000000, pinc ->
-1.000000, ace -> -1.000000, pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info]     ------------------------------------------------------------------------
[info]
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[info] DEBUG @ Predictor.stepwiseSelAll: bestf = BestStep(3,VectorD(0.942908,   0.942466,       4.28159e+06,
244446, 24.9682,        623.587,        24.9717,        18.3745,        10.2748,        392.000,
3.00000,        388.000,        2136.01,        -1809.58,-1793.70,       10.3404,        1.01440,
10.2952,        -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,
-1.00000),scalation.modeling.Regression@6a6afff2), bestb = BestStep(1,VectorD(0.901491, 0.901239,
4.28159e+06,    421774, 31.1670, 1075.95,        32.8017,        27.1653,        19.8345,        392.000,
1.00000,        390.000,        3569.05,        -1921.61,       -1913.66,       17.7830,        1.16540,
19.8447,        -1.00000,       -1.00000,       -1.00000,       -1.00000,-1.00000,
-1.00000),scalation.modeling.Regression@503d687a)
[info] -------------------------------------------------------------
[info] | crossValidate: fold 0: train-test splits sizes = (314, 78) |
[info] -------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.938578, rSqBar -> 0.938103, sst -> 842741.346154, sse -> 51762.820698, sde ->
25.903606, mse0 -> 663.625906, rmse -> 25.760938, mae -> 18.896442, smape -> 10.703619, m -> 78.000000, dfm
-> 3.000000, df -> 388.000000, fStat -> 1976.319836, aic -> -356.172599, bic -> -346.745764, mape ->
10.673790, mase -> 1.009197, smapeC -> 10.806183, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 0: qof = VectorD(0.938578, 0.938103,       842741, 51762.8,
25.9036,        663.626,        25.7609,        18.8964,        10.7036,        78.0000,        3.00000,
388.000,        1976.32,        -356.173,       -346.746,        10.6738,        1.00920,        10.8062,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] -------------------------------------------------------------
[info] | crossValidate: fold 1: train-test splits sizes = (314, 78) |
[info] -------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.914622, rSqBar -> 0.913961, sst -> 723406.717949, sse -> 61763.329578, sde ->
28.098726, mse0 -> 791.837559, rmse -> 28.139608, mae -> 20.599200, smape -> 11.419868, m -> 78.000000, dfm
-> 3.000000, df -> 388.000000, fStat -> 1385.491124, aic -> -364.213883, bic -> -354.787048, mape ->
11.311565, mase -> 0.997379, smapeC -> 11.522432, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 1: qof = VectorD(0.914622, 0.913961,       723407, 61763.3,
28.0987,        791.838,        28.1396,        20.5992,        11.4199,        78.0000,        3.00000,
388.000,        1385.49,        -364.214,       -354.787,        11.3116,        0.997379,       11.5224,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] -------------------------------------------------------------
[info] | crossValidate: fold 2: train-test splits sizes = (314, 78) |
[info] -------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.935768, rSqBar -> 0.935271, sst -> 981947.294872, sse -> 63072.897623, sde ->
28.174720, mse0 -> 808.626893, rmse -> 28.436366, mae -> 20.461106, smape -> 10.989688, m -> 78.000000, dfm
-> 3.000000, df -> 388.000000, fStat -> 1884.186286, aic -> -365.266891, bic -> -355.840055, mape ->
10.981703, mase -> 0.993184, smapeC -> 11.092252, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 2: qof = VectorD(0.935768, 0.935271,       981947, 63072.9,
28.1747,        808.627,        28.4364,        20.4611,        10.9897,        78.0000,        3.00000,
388.000,        1884.19,        -365.267,       -355.840,        10.9817,        0.993184,       11.0923,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] -------------------------------------------------------------
[info] | crossValidate: fold 3: train-test splits sizes = (314, 78) |
[info] -------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.948464, rSqBar -> 0.948066, sst -> 811184.708333, sse -> 41804.877798, sde ->
22.858562, mse0 -> 535.959972, rmse -> 23.150809, mae -> 17.124220, smape -> 9.670710, m -> 78.000000, dfm -
> 3.000000, df -> 388.000000, fStat -> 2380.259513, aic -> -348.165541, bic -> -338.738706, mape ->
10.173250, mase -> 0.996727, smapeC -> 9.773274, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 3: qof = VectorD(0.948464, 0.948066,       811185, 41804.9,
22.8586,        535.960,        23.1508,        17.1242,        9.67071,        78.0000,        3.00000,
388.000,        2380.26,        -348.166,       -338.739,        10.1733,        0.996727,       9.77327,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] -------------------------------------------------------------
[info] | crossValidate: fold 4: train-test splits sizes = (314, 78) |
[info] -------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.964762, rSqBar -> 0.964490, sst -> 880383.794872, sse -> 31022.700121, sde ->
20.030609, mse0 -> 397.726925, rmse -> 19.943092, mae -> 15.453099, smape -> 8.778333, m -> 78.000000, dfm -
> 3.000000, df -> 388.000000, fStat -> 3540.978095, aic -> -339.495726, bic -> -330.068891, mape ->
8.858528, mase -> 0.966447, smapeC -> 8.880897, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 4: qof = VectorD(0.964762, 0.964490,       880384, 31022.7,
20.0306,        397.727,        19.9431,        15.4531,        8.77833,        78.0000,        3.00000,
388.000,        3540.98,        -339.496,       -330.069,        8.85853,        0.966447,       8.88090,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
```

```
[info] stepwiseSelAll: (l = 3) ADD variable BestStep(3,VectorD(0.942908,        0.942466,       4.28159e+06,
244446, 24.9682,        623.587,        24.9717,        18.3745,        10.2748,        392.000,
3.00000,        388.000,        2136.01,        -1809.58,-1793.70,       10.3404,        1.01440,
10.2952,        -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,
-1.00000),scalation.modeling.Regression@6a6afff2)
[info] ------------------------------------------------------------------------------------------
----
[info] | stepwiseSelAll: (l = 3) ADD variable (3, x3) => cols = LinkedHashSet(0, 2, 1, 3) @
0.9424662931713765 |
[info] ------------------------------------------------------------------------------------------
----
[info] REPORT
[info]     ---------------------------------------------------------------------------
[info]     modelName  mn   = Regression @dfm = 3.0
[info]     ---------------------------------------------------------------------------
[info]     hparameter hp   = HyperParameter(factorization -> (Fac_QR,Fac_QR))
[info]     ---------------------------------------------------------------------------
[info]     features   fn   = Array(x0, x2, x1, x3)
[info]     ---------------------------------------------------------------------------
[info]     parameter  b    = VectorD(160.480,    100.976,        164.416,        49.9700)
[info]     ---------------------------------------------------------------------------
[info]     fitMap     qof = LinkedHashMap(rSq -> 0.942908, rSqBar -> 0.942466, sst -> 4281593.713648, sse ->
244445.911771, sde -> 24.968243, mse0 -> 623.586510, rmse -> 24.971714, mae -> 18.374520, smape ->
10.274768, m -> 392.000000, dfm -> 3.000000, df -> 388.000000, fStat -> 2136.005379, aic -> -1809.580243,
bic -> -1793.695195, mape -> 10.340419, mase -> 1.014402, smapeC -> 10.295177, picp -> -1.000000, pinc ->
-1.000000, ace -> -1.000000, pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info]     ---------------------------------------------------------------------------
[info]
[info] DEBUG @ Predictor.stepwiseSelAll: bestf = BestStep(5,VectorD(0.945120,   0.944552,       4.28159e+06,
234975, 24.4646,        599.427,        24.4832,        18.1448,        10.3744,        392.000,
4.00000,        387.000,        1666.18,        -1799.84,-1779.98,       10.3678,        1.02540,
10.3999,        -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,
-1.00000),scalation.modeling.Regression@77eca502), bestb = BestStep(2,VectorD(0.935402, 0.935070,
4.28159e+06,    276582, 26.5871, 705.565,        26.5625,        20.1025,        11.1885,        392.000,
2.00000,        389.000,        2816.44,        -1835.79,       -1823.87,       11.4029,        1.01598,
11.2038,        -1.00000,       -1.00000,       -1.00000,       -1.00000,-1.00000,
-1.00000),scalation.modeling.Regression@73ee04c8)
[info] ------------------------------------------------------------
[info] | crossValidate: fold 0: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.941142, rSqBar -> 0.940534, sst -> 842741.346154, sse -> 49601.903509, sde ->
25.372126, mse0 -> 635.921840, rmse -> 25.217491, mae -> 17.605364, smape -> 9.537925, m -> 78.000000, dfm -
> 4.000000, df -> 387.000000, fStat -> 1547.042263, aic -> -352.504646, bic -> -340.721101, mape ->
9.537003, mase -> 1.009850, smapeC -> 9.666130, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 0: qof = VectorD(0.941142, 0.940534,       842741, 49601.9,
25.3721,        635.922,        25.2175,        17.6054,        9.53792,        78.0000,        4.00000,
387.000,        1547.04,        -352.505,       -340.721,        9.53700,        1.00985,        9.66613,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ------------------------------------------------------------
[info] | crossValidate: fold 1: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.916527, rSqBar -> 0.915664, sst -> 723406.717949, sse -> 60385.157175, sde ->
27.789149, mse0 -> 774.168682, rmse -> 27.823887, mae -> 20.821070, smape -> 12.192181, m -> 78.000000, dfm
-> 4.000000, df -> 387.000000, fStat -> 1062.303039, aic -> -361.535988, bic -> -349.752443, mape ->
12.049679, mase -> 1.004992, smapeC -> 12.320386, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 1: qof = VectorD(0.916527, 0.915664,       723407, 60385.2,
27.7891,        774.169,        27.8239,        20.8211,        12.1922,        78.0000,        4.00000,
387.000,        1062.30,        -361.536,       -349.752,        12.0497,        1.00499,        12.3204,
-1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000,       -1.00000)
[info] ------------------------------------------------------------
[info] | crossValidate: fold 2: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.939306, rSqBar -> 0.938678, sst -> 981947.294872, sse -> 59598.659543, sde ->
27.353643, mse0 -> 764.085379, rmse -> 27.642094, mae -> 20.351033, smape -> 11.245368, m -> 78.000000, dfm
-> 4.000000, df -> 387.000000, fStat -> 1497.302643, aic -> -360.877269, bic -> -349.093725, mape ->
11.199130, mase -> 1.001813, smapeC -> 11.373574, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 2: qof = VectorD(0.939306, 0.938678,       981947, 59598.7,
27.3536,        764.085,        27.6421,        20.3510,        11.2454,        78.0000,        4.00000,
```

```
387.000,       1497.30,       -360.877,      -349.094,       11.1991,       1.00181,       11.3736,
-1.00000,      -1.00000,      -1.00000,      -1.00000,      -1.00000,      -1.00000)
[info] ------------------------------------------------------------------
[info] | crossValidate: fold 3: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.951608, rSqBar -> 0.951108, sst -> 811184.708333, sse -> 39254.619847, sde ->
22.369901, mse0 -> 503.264357, rmse -> 22.433554, mae -> 16.844555, smape -> 9.691792, m -> 78.000000, dfm -
> 4.000000, df -> 387.000000, fStat -> 1902.559147, aic -> -343.838443, bic -> -332.054899, mape ->
9.958163, mase -> 1.009557, smapeC -> 9.819997, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 3: qof = VectorD(0.951608, 0.951108,       811185, 39254.6,
22.3699,       503.264,       22.4336,       16.8446,       9.69179,       78.0000,       4.00000,
387.000,       1902.56,       -343.838,      -332.055,       9.95816,       1.00956,       9.82000,
-1.00000,      -1.00000,      -1.00000,      -1.00000,      -1.00000,      -1.00000)
[info] ------------------------------------------------------------------
[info] | crossValidate: fold 4: train-test splits sizes = (314, 78) |
[info] ------------------------------------------------------------------
[info] DEBUG @ Predictor.validate: n_test = 78, rando = true
[info] LinkedHashMap(rSq -> 0.964660, rSqBar -> 0.964295, sst -> 880383.794872, sse -> 31112.708696, sde ->
20.045441, mse0 -> 398.880881, rmse -> 19.972002, mae -> 15.922825, smape -> 9.517474, m -> 78.000000, dfm -
> 4.000000, df -> 387.000000, fStat -> 2640.945807, aic -> -337.019315, bic -> -325.235771, mape ->
9.493010, mase -> 0.967569, smapeC -> 9.645680, picp -> -1.000000, pinc -> -1.000000, ace -> -1.000000,
pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info] DEBUG @ Predictor.crossValidate: fold 4: qof = VectorD(0.964660, 0.964295,       880384, 31112.7,
20.0454,       398.881,       19.9720,       15.9228,       9.51747,       78.0000,       4.00000,
387.000,       2640.95,       -337.019,      -325.236,       9.49301,       0.967569,      9.64568,
-1.00000,      -1.00000,      -1.00000,      -1.00000,      -1.00000,      -1.00000)
[info] stepwiseSelAll: (l = 4) ADD variable BestStep(5,VectorD(0.945120,       0.944552,       4.28159e+06,
234975, 24.4646,       599.427,       24.4832,       18.1448,       10.3744,       392.000,
4.00000,       387.000,       1666.18,       -1799.84,-1779.98,       10.3678,       1.02540,
10.3999,       -1.00000,      -1.00000,      -1.00000,      -1.00000,      -1.00000,
-1.00000),scalation.modeling.Regression@77eca502)
[info] ------------------------------------------------------------------------------------------------------
-------
[info] | stepwiseSelAll: (l = 4) ADD variable (5, x5) => cols = LinkedHashSet(0, 2, 1, 3, 5) @
0.9445524176505258 |
[info] ------------------------------------------------------------------------------------------------------
-------
[info] REPORT
[info]     ---------------------------------------------------------------------------
[info]     modelName  mn   = Regression @dfm = 4.0
[info]     ---------------------------------------------------------------------------
[info]     hparameter hp   = HyperParameter(factorization -> (Fac_QR,Fac_QR))
[info]     ---------------------------------------------------------------------------
[info]     features   fn   = Array(x0, x2, x1, x3, x5)
[info]     ---------------------------------------------------------------------------
[info]     parameter  b    = VectorD(156.488,    79.8909,       187.761,       64.9839,       -14.7746)
[info]     ---------------------------------------------------------------------------
[info]     fitMap     qof  = LinkedHashMap(rSq -> 0.945120, rSqBar -> 0.944552, sst -> 4281593.713648, sse ->
234975.334398, sde -> 24.464617, mse0 -> 599.426873, rmse -> 24.483196, mae -> 18.144752, smape ->
10.374375, m -> 392.000000, dfm -> 4.000000, df -> 387.000000, fStat -> 1666.176278, aic -> -1799.836434,
bic -> -1779.980125, mape -> 10.367767, mase -> 1.025401, smapeC -> 10.399885, picp -> -1.000000, pinc ->
-1.000000, ace -> -1.000000, pinaw -> -1.000000, iscore -> -1.000000, wis -> -1.000000)
[info]     ---------------------------------------------------------------------------
[info]
[info] stepwiseSelAll: selected features = LinkedHashSet(0, 2, 1, 3, 5)
[info] stepwiseSelAll: selected features = LinkedHashSet(x0, x2, x1, x3, x5)
[info] stepwiseSelAll: features in/out   = ArrayBuffer(2, 1, 3, 5)
[info] k = 5
[info] Run + title
[info] x-axis: minX = 0.0, maxX = 4.0
[info] y-axis: minY = 10.0, maxY = 95.0
[info] rSq =
[info] MatrixD (90.1491,       90.1239,       19.8345,       90.0302,
[info]          91.9100,       91.8684,       17.7950,       91.6934,
[info]          94.2908,       94.2466,       10.2748,       94.0439,
[info]          94.5120,       94.4552,       10.3744,       94.2649)
[info] ----------------------
[info] | Feature Importance |
[info] ----------------------
[info] col = 0,          cylinders,      importance = -0.0
[info] col = 2,          weight,         importance = 1.0
[info] col = 1,          horsepower,     importance = 1.3521006746884316
```

```
[info] col = 3,          acceleration,   importance = 0.12561919789199613
[info] Run + title
[success] Total time: 21 s, completed Sep 11, 2025, 11:47:26 PM
```