

Email - C5.0 tree

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##
## Call:
## C5.0.default(x = Train[, independentVar], y = Train[,
##   dependentVar], trials = trialsNum, rules = rules, costs = costs)
##
##
## C5.0 [Release 2.07 GPL Edition]      Wed Sep 28 15:46:14 2016
## -----
##
## Class specified by attribute `outcome'
##
## Read 108058 cases (8 attributes) from undefined.data
## Read misclassification costs from undefined.costs
##
## Decision tree:
##
## Fo in {4,5,6,7}:
## :...Ro in {2,5,6,7}: 1 (12277/4679)
## :   Ro in {1,3,4}:
## :     :...Fc = 2: 0 (29/1)
## :     Fc in {3,4,5,6,7}: 1 (9/5)
## :     Fc = 1:
## :       :...clusterNum in {1,3}: 1 (54/39)
## :       clusterNum in {2,4}:
## :         :...Rc in {1,5,6,7}: 1 (6/5)
## :         Rc = 3: 0 (135/17)
## :         Rc = 2:
## :           :...Fo in {4,6,7}: 1 (4/2)
## :           :   Fo = 5:
## :             :...lifetime_sent <= 70: 1 (1)
## :             :   lifetime_sent > 70: 0 (9)
## :           Rc = 4:
## :             :...conversions <= 0: 1 (70/54)
## :             conversions > 0:
## :               :...lifetime_sent <= 42: 1 (3/1)
## :               lifetime_sent > 42: 0 (14)
## Fo in {1,2,3}:
## :...Ro in {1,2,3,4}:
## :   :...Fo = 1: 0 (47898/2009)
## :   Fo in {2,3}:
## :     :...Ro in {1,2,3}:
## :     :   :...lifetime_sent > 44: 0 (1859/101)
## :     :   :   lifetime_sent <= 44:
## :     :   :   :...lifetime_sent <= 16: 1 (4/1)
## :     :   :   lifetime_sent > 16:
## :     :   :   :...lifetime_sent > 41: 1 (52/43)
## :     :   :   lifetime_sent <= 41:
## :     :   :   :...Fo = 3: 1 (3/2)
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##      :      :      Fo = 2:
##      :      :      :...lifetime_sent <= 20: 1 (2/1)
##      :      :      lifetime_sent > 20: 0 (55)
##      :      Ro = 4:
##      :      :...Fo = 2: 0 (5868/634)
##      :      Fo = 3:
##      :      :...lifetime_sent > 62: 1 (497/399)
##      :      lifetime_sent <= 62:
##      :      :...Rc in {1,4,5,6,7}: 0 (379/30)
##      :      Rc = 3:
##      :      :...lifetime_sent <= 45: 1 (30/21)
##      :      :      lifetime_sent > 45: 0 (121/13)
##      :      Rc = 2:
##      :      :...conversions > 0: 1 (2/1)
##      :      conversions <= 0:
##      :      :...lifetime_sent <= 58: 0 (24)
##      :      lifetime_sent > 58: 1 (5/3)
##      Ro in {5,6,7}:
##      :...Fo = 1:
##      :      :...Ro in {5,6}: 0 (11784/1145)
##      :      Ro = 7:
##      :      :...lifetime_sent > 115: 1 (85/57)
##      :      lifetime_sent <= 115:
##      :      :...conversions <= 0:
##      :      :      :...Rc in {1,3,4}: 0 (1680/239)
##      :      :      Rc = 6: 1 (218/180)
##      :      :      Rc = 5:
##      :      :      :...lifetime_sent <= 56: 1 (87/66)
##      :      :      :      lifetime_sent > 56:
##      :      :      :      :...lifetime_sent > 102: 0 (15)
##      :      :      :      lifetime_sent <= 102:
##      :      :      :      :...lifetime_sent <= 87: 0 (69/5)
##      :      :      :      lifetime_sent > 87: 1 (55/44)
##      :      :      Rc = 7:
##      :      :      :...lifetime_sent > 107: 0 (44/1)
##      :      :      :      lifetime_sent <= 107:
##      :      :      :      :...Fc in {4,5,6,7}: 0 (0)
##      :      :      :      Fc = 3: 1 (2/1)
##      :      :      :      Fc = 1:
##      :      :      :      :...lifetime_sent <= 97: 0 (1336/180)
##      :      :      :      :      lifetime_sent > 97: 1 (137/106)
##      :      :      :      Fc = 2:
##      :      :      :      :...lifetime_sent <= 37: 1 (27/22)
##      :      :      :      lifetime_sent > 37: 0 (13)
##      :      :      Rc = 2:
##      :      :      :...lifetime_sent <= 46:
##      :      :      :      :...lifetime_sent <= 34: 1 (5/4)
##      :      :      :      :      lifetime_sent > 34: 0 (44)
##      :      :      :      lifetime_sent > 46:
##      :      :      :      :...lifetime_sent <= 63: 1 (48/35)
##      :      :      :      lifetime_sent > 63:
##      :      :      :      :...lifetime_sent <= 86: 0 (126/6)
##      :      :      :      lifetime_sent > 86:
##      :      :      :      :...lifetime_sent <= 106: 1 (106/83)

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##      :      :      lifetime_sent > 106: 0 (16)
##      :      conversions > 0:
##      :      :...Rc in {4,5,6,7}: 1 (777/598)
##      :      Rc = 3:
##      :      :...conversions <= 1: 0 (156/17)
##      :      :      conversions > 1: 1 (11/9)
##      :      Rc = 2:
##      :      :...lifetime_sent <= 73: 1 (22/16)
##      :      :      lifetime_sent > 73:
##      :      :      :...conversions <= 1: 0 (49/3)
##      :      :      :      conversions > 1: 1 (5/4)
##      :      Rc = 1:
##      :      :...lifetime_sent > 102: 0 (12)
##      :      lifetime_sent <= 102:
##      :      :...lifetime_sent <= 78: 0 (10)
##      :      lifetime_sent > 78:
##      :      :...lifetime_sent <= 79: 1 (2)
##      :      lifetime_sent > 79:
##      :      :...lifetime_sent <= 86: 0 (12)
##      :      lifetime_sent > 86: 1 (40/32)
## Fo in {2,3}:
## :...clusterNum in {2,3}: 1 (0)
##      clusterNum = 4:
##      :...Fo = 3:
##      :      :...Ro in {6,7}: 1 (828/584)
##      :      :      Ro = 5:
##      :      :      :...lifetime_sent > 81: 1 (298/226)
##      :      :      lifetime_sent <= 81:
##      :      :      :...conversions <= 0:
##      :      :      :...Rc in {1,5,6,7}: 0 (11)
##      :      :      :      Rc = 2:
##      :      :      :      :...lifetime_sent <= 58: 1 (4/3)
##      :      :      :      :      lifetime_sent > 58: 0 (6)
##      :      :      :      Rc = 3:
##      :      :      :      :...lifetime_sent <= 69: 1 (110/88)
##      :      :      :      :      lifetime_sent > 69: 0 (22)
##      :      :      :      Rc = 4:
##      :      :      :      :...Fc in {1,3,4,5,6,7}: 1 (303/245)
##      :      :      :      Fc = 2:
##      :      :      :      :...lifetime_sent <= 43: 1 (9/7)
##      :      :      :      lifetime_sent > 43: 0 (11)
##      :      :      conversions > 0:
##      :      :      :...Rc in {1,2,5,6,7}: 0 (3)
##      :      :      Rc = 3:
##      :      :      :...lifetime_sent <= 45: 0 (7)
##      :      :      :      lifetime_sent > 45: 1 (30/22)
##      :      :      Rc = 4:
##      :      :      :...Fc in {1,3,4,5,6,7}: 0 (128/14)
##      :      :      Fc = 2:
##      :      :      :...lifetime_sent > 57: 1 (15/10)
##      :      :      lifetime_sent <= 57:
##      :      :      :...lifetime_sent <= 32: 1 (5/4)
##      :      :      lifetime_sent > 32: 0 (14)
##      :      Fo = 2:
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##      :      :...Ro in {5,6}:
##      :      :...lifetime_sent <= 51:
##      :      :      :...lifetime_sent <= 21: 0 (235/18)
##      :      :      :      lifetime_sent > 21:
##      :      :      :      :...Fc in {1,3,4,5,6,7}: 0 (2005/255)
##      :      :      :      Fc = 2:
##      :      :      :      :...Rc in {2,6,7}: 0 (0)
##      :      :      :      Rc in {1,4}:
##      :      :      :      :...lifetime_sent <= 25: 1 (5/4)
##      :      :      :      :      lifetime_sent > 25: 0 (27)
##      :      :      :      Rc in {3,5}:
##      :      :      :      :...lifetime_sent <= 46: 1 (118/93)
##      :      :      :      :      lifetime_sent > 46: 0 (14)
##      :      :      lifetime_sent > 51:
##      :      :      :...Rc in {6,7}: 0 (0)
##      :      :      Rc = 4: 1 (1398/1148)
##      :      :      Rc in {1,2,3,5}:
##      :      :      :...conversions <= 0:
##      :      :      :      :...Rc = 1: 0 (229/35)
##      :      :      :      :      Rc = 5: 1 (404/335)
##      :      :      :      :      Rc = 2:
##      :      :      :      :      :...Ro = 6: 1 (236/198)
##      :      :      :      :      :      Ro = 5:
##      :      :      :      :      :      :...lifetime_sent <= 109: 1 (190/159)
##      :      :      :      :      :      :      lifetime_sent > 109: 0 (17)
##      :      :      :      :      Rc = 3:
##      :      :      :      :      :...lifetime_sent <= 114:
##      :      :      :      :      :      :...Ro = 5: 0 (455/62)
##      :      :      :      :      :      :      Ro = 6: 1 (488/409)
##      :      :      :      :      :      lifetime_sent > 114:
##      :      :      :      :      :      :...Ro = 5: 1 (21/14)
##      :      :      :      :      :      :      Ro = 6: 0 (10)
##      :      :      conversions > 0:
##      :      :      :...Rc = 5: 0 (230/29)
##      :      :      Rc = 1:
##      :      :      :...lifetime_sent <= 100: 1 (36/29)
##      :      :      :      lifetime_sent > 100: 0 (14)
##      :      :      Rc = 2:
##      :      :      :...lifetime_sent <= 118: 0 (118/15)
##      :      :      :      lifetime_sent > 118: 1 (4/1)
##      :      :      Rc = 3:
##      :      :      :...conversions > 1:
##      :      :      :      :...lifetime_sent <= 64: 1 (3/1)
##      :      :      :      :      lifetime_sent > 64: 0 (33)
##      :      :      conversions <= 1:
##      :      :      :...Ro = 5:
##      :      :      :      :...lifetime_sent <= 88: 0 (105/9)
##      :      :      :      :      lifetime_sent > 88: 1 (74/59)
##      :      :      :      Ro = 6:
##      :      :      :      :...lifetime_sent <= 75: 1 (54/45)
##      :      :      :      :      lifetime_sent > 75: 0 (83/5)
##      :      :      Ro = 7:
##      :      :      :...Fc in {2,3,4,5,6,7}: 1 (8/4)
##      :      :      Fc = 1:

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##      :      :...lifetime_sent <= 37:
##      :      :...lifetime_sent > 33: 0 (26)
##      :      :   lifetime_sent <= 33:
##      :      :   :...lifetime_sent <= 32: 0 (19/1)
##      :      :   lifetime_sent > 32: 1 (3/1)
##      :      lifetime_sent > 37:
##      :      :...conversions > 0:
##      :      :...lifetime_sent <= 97: 0 (234/28)
##      :      :   lifetime_sent > 97: 1 (118/92)
##      :      conversions <= 0:
##      :      :...Rc in {1,3,4,5,6,7}: 1 (831/645)
##      :      Rc = 2:
##      :      :...lifetime_sent > 61: 1 (169/129)
##      :      lifetime_sent <= 61:
##      :      :...lifetime_sent <= 47: 0 (17)
##      :      lifetime_sent > 47:
##      :      :...lifetime_sent <= 55: 1 (27/22)
##      :      lifetime_sent > 55: 0 (13)
## clusterNum = 1:
## :...Ro in {5,7}: 1 (8393/6034)
##   Ro = 6:
##   :...conversions > 2: 1 (25/15)
##   conversions <= 2:
##   :...Fo = 3:
##   :...Fc in {1,3,5,6,7}: 1 (1158/869)
##   :   Fc = 4: 0 (2)
##   :   Fc = 2:
##   :   :...conversions > 0: 1 (117/81)
##   :   conversions <= 0:
##   :   :...Rc in {1,2,3,7}: 1 (0)
##   :   Rc = 4:
##   :   :...lifetime_sent <= 47: 0 (10)
##   :   :   lifetime_sent > 47: 1 (19/14)
##   :   Rc = 5:
##   :   :...lifetime_sent <= 39: 0 (19)
##   :   :   lifetime_sent > 39: 1 (13/8)
##   :   Rc = 6:
##   :   :...lifetime_sent <= 58: 1 (102/72)
##   :   lifetime_sent > 58:
##   :   :...lifetime_sent <= 124: 0 (17)
##   :   lifetime_sent > 124: 1 (1)
##   Fo = 2:
##   :...Fc in {5,6,7}: 1 (0)
##   Fc in {3,4}: 0 (20/1)
##   Fc in {1,2}:
##   :...Rc in {1,2,3,4}: 1 (0)
##   Rc = 7: 0 (3)
##   Rc = 5:
##   :...conversions > 0:
##   :   :...lifetime_sent <= 36: 0 (57/4)
##   :   :   lifetime_sent > 36: 1 (98/77)
##   :   conversions <= 0:
##   :   :...Fc = 1: 1 (346/252)
##   :   Fc = 2:

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##          :      :...lifetime_sent > 60: 1 (3/1)
##          :      lifetime_sent <= 60:
##          :      :...lifetime_sent <= 16: 1 (1)
##          :      lifetime_sent > 16: 0 (16/1)
## Rc = 6:
## :...lifetime_sent <= 16:
##       :...Fc = 2:
##       :   :...lifetime_sent <= 11: 1 (15/7)
##       :   :   lifetime_sent > 11: 0 (169/16)
##       :   Fc = 1:
##       :   :...conversions > 0: 1 (6/3)
##       :   conversions <= 0:
##       :   :...lifetime_sent <= 14: 1 (9/5)
##       :   lifetime_sent > 14: 0 (24/1)
## lifetime_sent > 16:
## :...conversions <= 0: 1 (836/673)
##       conversions > 0:
##       :...lifetime_sent <= 71:
##       :...lifetime_sent <= 58: 1 (161/130)
##       :   lifetime_sent > 58: 0 (23/1)
##       lifetime_sent > 71:
##       :...conversions <= 1: 1 (98/68)
##       conversions > 1:
##       :...lifetime_sent <= 107: 1 (9/4)
##       lifetime_sent > 107: 0 (10)
##
## Evaluation on training data (108058 cases):
##
##           Decision Tree
##           -----
##           Size      Errors   Cost
##
##           144 24299(22.5%)7223.66  <<
##
##           (a)   (b)   <-classified as
##           ----  ----
##           71317 19403   (a): class 0
##           4896 12442   (b): class 1
##
## Attribute usage:
##
## 100.00% Ro
## 100.00% Fo
## 20.31% clusterNum
## 17.61% lifetime_sent
## 13.04% Rc
## 12.51% conversions
## 8.63% Fc
##
## Time: 0.3 secs

```

```

##
## Confusion Matrix and Statistics
##
##           Reference
## Prediction    0    1
##           0 23806 1708
##           1  6433 4071
##
##           Accuracy : 0.774
##           95% CI : (0.7696, 0.7783)
##           No Information Rate : 0.8396
##           P-Value [Acc > NIR] : 1
##
##           Kappa : 0.3695
##           McNemar's Test P-Value : <2e-16
##
##           Sensitivity : 0.7873
##           Specificity : 0.7044
##           Pos Pred Value : 0.9331
##           Neg Pred Value : 0.3876
##           Prevalence : 0.8396
##           Detection Rate : 0.6609
##           Detection Prevalence : 0.7084
##           Balanced Accuracy : 0.7459
##
##           'Positive' Class : 0
##

```