Logistic Regression

text feature engineering:

```
wine_words <- function(df, j = 1000, stem=F){
  library(tidytext)
  library(SnowballC)
  data(stop_words)
  words <- df %>%
    unnest_tokens(word, description) %>%
    anti_join(stop_words) %>% # get rid of stop words
    filter(!(word %in% c("wine","pinot","vineyard", "price", "points")))

  if(stem){
    words <- words %>%
      mutate(word = wordStem(word))
  }

  words <- words %>%
    count(id, word) %>%
    group_by(id) %>%
    mutate(exists = (n>0)) %>%
    ungroup %>%
    group_by(word) %>%
    mutate(total = sum(n)) %>%
    filter(total > j) %>%
    pivot_wider(id_cols = id, names_from = word, values_from = exists, values_fill = list(
    right_join(select(df,id,province)) %>%
    mutate(across(-province, ~replace_na(.x, F)))
}
wino <- wine_words(wine, j=400, stem=F)
```

```
Joining with `by = join_by(word)`
```

```
Joining with `by = join_by(id)`
```

bringing back numerical features from original dataset to wino:

```
wino = wino %>% left_join(select(wine, id, price, points, year), by = "id")
```

Numerical feature engineering:

```
#center and scale points:
wino = wino %>% select(points) %>% preProcess(method = c("center", "scale")) %>% predict(w


#year as factor, logprice:
wino = wino %>% mutate(year_f = as.factor(year),
                       lprice = log(price))
#binning year and and price:
wino = wino %>%
  mutate(price_f = case_when(
    price < 16 ~ "low",
    price >= 16 & price < 41 ~ "med",
    price >= 41 ~ "high"
  ),
   year_f = case_when(
    year < 2005 ~ "old",
    year >= 2005 & year < 2011 ~ "recent",
    year >= 2011 ~ "current"
  ))
wino = wino %>% dplyr::select(-price)
#difference of wine's lprice from total average lprice
wino = wino %>% mutate(diff_from_avg_lprice = mean(lprice) - lprice)
wino = wino %>% mutate(cost_per_point = lprice/points)
wino = wino %>% select(-id)
wino = wino %>% select(-diff_from_avg_lprice)

head(wino)
```

```
# A tibble: 6 x 82
  bottling earthy herbal berry chocolate drink herb  oak   tart  aromas bodied
  <lgl>    <lgl>  <lgl>  <lgl> <lgl>     <lgl> <lgl> <lgl> <lgl> <lgl>  <lgl>
1 TRUE     TRUE   TRUE   FALSE FALSE     FALSE FALSE FALSE FALSE FALSE  FALSE
2 FALSE    FALSE  FALSE  TRUE  TRUE      TRUE  TRUE  TRUE  TRUE  FALSE  FALSE
3 FALSE    FALSE  FALSE  FALSE FALSE     FALSE FALSE TRUE  FALSE TRUE   TRUE
```

```
4 FALSE    FALSE  TRUE   FALSE FALSE     FALSE TRUE  FALSE FALSE FALSE  FALSE
5 FALSE    TRUE   FALSE  TRUE  FALSE     FALSE FALSE FALSE FALSE FALSE  FALSE
6 FALSE    FALSE  FALSE  FALSE FALSE     TRUE  FALSE FALSE FALSE FALSE  FALSE
# ... with 71 more variables: earth <lgl>, forest <lgl>, offers <lgl>,
#   raspberry <lgl>, smooth <lgl>, spice <lgl>, texture <lgl>, finish <lgl>,
#   flavor <lgl>, fruit <lgl>, notes <lgl>, sweet <lgl>, touch <lgl>,
#   flavors <lgl>, tannins <lgl>, fruity <lgl>, strawberry <lgl>,
#   cranberry <lgl>, dark <lgl>, palate <lgl>, acidity <lgl>, black <lgl>,
#   cherry <lgl>, cola <lgl>, dried <lgl>, nose <lgl>, soft <lgl>, juicy <lgl>,
#   ripe <lgl>, light <lgl>, spicy <lgl>, red <lgl>, age <lgl>, bit <lgl>, ...
```

Split the data

```
set.seed(1000)
wine_index <- createDataPartition(wino$province, p = 0.80, list = FALSE)

train <- wino[ wine_index, ]
test <- wino[-wine_index, ]

table(train$province)
```

```
       Burgundy        California Casablanca_Valley       Marlborough
            955              3168               105               184
       New_York            Oregon
            105              2190
```

```
# Fit the mode

control <- trainControl(method="cv",
                        number=10,
                        savePredictions="all",
                        classProbs=TRUE)

model <- nnet::multinom(province ~.,
                        data = train,
                        trControl=control)
```

```
# weights:  510 (420 variable)
```

```
initial  value 12017.330760
iter  10 value 8584.678063
iter  20 value 3590.850590
iter  30 value 2901.827100
iter  40 value 2452.435560
iter  50 value 2219.885203
iter  60 value 2083.635497
iter  70 value 1970.867905
iter  80 value 1917.319694
iter  90 value 1857.675672
iter 100 value 1832.662495
final  value 1832.662495
stopped after 100 iterations
```

```r
# Summarize the model
summary(model)
```

```
Call:
nnet::multinom(formula = province ~ ., data = train, trControl = control)

Coefficients:
                  (Intercept) bottlingTRUE earthyTRUE herbalTRUE   berryTRUE
California        -2.77500648    2.5209736  2.2453710  1.5339226 -1.09657930
Casablanca_Valley -0.10157961    0.4768997  1.8774559  4.0175335  1.25237824
Marlborough        0.01963430    1.9118278 -0.1145254  1.6625478 -1.37893903
New_York          -0.06825329   -0.8768964  1.3880775  0.9986137  0.77942113
Oregon             1.79051669    1.5560276  0.7711434  1.0970615 -0.04907631
                  chocolateTRUE  drinkTRUE herbTRUE  oakTRUE tartTRUE
California           -0.6643259 -3.3716573 3.436038 3.079318 3.100881
Casablanca_Valley     0.8297156 -0.9351729 1.301126 3.813594 2.411478
Marlborough           0.1048103  1.4577371 3.358910 2.875729 3.757737
New_York             -0.2232008 -2.5937527 4.883826 2.600138 4.099524
Oregon                2.1629387 -1.9855106 3.787791 2.242853 3.794446
                  aromasTRUE bodiedTRUE earthTRUE forestTRUE offersTRUE
California          3.987299  2.9749092  4.066725   4.679266  1.1833147
Casablanca_Valley   5.896640  2.0703769  3.135205   2.444916 -1.0393156
Marlborough         2.873201  3.6866901  4.434232   4.569610  0.5302051
New_York            2.931192  3.5573119  3.852640   3.161319  0.7286386
Oregon              1.329239  0.8036162  3.946574   2.632343  0.7777891
                  raspberryTRUE smoothTRUE  spiceTRUE textureTRUE finishTRUE
California            0.6062337  1.1536197 -0.1726341   0.7045566   1.409196
```

```
Casablanca_Valley     2.8150701  2.0737349  0.8693627  -3.2567182   3.796586
Marlborough          -1.5329222  0.6252891 -2.3327408   0.7286398   2.806587
New_York              0.8630589 -2.6231495 -0.3213235  -4.7358893   2.346425
Oregon                0.5319400  1.3031381 -1.5063145  -1.8071877   1.775728
                  flavorTRUE  fruitTRUE notesTRUE  sweetTRUE touchTRUE
California         0.5129564 -0.7700230  2.332698  0.4876928 -1.845129
Casablanca_Valley  1.4119770 -0.7809294  4.345764  1.4633271 -1.584681
Marlborough       -0.8182311  0.7906989  4.356205 -2.7113104 -1.850882
New_York           1.7685619 -1.9319092  4.802967  0.2811852 -2.449665
Oregon             0.4023136  1.0811985  2.690080  0.8509886 -1.419243
                  flavorsTRUE tanninsTRUE fruityTRUE strawberryTRUE
California        -0.27103187  -2.2722930  -1.853853      -0.679039
Casablanca_Valley  2.51289914  -3.5636578  -1.250639      -1.876021
Marlborough       -0.69649195  -1.0574806  -4.972996      -2.158214
New_York          -0.03926085   0.8133222  -2.255440      -1.159168
Oregon             0.88531711  -1.8448261  -1.352891      -1.086874
                  cranberryTRUE    darkTRUE palateTRUE acidityTRUE   blackTRUE
California            2.6986905 -0.26088270  1.8395931   -1.856400  0.22377633
Casablanca_Valley     0.4285337 -0.09059593  2.9407091   -1.553167 -0.02662684
Marlborough           1.9133996 -1.12332313  1.1804939   -5.476348  0.19441739
New_York              2.5996938 -4.21790610  3.5186774   -1.058879  1.08744301
Oregon                1.9567369 -2.25848909  0.6028781   -3.601053 -0.60808725
                  cherryTRUE colaTRUE driedTRUE  noseTRUE  softTRUE  juicyTRUE
California          2.026573 3.877221  3.710345 3.3457571 -1.526021 -1.6983668
Casablanca_Valley   2.022925 3.037918  4.227264 3.6964722 -2.943853 -0.8147643
Marlborough         2.440956 3.942322  3.247060 0.9568684 -2.997071 -8.9815429
New_York            3.750786 2.370356  4.894553 2.1552595 -1.300078 -1.3778476
Oregon              1.797066 4.570044  2.430325 0.3120050 -3.006307 -2.1172969
                     ripeTRUE  lightTRUE  spicyTRUE     redTRUE    ageTRUE
California        -0.310123106 -0.5044199  2.1268473 -2.09406904 -1.8282947
Casablanca_Valley  0.009579719 -0.9561360  2.8327447 -0.78570852 -1.6148570
Marlborough       -1.805042178 -1.4096910 -2.4202588 -4.02642933 -1.5628434
New_York           0.442156692 -1.3891852 -0.8157115 -0.06465313 -0.9315412
Oregon            -1.132798172 -0.3082791  1.7785449 -3.38248702 -0.3135615
                   bitTRUE tightTRUE cherriesTRUE   coreTRUE  fruitsTRUE
California        2.821779 -1.648567    1.8510042 -0.8577396 -2.57366773
Casablanca_Valley 3.078756 -2.677989   -0.1840197 -2.1164158 -0.67466774
Marlborough       3.529358 -2.983731    4.0697903 -2.8913075 -2.48596178
New_York          4.158226 -3.183529    2.2038128 -1.7483764 -3.25816470
Oregon            4.046066 -1.095682    2.3548699 -0.2130100  0.04856493
                    richTRUE agingTRUE brightTRUE characterTRUE
California        -1.2669757 -3.776425  1.0289868     -2.024692
Casablanca_Valley -1.2208220 -2.771589  1.1068174     -3.395049
```

```
Marlborough       -1.7660246 -4.255738  1.6195382     -5.174097
New_York          -0.4932591 -2.236244  2.7419775     -1.938130
Oregon            -2.4651431 -1.357490  0.1593359     -2.613282
                  concentratedTRUE vintageTRUE complexTRUE estateTRUE   teaTRUE
California               0.9467508  -0.4821498  -0.9185983   1.083988 3.8850754
Casablanca_Valley       -2.5786493   0.1950360  -2.4965566   1.515273 3.9280504
Marlborough             -0.5702413  -1.4622083   1.3451000  -4.128839 0.4366901
New_York                 2.7822444  -2.1289379  -0.1315482  -2.455003 0.3844416
Oregon                  -0.1958550   0.2326041  -0.3847067   1.427878 2.9612566
                     wildTRUE   firmTRUE  noirTRUE mediumTRUE structureTRUE
California         0.24021942 -0.3389080 1.0344024 1.45088421    -2.2425752
Casablanca_Valley -1.28548790 -2.3655243 1.9480954 0.55061391    -0.9459815
Marlborough       -4.75889564 -0.5749532 2.4172721 2.52742259    -4.6092447
New_York          -0.65067923 -2.0268298 4.0831641 0.06512319    -2.6658477
Oregon            -0.06725654 -1.5791229 0.8699755 0.87686594    -3.8460994
                  cloveTRUE  timeTRUE     freshTRUE balancedTRUE structuredTRUE
California         4.822613 -1.007236 -0.7086727852    0.2001176      -2.031786
Casablanca_Valley  3.221613 -2.473415  0.0006037306    1.2844956      -3.725305
Marlborough        3.898832 -1.303105 -1.3078335889   -3.3291800      -1.825072
New_York           2.807813 -2.692847 -0.5539863349   -0.1136392      -4.128570
Oregon             3.061582 -1.516108 -0.7289361006    0.1074632      -3.399736
                  orangeTRUE   plumTRUE pomegranateTRUE cinnamonTRUE savoryTRUE
California         4.2612356 -1.0193761        7.969549    2.2873118   5.831156
Casablanca_Valley  3.2123455  1.8624871        5.737819    1.3164538   4.714932
Marlborough        0.7151617 -1.7072324        7.779114    0.8622363   7.189825
New_York           1.5796032 -0.1125171        5.130179    1.3998277   7.563856
Oregon             3.7475928 -0.7895521        6.202471    1.5734575   3.121859
                  pepperTRUE  roseTRUE     points        year year_fold
California          5.476676  2.752658  0.8112382 0.011961956 -7.023546
Casablanca_Valley   5.341680 -1.457274 -0.5157338 0.007071878 -4.759791
Marlborough         4.454945  1.597131  0.7672799 0.012071212 -3.690217
New_York            2.443789  2.168767  0.1329819 0.007962507 -5.828934
Oregon              5.232729  1.851036  1.0516143 0.010926753 -3.338695
                  year_frecent    lprice price_flow  price_fmed cost_per_point
California         -3.68228628 -4.119757  -3.425767 -2.87693973   0.0004341442
Casablanca_Valley  -0.14204301 -5.552746  -2.805696 -3.11207422   0.0046429021
Marlborough         0.02246605 -6.482572  -3.648329 -1.12006686  -0.0016645341
New_York           -1.38459326 -5.799768  -1.342581 -0.03329879   0.0008014719
Oregon             -1.52487526 -4.521092  -4.558390 -2.78805259   0.0005621888

Std. Errors:
                   (Intercept) bottlingTRUE  earthyTRUE  herbalTRUE   berryTRUE
California        1.719415e-04 0.0394793232 0.087907905 0.038084025 0.053270448
```

```
Casablanca_Valley 2.302220e-05 0.0016258667 0.001312199 0.002185899 0.002052613
Marlborough       6.553365e-05 0.0018666714 0.003683545 0.003740238 0.002947693
New_York          3.443324e-05 0.0004793587 0.002678153 0.001917216 0.004522157
Oregon            2.172732e-04 0.0377067633 0.088836386 0.040515392 0.059391266
                  chocolateTRUE   drinkTRUE     herbTRUE     oakTRUE
California         0.0441731689 0.071973013 0.0710594337 0.069247510
Casablanca_Valley  0.0018219386 0.002032301 0.0006492517 0.002437634
Marlborough        0.0041339151 0.017070348 0.0032010114 0.005678034
New_York           0.0006576456 0.001791696 0.0027441881 0.001054560
Oregon             0.0508636092 0.093763747 0.0715165408 0.070269284
                     tartTRUE  aromasTRUE  bodiedTRUE    earthTRUE   forestTRUE
California        0.081963724 0.086589470 0.079866042 0.0857243274 0.0081274089
Casablanca_Valley 0.001070397 0.004674932 0.002569986 0.0007230178 0.0002930786
Marlborough       0.008310574 0.009717525 0.016455318 0.0053041067 0.0019518867
New_York          0.004431897 0.007071638 0.004681259 0.0024858586 0.0007759841
Oregon            0.083732732 0.073910405 0.061945572 0.0848192269 0.0076321932
                   offersTRUE raspberryTRUE  smoothTRUE   spiceTRUE
California        0.087419824   0.070821830 0.040343387 0.087089761
Casablanca_Valley 0.001333962   0.005349329 0.001239403 0.004757900
Marlborough       0.002830329   0.001521426 0.002151977 0.003998272
New_York          0.002418715   0.003504430 0.001062236 0.006086569
Oregon            0.088639640   0.070207258 0.042306665 0.080974248
                   textureTRUE  finishTRUE  flavorTRUE   fruitTRUE   notesTRUE
California        0.0780325598 0.060873188 0.088450345 0.053212183 0.088658199
Casablanca_Valley 0.0016971488 0.002797241 0.001958817 0.002250438 0.002177757
Marlborough       0.0123597244 0.006799026 0.003058842 0.013005603 0.005749720
New_York          0.0001145886 0.004293504 0.005283677 0.003155229 0.003622139
Oregon            0.0656688277 0.062040702 0.088878121 0.055377361 0.092009440
                     sweetTRUE   touchTRUE flavorsTRUE tanninsTRUE  fruityTRUE
California        0.017990082 0.080793755 0.054084109 0.066680302 0.016932742
Casablanca_Valley 0.001467188 0.002540427 0.002440261 0.001017936 0.001434643
Marlborough       0.001037824 0.002671071 0.010504045 0.007355396 0.001233637
New_York          0.001999442 0.001857465 0.006740494 0.007405988 0.001351809
Oregon            0.017750115 0.083589097 0.060303530 0.073467677 0.018582646
                  strawberryTRUE cranberryTRUE    darkTRUE  palateTRUE
California           0.075609251   0.082653198 0.074432324 0.070408218
Casablanca_Valley    0.002439287   0.001271257 0.003330679 0.005128075
Marlborough          0.001938390   0.003233459 0.001960605 0.005756635
New_York             0.003218366   0.003206557 0.001155100 0.006199995
Oregon               0.075990974   0.081931207 0.073680606 0.068055830
                  acidityTRUE   blackTRUE  cherryTRUE     colaTRUE   driedTRUE
California        0.076940603 0.064847821 0.054818437 0.0882327689 0.057460834
Casablanca_Valley 0.003959028 0.005408641 0.004403557 0.0007707169 0.001618321
```

```
Marlborough       0.001754184 0.014941077 0.007528584 0.0037476283 0.002195061
New_York          0.007955056 0.009697174 0.009352051 0.0009487048 0.005344558
Oregon            0.073980038 0.064329632 0.056231843 0.0887535566 0.053909719
                     noseTRUE     softTRUE    juicyTRUE    ripeTRUE   lightTRUE
California        0.072455432 0.0616294481 5.209954e-02 0.078452971 0.071857850
Casablanca_Valley 0.005009358 0.0008009083 1.030901e-03 0.002944626 0.003425548
Marlborough       0.002624505 0.0040482838 8.044305e-06 0.003674383 0.006403373
New_York          0.006345070 0.0027865352 2.515925e-03 0.006297878 0.003266251
Oregon            0.062671018 0.0606514214 5.155912e-02 0.078623059 0.075748857
                     spicyTRUE     redTRUE     ageTRUE     bitTRUE    tightTRUE
California        0.0836405368 0.069898393 0.012176591 0.037776528 0.0184629342
Casablanca_Valley 0.0024791069 0.001961892 0.000211958 0.002430723 0.0008802425
Marlborough       0.0010972826 0.002684283 0.002433669 0.004890361 0.0007041964
New_York          0.0003355526 0.004152037 0.001878453 0.002736310 0.0006339256
Oregon            0.0825284598 0.070242729 0.015836031 0.039504487 0.0191626225
                  cherriesTRUE     coreTRUE   fruitsTRUE    richTRUE
California        0.0325663675 0.0217601252 0.0261024394 0.055161886
Casablanca_Valley 0.0001347566 0.0009772601 0.0013329558 0.002257235
Marlborough       0.0077947824 0.0004318635 0.0006831784 0.007168181
New_York          0.0020358032 0.0006688722 0.0004829530 0.004845049
Oregon            0.0326836227 0.0224875161 0.0336928576 0.051059350
                     agingTRUE  brightTRUE characterTRUE concentratedTRUE
California        0.0069742849 0.052582925   0.017521080     2.757774e-02
Casablanca_Valley 0.0002993544 0.001799931   0.001236932     5.762273e-05
Marlborough       0.0008842052 0.001578567   0.000862982     2.693995e-03
New_York          0.0011600937 0.003013410   0.001123660     2.965611e-03
Oregon            0.0106321324 0.051286758   0.020000987     2.749381e-02
                   vintageTRUE  complexTRUE   estateTRUE      teaTRUE
California        0.0316442503 0.0333758737 4.817880e-02 0.0406954217
Casablanca_Valley 0.0012313132 0.0008333883 1.067598e-03 0.0008163434
Marlborough       0.0021493085 0.0064585111 1.267738e-03 0.0019724206
New_York          0.0002213314 0.0016401929 9.191167e-05 0.0005633459
Oregon            0.0335850153 0.0331954588 4.913375e-02 0.0397744784
                      wildTRUE     firmTRUE    noirTRUE  mediumTRUE
California        2.576501e-02 0.0210422874 0.079235340 0.057539259
Casablanca_Valley 2.842943e-04 0.0003710987 0.001808535 0.001193553
Marlborough       1.930763e-05 0.0035849085 0.010505599 0.014754129
New_York          1.271847e-03 0.0016958175 0.004616756 0.003867468
Oregon            2.581474e-02 0.0211023913 0.084152399 0.044554485
                  structureTRUE    cloveTRUE     timeTRUE   freshTRUE
California          0.011737111 0.0149552783 1.812303e-02 0.091008764
Casablanca_Valley   0.001035628 0.0007171999 3.477994e-04 0.002197237
Marlborough         0.001368301 0.0017974986 2.330943e-03 0.002746505
```

```
New_York            0.002725939 0.0003304636 8.377225e-05 0.004851295
Oregon              0.012670282 0.0143281293 1.902628e-02 0.090905478
                  balancedTRUE structuredTRUE   orangeTRUE    plumTRUE
California         0.059505843   0.0087208711 3.008611e-02 0.087330910
Casablanca_Valley  0.001344610   0.0005063211 5.030824e-04 0.006430368
Marlborough        0.000549597   0.0022073885 9.097799e-05 0.002475507
New_York           0.001124548   0.0013622686 3.643664e-04 0.005203934
Oregon             0.061546732   0.0084426662 3.002776e-02 0.084022793
                  pomegranateTRUE cinnamonTRUE   savoryTRUE   pepperTRUE
California           0.0168131429  0.057769922 0.0103968743 0.0325870496
Casablanca_Valley    0.0004547328  0.001370427 0.0006049508 0.0008551444
Marlborough          0.0022832782  0.001967276 0.0056086561 0.0012357472
New_York             0.0010206977  0.002791881 0.0020760534 0.0001293620
Oregon               0.0151833779  0.054275007 0.0073133822 0.0320672258
                     roseTRUE     points         year   year_fold year_frecent
California        0.0475323643 0.06656363 1.500173e-04 0.012968790  0.062757704
Casablanca_Valley 0.0004990768 0.02918698 1.260220e-04 0.001815310  0.004902305
Marlborough       0.0019190247 0.10376309 9.139525e-05 0.003856658  0.020208260
New_York          0.0030651546 0.05994255 1.077433e-04 0.001823583  0.008490916
Oregon            0.0465206936 0.06497081 1.489254e-04 0.016984034  0.085130346
                      lprice  price_flow  price_fmed cost_per_point
California        0.07065033 0.042164641 0.063940185   0.0007900074
Casablanca_Valley 0.01124685 0.006453263 0.002997031   0.0013747144
Marlborough       0.02932427 0.007170623 0.013173927   0.0012306636
New_York          0.01673558 0.008638582 0.006079677   0.0013903580
Oregon            0.06867945 0.035336134 0.060005391   0.0007652392

Residual Deviance: 3665.325
AIC: 4505.325
```

```r
# Make predictions
predicted.classes <- model %>% predict(test)
head(predicted.classes)
```

```
[1] Oregon     Oregon     California California California Oregon
6 Levels: Burgundy California Casablanca_Valley Marlborough ... Oregon
```

```r
# Model accuracy
mean(predicted.classes == test$province)
```

```
[1] 0.8828452
```

```r
varImp(model)%>%
  arrange(desc(Overall))
```

```
                     Overall
pomegranateTRUE  32.819130475
savoryTRUE       28.421627534
lprice           26.475934835
year_fold        24.641182561
pepperTRUE       22.949819354
earthTRUE        19.435376728
notesTRUE        18.527713356
driedTRUE        18.509548695
cloveTRUE        17.812451886
colaTRUE         17.797860972
bitTRUE          17.634184899
forestTRUE       17.487454152
tartTRUE         17.164065879
aromasTRUE       17.017570445
herbTRUE         16.767691647
price_flow       15.780762880
characterTRUE    15.145249894
structuredTRUE   15.110468984
juicyTRUE        14.989818627
oakTRUE          14.611632867
agingTRUE        14.397484962
structureTRUE    14.309748544
acidityTRUE      13.545846805
orangeTRUE       13.515938671
bodiedTRUE       13.092904284
finishTRUE       12.134521551
cherryTRUE       12.038306784
softTRUE         11.773329594
fruityTRUE       11.685817634
teaTRUE          11.595514045
tightTRUE        11.589497642
textureTRUE      11.232991436
cherriesTRUE     10.663497001
estateTRUE       10.610979731
noseTRUE         10.466362220
redTRUE          10.353347040
noirTRUE         10.352909503
drinkTRUE        10.343830697
```

```
palateTRUE       10.082351630
spicyTRUE         9.974107164
price_fmed        9.930432187
roseTRUE          9.826866097
cranberryTRUE     9.597054458
tanninsTRUE       9.551579722
herbalTRUE        9.309679118
touchTRUE         9.149598987
fruitsTRUE        9.041026868
timeTRUE          8.992711975
darkTRUE          7.951196939
coreTRUE          7.826849298
smoothTRUE        7.778931272
cinnamonTRUE      7.439287158
bottlingTRUE      7.342625204
richTRUE          7.212224540
concentratedTRUE  7.073740763
wildTRUE          7.002538730
strawberryTRUE    6.959315672
firmTRUE          6.885338184
year_frecent      6.756263864
brightTRUE        6.656655756
earthyTRUE        6.396573214
raspberryTRUE     6.349224841
ageTRUE           6.251097823
sweetTRUE         5.794504124
plumTRUE          5.491164823
mediumTRUE        5.470909838
fruitTRUE         5.354759056
complexTRUE       5.276509741
spiceTRUE         5.202375564
balancedTRUE      5.034895537
flavorTRUE        4.914039999
lightTRUE         4.567711289
berryTRUE         4.556394021
vintageTRUE       4.500936083
flavorsTRUE       4.405000928
offersTRUE        4.259263040
chocolateTRUE     3.984991318
ripeTRUE          3.699699866
freshTRUE         3.300032540
points            3.278848071
blackTRUE         2.140350825
```

```
year              0.049994306
cost_per_point    0.008105241
```