Predicting the Oligomerization of Fluorescent Protein

Rnewbie

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```
library(RCurl)
```

```
## Loading required package: bitops
```

```
library(prospectr)
```

```
## Loading required package: RcppArmadillo
```

```
library(caret)
```

```
## Loading required package: lattice
## Loading required package: ggplot2
```

```
library(RWeka)
set.seed(3)
x <- getURL("https://raw.githubusercontent.com/Rnewbie/OliFP/master/OliFP.csv")
OliFP <- read.csv(text=x, header = TRUE)
data <- OliFP
PCP <- data[, 2:532]
DPC <- data[, 533:932]
AAC <- data[, 933:952]
AAC_DPC <- cbind(AAC, DPC)
AAC_PCP <- cbind(AAC, PCP)
DPC_PCP <- cbind(DPC, PCP)
ALL <- data[, 5:952]
Oligomerization <- data$Oligomerization
set.seed(1)
x <- list(AAC = AAC,
          DPC = DPC,
          PCP = PCP,
          AAC_DPC = AAC_DPC,
          AAC_PCP = AAC_PCP,
          DPC_PCP = DPC_PCP,
          ALL = ALL)
J48 <- lapply(x, function(x){
  data <- cbind(Oligomerization, x)
  Monomer <- subset(data, Oligomerization == "Monomer")
  Oligomer <- subset(data, Oligomerization == "Oligomer")
  sel <- kenStone(Monomer[-1], k = 150, metric = "mahal", pc=2)
  train_Monomer <- Monomer[sel$model, ]
  test_Monomer <- Monomer[sel$test, ]
  sel <- kenStone(Oligomer[-1], k = 149, metric = "mahal", pc=2)
  train_Oligomer <- Oligomer[sel$model, ]
  test_Oligomer <- Oligomer[sel$test, ]
  Train <- rbind(train_Monomer, train_Oligomer)
```

```
  Test <- rbind(test_Monomer, test_Oligomer)
  x <- J48(Oligomerization~., data = Train)
  cv <- evaluate_Weka_classifier(x,
                                       numFolds=10,
                                       complexity = FALSE,
                                       seed=1,
                                       class=TRUE)
  external <- evaluate_Weka_classifier(x,
                                      newdata = Test,
                                      numFolds=10,
                                      complexity = FALSE,
                                      seed=1,
                                      class=TRUE)
  Model <- summary(x)
  results <- list(Training = Model, Cross_Validation_10_Fold = cv, Testing = external)
  return(results)
})
J48
```

```
## $AAC
## $AAC$Training
##
## === Summary ===
##
## Correctly Classified Instances         269               89.9666 %
## Incorrectly Classified Instances        30               10.0334 %
## Kappa statistic                          0.7993
## Mean absolute error                      0.1599
## Root mean squared error                  0.2828
## Relative absolute error                 31.9819 %
## Root relative squared error             56.5525 %
## Coverage of cases (0.95 level)          98.6622 %
## Mean rel. region size (0.95 level)      73.2441 %
## Total Number of Instances              299
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  133  17 |   a = Monomer
##   13 136 |   b = Oligomer
##
## $AAC$Cross_Validation_10_Fold
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances         234               78.2609 %
## Incorrectly Classified Instances        65               21.7391 %
## Kappa statistic                          0.5651
## Mean absolute error                      0.2321
## Root mean squared error                  0.4343
## Relative absolute error                 46.4215 %
## Root relative squared error             86.8685 %
```

```
## Coverage of cases (0.95 level)          88.6288 %
## Mean rel. region size (0.95 level)      68.7291 %
## Total Number of Instances              299
##
## === Detailed Accuracy By Class ===
##
##                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                 0.820    0.255    0.764      0.820    0.791      0.567    0.814     0.787     Monome
##                 0.745    0.180    0.804      0.745    0.774      0.567    0.814     0.751     Oligom
## Weighted Avg.   0.783    0.218    0.784      0.783    0.782      0.567    0.814     0.769
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  123  27 |   a = Monomer
##   38 111 |   b = Oligomer
##
## $AAC$Testing
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances          62               81.5789 %
## Incorrectly Classified Instances        14               18.4211 %
## Kappa statistic                          0.6316
## Mean absolute error                      0.1819
## Root mean squared error                  0.4055
## Relative absolute error                 36.3454 %
## Root relative squared error             81.0351 %
## Coverage of cases (0.95 level)          86.8421 %
## Mean rel. region size (0.95 level)      55.2632 %
## Total Number of Instances               76
##
## === Detailed Accuracy By Class ===
##
##                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                 0.816    0.184    0.816      0.816    0.816      0.632    0.853     0.809     Monome
##                 0.816    0.184    0.816      0.816    0.816      0.632    0.853     0.809     Oligom
## Weighted Avg.   0.816    0.184    0.816      0.816    0.816      0.632    0.853     0.809
##
## === Confusion Matrix ===
##
##   a  b   <-- classified as
##  31  7 |  a = Monomer
##   7 31 |  b = Oligomer
##
##
## $DPC
## $DPC$Training
##
## === Summary ===
##
## Correctly Classified Instances         284               94.9833 %
## Incorrectly Classified Instances        15                5.0167 %
```

```
## Kappa statistic                          0.8997
## Mean absolute error                      0.0877
## Root mean squared error                  0.2094
## Relative absolute error                 17.5344 %
## Root relative squared error             41.8741 %
## Coverage of cases (0.95 level)          98.9967 %
## Mean rel. region size (0.95 level)      69.5652 %
## Total Number of Instances              299
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  144   6 |   a = Monomer
##    9 140 |   b = Oligomer
##
## $DPC$Cross_Validation_10_Fold
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances         256               85.6187 %
## Incorrectly Classified Instances        43               14.3813 %
## Kappa statistic                          0.7123
## Mean absolute error                      0.1612
## Root mean squared error                  0.3688
## Relative absolute error                 32.242  %
## Root relative squared error             73.7594 %
## Coverage of cases (0.95 level)          89.2977 %
## Mean rel. region size (0.95 level)      59.5318 %
## Total Number of Instances              299
##
## === Detailed Accuracy By Class ===
##
##                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                 0.887    0.174    0.836      0.887    0.861      0.714    0.878     0.841     Monome
##                 0.826    0.113    0.879      0.826    0.851      0.714    0.878     0.854     Oligom
## Weighted Avg.   0.856    0.144    0.857      0.856    0.856      0.714    0.878     0.848
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  133  17 |   a = Monomer
##   26 123 |   b = Oligomer
##
## $DPC$Testing
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances          62               81.5789 %
## Incorrectly Classified Instances        14               18.4211 %
## Kappa statistic                          0.6316
## Mean absolute error                      0.1946
## Root mean squared error                  0.4175
```

```
## Relative absolute error                 38.8854 %
## Root relative squared error             83.4403 %
## Coverage of cases (0.95 level)          85.5263 %
## Mean rel. region size (0.95 level)      55.2632 %
## Total Number of Instances               76
##
## === Detailed Accuracy By Class ===
##
##                  TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                  0.789    0.158    0.833      0.789    0.811      0.632    0.868     0.868     Monome
##                  0.842    0.211    0.800      0.842    0.821      0.632    0.868     0.814     Oligom
## Weighted Avg.    0.816    0.184    0.817      0.816    0.816      0.632    0.868     0.841
##
## === Confusion Matrix ===
##
##   a  b   <-- classified as
##  30  8 |  a = Monomer
##   6 32 |  b = Oligomer
##
##
## $PCP
## $PCP$Training
##
## === Summary ===
##
## Correctly Classified Instances         296               98.9967 %
## Incorrectly Classified Instances         3                1.0033 %
## Kappa statistic                          0.9799
## Mean absolute error                      0.0156
## Root mean squared error                  0.0883
## Relative absolute error                  3.1216 %
## Root relative squared error             17.6679 %
## Coverage of cases (0.95 level)         100      %
## Mean rel. region size (0.95 level)      53.1773 %
## Total Number of Instances              299
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  149   1 |   a = Monomer
##    2 147 |   b = Oligomer
##
## $PCP$Cross_Validation_10_Fold
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances         243               81.2709 %
## Incorrectly Classified Instances        56               18.7291 %
## Kappa statistic                          0.6254
## Mean absolute error                      0.1928
## Root mean squared error                  0.4285
## Relative absolute error                 38.5587 %
## Root relative squared error             85.7063 %
```

```
## Coverage of cases (0.95 level)          82.6087 %
## Mean rel. region size (0.95 level)      52.1739 %
## Total Number of Instances              299
##
## === Detailed Accuracy By Class ===
##
##                  TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                  0.813    0.188    0.813      0.813    0.813      0.625    0.813     0.765     Monome
##                  0.812    0.187    0.812      0.812    0.812      0.625    0.813     0.768     Oligom
## Weighted Avg.    0.813    0.187    0.813      0.813    0.813      0.625    0.813     0.767
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  122  28 |   a = Monomer
##   28 121 |   b = Oligomer
##
## $PCP$Testing
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances          65               85.5263 %
## Incorrectly Classified Instances        11               14.4737 %
## Kappa statistic                          0.7105
## Mean absolute error                      0.1478
## Root mean squared error                  0.3767
## Relative absolute error                 29.5314 %
## Root relative squared error             75.2755 %
## Coverage of cases (0.95 level)          85.5263 %
## Mean rel. region size (0.95 level)      50      %
## Total Number of Instances               76
##
## === Detailed Accuracy By Class ===
##
##                  TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                  0.868    0.158    0.846      0.868    0.857      0.711    0.880     0.824     Monome
##                  0.842    0.132    0.865      0.842    0.853      0.711    0.880     0.862     Oligom
## Weighted Avg.    0.855    0.145    0.856      0.855    0.855      0.711    0.880     0.843
##
## === Confusion Matrix ===
##
##   a  b   <-- classified as
##  33  5 |  a = Monomer
##   6 32 |  b = Oligomer
##
##
## $AAC_DPC
## $AAC_DPC$Training
##
## === Summary ===
##
## Correctly Classified Instances         292               97.6589 %
## Incorrectly Classified Instances         7                2.3411 %
```

```
## Kappa statistic                          0.9532
## Mean absolute error                      0.0381
## Root mean squared error                  0.138
## Relative absolute error                  7.6186 %
## Root relative squared error             27.6017 %
## Coverage of cases (0.95 level)         100      %
## Mean rel. region size (0.95 level)      60.3679 %
## Total Number of Instances              299
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  144   6 |   a = Monomer
##    1 148 |   b = Oligomer
##
## $AAC_DPC$Cross_Validation_10_Fold
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances         251               83.9465 %
## Incorrectly Classified Instances        48               16.0535 %
## Kappa statistic                          0.6789
## Mean absolute error                      0.1738
## Root mean squared error                  0.3848
## Relative absolute error                 34.7643 %
## Root relative squared error             76.95   %
## Coverage of cases (0.95 level)          88.9632 %
## Mean rel. region size (0.95 level)      61.0368 %
## Total Number of Instances              299
##
## === Detailed Accuracy By Class ===
##
##                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                 0.833    0.154    0.845      0.833    0.839      0.679    0.870     0.840     Monome
##                 0.846    0.167    0.834      0.846    0.840      0.679    0.870     0.840     Oligom
## Weighted Avg.   0.839    0.160    0.840      0.839    0.839      0.679    0.870     0.840
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  125  25 |   a = Monomer
##   23 126 |   b = Oligomer
##
## $AAC_DPC$Testing
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances          65               85.5263 %
## Incorrectly Classified Instances        11               14.4737 %
## Kappa statistic                          0.7105
## Mean absolute error                      0.1485
## Root mean squared error                  0.3562
```

```
## Relative absolute error                 29.6792 %
## Root relative squared error             71.1894 %
## Coverage of cases (0.95 level)          90.7895 %
## Mean rel. region size (0.95 level)      61.8421 %
## Total Number of Instances               76
##
## === Detailed Accuracy By Class ===
##
##                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                 0.789    0.079    0.909      0.789    0.845      0.717    0.882     0.833     Monome
##                 0.921    0.211    0.814      0.921    0.864      0.717    0.882     0.858     Oligom
## Weighted Avg.   0.855    0.145    0.862      0.855    0.855      0.717    0.882     0.846
##
## === Confusion Matrix ===
##
##   a  b   <-- classified as
##  30  8 |  a = Monomer
##   3 35 |  b = Oligomer
##
##
## $AAC_PCP
## $AAC_PCP$Training
##
## === Summary ===
##
## Correctly Classified Instances         296               98.9967 %
## Incorrectly Classified Instances         3                1.0033 %
## Kappa statistic                          0.9799
## Mean absolute error                      0.0156
## Root mean squared error                  0.0883
## Relative absolute error                  3.1216 %
## Root relative squared error             17.6679 %
## Coverage of cases (0.95 level)         100      %
## Mean rel. region size (0.95 level)      53.1773 %
## Total Number of Instances              299
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  149   1 |   a = Monomer
##    2 147 |   b = Oligomer
##
## $AAC_PCP$Cross_Validation_10_Fold
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances         238               79.5987 %
## Incorrectly Classified Instances        61               20.4013 %
## Kappa statistic                          0.592
## Mean absolute error                      0.2085
## Root mean squared error                  0.4482
## Relative absolute error                 41.7058 %
## Root relative squared error             89.6348 %
```

```
## Coverage of cases (0.95 level)          80.2676 %
## Mean rel. region size (0.95 level)      51.1706 %
## Total Number of Instances              299
##
## === Detailed Accuracy By Class ===
##
##                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                 0.793    0.201    0.799      0.793    0.796      0.592    0.796     0.743     Monome
##                 0.799    0.207    0.793      0.799    0.796      0.592    0.796     0.752     Oligom
## Weighted Avg.   0.796    0.204    0.796      0.796    0.796      0.592    0.796     0.747
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  119  31 |   a = Monomer
##   30 119 |   b = Oligomer
##
## $AAC_PCP$Testing
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances          62               81.5789 %
## Incorrectly Classified Instances        14               18.4211 %
## Kappa statistic                          0.6316
## Mean absolute error                      0.1869
## Root mean squared error                  0.4258
## Relative absolute error                 37.3452 %
## Root relative squared error             85.1027 %
## Coverage of cases (0.95 level)          81.5789 %
## Mean rel. region size (0.95 level)      50      %
## Total Number of Instances               76
##
## === Detailed Accuracy By Class ===
##
##                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                 0.816    0.184    0.816      0.816    0.816      0.632    0.832     0.779     Monome
##                 0.816    0.184    0.816      0.816    0.816      0.632    0.832     0.791     Oligom
## Weighted Avg.   0.816    0.184    0.816      0.816    0.816      0.632    0.832     0.785
##
## === Confusion Matrix ===
##
##   a  b   <-- classified as
##  31  7 |  a = Monomer
##   7 31 |  b = Oligomer
##
##
## $DPC_PCP
## $DPC_PCP$Training
##
## === Summary ===
##
## Correctly Classified Instances         291               97.3244 %
## Incorrectly Classified Instances         8                2.6756 %
```

```
## Kappa statistic                          0.9465
## Mean absolute error                      0.0506
## Root mean squared error                  0.1591
## Relative absolute error                 10.126  %
## Root relative squared error             31.8213 %
## Coverage of cases (0.95 level)         100      %
## Mean rel. region size (0.95 level)      74.9164 %
## Total Number of Instances              299
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  149   1 |   a = Monomer
##    7 142 |   b = Oligomer
##
## $DPC_PCP$Cross_Validation_10_Fold
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances         243               81.2709 %
## Incorrectly Classified Instances        56               18.7291 %
## Kappa statistic                          0.6254
## Mean absolute error                      0.1927
## Root mean squared error                  0.4213
## Relative absolute error                 38.5419 %
## Root relative squared error             84.2602 %
## Coverage of cases (0.95 level)          84.6154 %
## Mean rel. region size (0.95 level)      54.3478 %
## Total Number of Instances              299
##
## === Detailed Accuracy By Class ===
##
##                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                 0.800    0.174    0.822      0.800    0.811      0.626    0.826     0.795     Monome
##                 0.826    0.200    0.804      0.826    0.815      0.626    0.826     0.777     Oligom
## Weighted Avg.   0.813    0.187    0.813      0.813    0.813      0.626    0.826     0.786
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  120  30 |   a = Monomer
##   26 123 |   b = Oligomer
##
## $DPC_PCP$Testing
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances          67               88.1579 %
## Incorrectly Classified Instances         9               11.8421 %
## Kappa statistic                          0.7632
## Mean absolute error                      0.1278
## Root mean squared error                  0.3424
```

```
## Relative absolute error                 25.5345 %
## Root relative squared error             68.4233 %
## Coverage of cases (0.95 level)          88.1579 %
## Mean rel. region size (0.95 level)      50      %
## Total Number of Instances               76
##
## === Detailed Accuracy By Class ===
##
##                  TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                  0.868    0.105    0.892      0.868    0.880      0.763    0.862     0.844     Monome
##                  0.895    0.132    0.872      0.895    0.883      0.763    0.862     0.792     Oligom
## Weighted Avg.    0.882    0.118    0.882      0.882    0.882      0.763    0.862     0.818
##
## === Confusion Matrix ===
##
##   a  b   <-- classified as
##  33  5 |  a = Monomer
##   4 34 |  b = Oligomer
##
##
## $ALL
## $ALL$Training
##
## === Summary ===
##
## Correctly Classified Instances         291               97.3244 %
## Incorrectly Classified Instances         8                2.6756 %
## Kappa statistic                          0.9465
## Mean absolute error                      0.0506
## Root mean squared error                  0.1591
## Relative absolute error                 10.126  %
## Root relative squared error             31.8213 %
## Coverage of cases (0.95 level)         100      %
## Mean rel. region size (0.95 level)      74.9164 %
## Total Number of Instances              299
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  149   1 |   a = Monomer
##    7 142 |   b = Oligomer
##
## $ALL$Cross_Validation_10_Fold
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances         244               81.6054 %
## Incorrectly Classified Instances        55               18.3946 %
## Kappa statistic                          0.6321
## Mean absolute error                      0.1894
## Root mean squared error                  0.4173
## Relative absolute error                 37.873  %
## Root relative squared error             83.4626 %
```

```
## Coverage of cases (0.95 level)          84.9498 %
## Mean rel. region size (0.95 level)      54.3478 %
## Total Number of Instances              299
##
## === Detailed Accuracy By Class ===
##
##                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                 0.800    0.168    0.828      0.800    0.814      0.632    0.831     0.803     Monome
##                 0.832    0.200    0.805      0.832    0.818      0.632    0.831     0.780     Oligor
## Weighted Avg.   0.816    0.184    0.816      0.816    0.816      0.632    0.831     0.792
##
## === Confusion Matrix ===
##
##    a   b   <-- classified as
##  120  30 |   a = Monomer
##   25 124 |   b = Oligomer
##
## $ALL$Testing
## === 10 Fold Cross Validation ===
##
## === Summary ===
##
## Correctly Classified Instances          67               88.1579 %
## Incorrectly Classified Instances         9               11.8421 %
## Kappa statistic                          0.7632
## Mean absolute error                      0.1278
## Root mean squared error                  0.3424
## Relative absolute error                 25.5345 %
## Root relative squared error             68.4233 %
## Coverage of cases (0.95 level)          88.1579 %
## Mean rel. region size (0.95 level)      50      %
## Total Number of Instances               76
##
## === Detailed Accuracy By Class ===
##
##                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
##                 0.868    0.105    0.892      0.868    0.880      0.763    0.862     0.844     Monome
##                 0.895    0.132    0.872      0.895    0.883      0.763    0.862     0.792     Oligor
## Weighted Avg.   0.882    0.118    0.882      0.882    0.882      0.763    0.862     0.818
##
## === Confusion Matrix ===
##
##   a  b   <-- classified as
##  33  5 |  a = Monomer
##   4 34 |  b = Oligomer
```

Performance table of J48 for training, 10-fold cross validation and external validation.

```
library(knitr)
x <- getURL("https://raw.githubusercontent.com/Rnewbie/OliFP/master/OliFPJ48.csv")
OliFPJ48 <- read.csv(text=x, header = TRUE)
kable(OliFPJ48, align = 'c', format = "markdown")
```

Des	Acc.tr	Sen.tr	Spe.tr	MCC.tr	Acc.cv	Sen.cv	Spe.cv	MCC.cv	Acc.tes	Sen.tes	Spe.tes	MCC
AAC	89.97	91.28	88.67	0.80	78.26	74.50	82.00	0.57	81.58	81.58	81.58	0.6
DPC	94.98	93.96	96.00	0.90	85.62	82.55	88.67	0.71	81.58	84.21	78.95	0.6
PCP	99.00	98.66	99.33	0.98	81.27	81.21	81.33	0.63	85.51	84.21	86.84	0.7
AAC+DPC	97.99	99.33	96.64	0.96	83.95	84.56	83.33	0.68	85.53	92.11	78.95	0.7
AAC+PCP	99.00	98.66	99.33	0.98	79.60	79.87	79.33	0.59	81.58	81.58	81.58	0.6
DPC+PCP	97.32	95.30	99.33	0.95	81.27	82.55	80.00	0.63	88.16	89.47	86.84	0.7
ALL	97.32	95.30	99.33	0.95	81.61	83.22	80.00	0.63	88.16	89.47	86.84	0.7