Using MBatch Corrections: EB_withParametricPriors

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2018-05-03

1   Introduction

These instructions are aimed at people familiar with R and familiar with TCGA/GDC platforms and data types. They are intended to introduce the reader to producing the given assessment. These instructions will only rarely, if ever, touch on the appropriateness of the assessment algorithm or interpretation of output. See MBatch_01_InstallLinux for instructions on downloading test data.

2   Algorithm

EB with Parametric Priors performs Empirical Bayes correction taking a BEA_DATA object (with data matrix and batch dataframe) and returning either a corrected matrix or a string containing the path to where the data file was written.

3   Output

The primary output method for MBatch is to view results in the Batch Effects Website. Correction algorithms generally do not create graphical output and instead create TSV output files.

4   Usage

EB_withParametricPriors(theBeaData, theBatchIdsNotToCorrect, theDoCheckPlotsFlag, theBatchType, theThreads = 1, thePath = NULL, theWriteToFile = FALSE)

5   Arguments

5.1   theBeaData

BEA_DATA objects can be created by calls of the form new("BEA_DATA", theData, theBatches, theCovariates). If you have no covariate data, use an empty data.frame created with data.frame()

mData: Object of class "matrix" A matrix where the colnames are sample ids and the rownames are gene equivalents. All names should be strings, not factors.

mBatches: Object of class "data.frame" A data.frame where the column "names" are batch types. The first batch "type" is "Sample". All names and values should be strings, not factors or numeric.

mCovariates: Object of class "data.frame" A data.frame where the column "names" are covariate types. The first covariate "type" is "Sample". All names and values should be strings, not factors or numeric.

5.2   theBatchIdsNotToCorrect

A vector of strings giving batch names/ids within the batch type that should not be corrected

5.3   theDoCheckPlotsFlag

Defaults to FALSE. TRUE indicates a prior plots image should be created.

5.4   theBatchType

A string identifying the batch type to correct.

5.5   theThreads

Integer defaulting to 1. Number of threads to use for calculating priors.

5.6   thePath

Output path for any files.

5.7   theWriteToFile

TRUE to write the corrected data to file and return the file pathname instead of the corrected matrix.

6   Example Call

The following code is adapted from the tests/EB_withNonParametricPriors.R file. Data used is from the testing data as per the MBatch_01_InstallLinux document. In the future, we plan to make the output from MBatch more user friendly, but currently, this produces the following output at the command line.

```
{
  library(MBatch)

  # set the paths
  invariantFile="/bea_testing/MATRIX_DATA/rbn-pseudo-iset.tsv"
  variantFile="/bea_testing/MATRIX_DATA/rbn-pseudo-vset.tsv"
  theOutputDir="/bea_testing/output/RBN_Pseudoreplicates"
  theRandomSeed=314

  theGeneFile="/bea_testing/MATRIX_DATA/matrix_data-Tumor.tsv"
  theBatchFile="/bea_testing/MATRIX_DATA/batches-Tumor.tsv"
  theOutputDir="/bea_testing/output/EB_withParametricPriors"
  theRandomSeed=314
  theBatchType="TSS"

  # make sure the output dir exists and is empty
  unlink(theOutputDir, recursive=TRUE)
  dir.create(theOutputDir, showWarnings=FALSE, recursive=TRUE)
```

```r
  # load data
  myData <- mbatchLoadFiles(theGeneFile, theBatchFile)
  myData@mData <- mbatchTrimData(myData@mData, 100000)
  # call
  outputFile <- EB_withParametricPriors(theBeaData=myData,
                          theBatchIdsNotToCorrect=c(""),
                          theDoCheckPlotsFlag=TRUE,
                          theBatchType=theBatchType,
                          theThreads=1,
                          thePath=theOutputDir,
                          theWriteToFile=TRUE)
  correctedMatrix <- readAsGenericMatrix(outputFile)
  print(correctedMatrix[1:4, 1:4])
}
```

```
## 2018 05 03 13:39:29.836 DEBUG megazone23 Changing LC_COLLATE to C for duration of run
## 2018 05 03 13:39:29.836 INFO megazone23 \/ \/ \/ \/ \/ \/ \/ \/ \/ \/ \/ \/ \/
## 2018 05 03 13:39:29.837 INFO megazone23 Starting mbatchLoadFiles
## 2018 05 03 13:39:29.837 INFO megazone23 MBatch Version: 2017-09-19-1530
## 2018 05 03 13:39:29.837 INFO megazone23 read batch file= /bea_testing/MATRIX_DATA/batches-Tumor.tsv
## 2018 05 03 13:39:29.839 INFO megazone23 read gene file= /bea_testing/MATRIX_DATA/matrix_data-Tumor.t:
## 2018 05 03 13:39:39.318 INFO megazone23 filter samples in batches using gene samples
## 2018 05 03 13:39:39.319 INFO megazone23 sort batches by gene file samples
## 2018 05 03 13:39:39.410 INFO megazone23 Finishing mbatchLoadFiles
## 2018 05 03 13:39:39.410 INFO megazone23 ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
## 2018 05 03 13:39:39.411 DEBUG megazone23 Changing LC_COLLATE to C for duration of run
## 2018 05 03 13:39:39.411 INFO megazone23 \/ \/ \/ \/ \/ \/ \/ \/ \/ \/ \/ \/ \/
## 2018 05 03 13:39:39.411 INFO megazone23 mbatchTrimData Starting
## 2018 05 03 13:39:39.412 INFO megazone23 MBatch Version: 2017-09-19-1530
## 2018 05 03 13:39:46.526 INFO megazone23 mbatchTrimData Finishing
## 2018 05 03 13:39:46.527 INFO megazone23 ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
## 2018 05 03 13:39:46.528 INFO megazone23 EB_internal - starting
## 2018 05 03 13:39:46.528 DEBUG megazone23 checkCreateDir:  /bea_testing/output/EB_withParametricPriors
## 2018 05 03 13:39:46.717 DEBUG megazone23 starting BeaEB
## 2018 05 03 13:39:46.718 DEBUG megazone23 EB start
## 2018 05 03 13:39:46.719 DEBUG megazone23 convertDataFrameToSi start
## 2018 05 03 13:39:46.719 DEBUG megazone23 convertDataFrameToSi asmatrixWithIssues
## 2018 05 03 13:39:46.720 DEBUG megazone23 convertDataFrameToSi rownames
## 2018 05 03 13:39:46.720 DEBUG megazone23 convertDataFrameToSi colnames
## 2018 05 03 13:39:46.720 DEBUG megazone23 convertDataFrameToSi done
## 2018 05 03 13:39:46.723 DEBUG megazone23 EB check number of batches
## 2018 05 03 13:39:46.724 DEBUG megazone23 EB Check for missing values
## 2018 05 03 13:39:46.724 DEBUG megazone23 Check for genes with whole batch missing or no variation
## 2018 05 03 13:39:47.021 DEBUG megazone23 Standardizing Data across genes
## 2018 05 03 13:39:47.082 DEBUG megazone23 Standarization Model
## 2018 05 03 13:39:47.108 DEBUG megazone23 stand.mean
## 2018 05 03 13:39:47.110 DEBUG megazone23 Fitting L/S model and finding priors
## 2018 05 03 13:39:47.110 DEBUG megazone23 with NAs
## 2018 05 03 13:39:47.304 DEBUG megazone23 Find priors
## 2018 05 03 13:39:47.306 DEBUG megazone23 Plot empirical and parametric priors
## 2018 05 03 13:39:47.306 DEBUG megazone23 Print prior plots at  /bea_testing/output/EB_withParametricl

## 2018 05 03 13:39:47.374 DEBUG megazone23 finished prior plots
## 2018 05 03 13:39:47.468 DEBUG megazone23 Find EB batch adjustments
```

```
## 2018 05 03 13:39:47.469 DEBUG megazone23 Finding parametric adjustments
## 2018 05 03 13:39:47.546 DEBUG megazone23 Adjusting the Data
## 2018 05 03 13:39:47.549 DEBUG megazone23 add back the removed genes with missing data in whole batch
## 2018 05 03 13:39:47.549 DEBUG megazone23 EB done
## 2018 05 03 13:39:47.550 DEBUG megazone23 finishing BeaEB
## 2018 05 03 13:39:47.550 TIMING megazone23    0.831999999999994   0.833000000000538   EBwithParametri
## 2018 05 03 13:39:47.550 DEBUG megazone23 Write to file  /bea_testing/output/EB_withParametricPriors/
## 2018 05 03 13:39:47.658 DEBUG megazone23 Finished write to file  /bea_testing/output/EB_withParametri
## 2018 05 03 13:39:47.658 INFO megazone23 EB_internal - completed
##                              TCGA-OR-A5J1-01A-11D-A29J-05
## ABR-cg06968724-17-1012579                    0.02849124
## ABR-cg23568341-17-1011974                    0.03145029
## ABR-cg24479027-17-1012576                    0.03469018
## ACOT7-cg16034168-1-6336711                   0.94492223
##                              TCGA-OR-A5J2-01A-11D-A29J-05
## ABR-cg06968724-17-1012579                    0.03034496
## ABR-cg23568341-17-1011974                    0.03843613
## ABR-cg24479027-17-1012576                    0.03859833
## ACOT7-cg16034168-1-6336711                   0.08647952
##                              TCGA-OR-A5J3-01A-11D-A29J-05
## ABR-cg06968724-17-1012579                    0.87724201
## ABR-cg23568341-17-1011974                    0.81419298
## ABR-cg24479027-17-1012576                    0.89434359
## ACOT7-cg16034168-1-6336711                   0.08873563
##                              TCGA-OR-A5J4-01A-11D-A29J-05
## ABR-cg06968724-17-1012579                    0.9017521
## ABR-cg23568341-17-1011974                    0.8916143
## ABR-cg24479027-17-1012576                    0.9017029
## ACOT7-cg16034168-1-6336711                   0.9089894
```

7   Example File Output

The above code creates the following output file. File is named using the following naming convention:
ANY_Corrections-EBwithParametricPriors.tsv The TSV file with the corrected dataset is written by the
MBatch package. The end of the output shows a snippet from the corrected matrix.