Univariate: DARWIN

Jose Tamez

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Contents

DARWIN Univariate

Loading the libraries

```
library("FRESA.CAD")
library(readxl)
op <- par(no.readonly = TRUE)
pander::panderOptions('digits', 3)
pander::panderOptions('table.split.table', 400)
pander::panderOptions('keep.trailing.zeros',TRUE)
```

The Data

```
DARWIN <- read.csv("~/GitHub/FCA/Data/DARWIN/DARWIN.csv")
rownames(DARWIN) <- DARWIN$ID
DARWIN$ID <- NULL
DARWIN$class <- 1*(DARWIN$class=="P")
print(table(DARWIN$class))
#>
#>  0  1
#> 85 89


DARWIN[,1:ncol(DARWIN)] <- sapply(DARWIN,as.numeric)



dataframe <- DARWIN
outcome <- "class"


pander::pander(c(rows=nrow(dataframe),col=ncol(dataframe)-1))
```

Standarize the names for the reporting

rows	col
174	450

```
pander::pander(table(dataframe[,outcome]))
```

0	1
85	89

```
varlist <- colnames(dataframe)
varlist <- varlist[varlist != outcome]
varlist <- as.data.frame(cbind(name=varlist,desc=varlist))
```

Univariate

```
univariate_columns <- c("caseMean","caseStd","controlMean","controlStd","controlKSP","ROCAUC","WilcoxRe
univar <- uniRankVar(varlist,
              paste(outcome,"~1"),
              outcome,
              dataframe,
              categorizationType = "Raw",
              type = "LOGIT",
              rankingTest = "AUC",
               cateGroups = c(0.1, 0.9),
               raw.dataFrame = NULL,
               description = ".",
               uniType = "Binary")
```

100 : mean_jerk_in_air6 200 : disp_index12 300 : mean_speed_in_air17 400 : gmrt_on_paper23

```
pander::pander(univar$orderframe[1:20,univariate_columns])
```

	caseMean	caseStd	controlMean	controlStd	controlKSP	ROCAUC	WilcoxRes.p	FRes.p
total_time23	1.70e+04	1.10e+04	1.18e+04	3.15e+04	4.26e-13	0.863	1.40e-13	9.35e-05
total_time15	5.34e+04	6.17e+04	1.48e+04	6.66e+03	1.42e-02	0.844	1.03e-15	0.00e+00
air_time23	9.79e+03	7.42e+03	7.38e+03	3.14e+04	5.73e-14	0.844	7.90e-11	1.57e-01
air_time15	4.38e+04	5.81e+04	9.39e+03	5.46e+03	3.71e-02	0.829	4.82e-15	0.00e+00
total_time17	7.44e+04	1.03e+05	3.50e+04	4.42e+04	1.39e-09	0.824	3.94e-12	6.39e-10
paper_time23	7.24e+03	4.56e+03	4.43e+03	1.08e+03	1.45e-01	0.814	2.30e-12	1.21e-14
air_time17	5.09e+04	1.01e+05	1.96e+04	4.39e+04	2.22e-11	0.806	9.71e-11	2.72e-07
paper_time17	2.35e+04	1.31e+04	1.54e+04	4.69e+03	2.55e-02	0.796	5.43e-11	2.65e-12
total_time6	1.77e+04	1.72e+04	6.93e+03	3.64e+03	1.14e-02	0.790	6.24e-12	7.99e-14
air_time16	1.03e+04	1.02e+04	2.91e+03	2.77e+03	2.89e-03	0.787	4.24e-12	5.01e-14
total_time2	2.20e+04	1.93e+04	9.97e+03	5.14e+03	4.98e-01	0.787	6.85e-12	1.88e-13
disp_index23	1.02e-05	2.08e-06	8.37e-06	1.45e-06	8.73e-02	0.787	4.32e-11	6.25e-12
total_time7	1.78e+04	1.52e+04	1.77e+04	5.43e+04	1.78e-15	0.785	6.19e-07	4.90e-01
total_time16	1.45e+04	1.24e+04	5.81e+03	4.54e+03	1.21e-03	0.784	5.43e-11	5.47e-12
air_time6	1.29e+04	1.43e+04	4.46e+03	3.39e+03	2.81e-03	0.784	2.20e-11	4.92e-13

	caseMean	caseStd	controlMean	controlStd	controlKSP	ROCAUC	WilcoxRes.p	FRes.p
total_time22	3.48e+04	1.56e+05	8.84e+03	3.29e+03	1.25e-01	0.780	1.30e-11	1.61e-13
air_time7	1.22e+04	1.14e+04	1.49e+04	5.40e+04	5.55e-16	0.779	1.00e+00	3.26e-01
total_time8	1.27e+04	1.34e+04	4.97e+03	3.15e+03	6.98e-03	0.776	1.06e-10	5.11e-12
gmrt_in_air7	2.21e+02	9.09e+01	3.39e+02	1.33e+02	5.14e-01	0.775	2.21e-10	1.53e-11
total_time9	1.68e+04	1.45e+04	6.72e+03	3.40e+03	2.69e-01	0.774	5.06e-12	1.23e-13

```
topfiveOrg <- rownames(univar$orderframe[1:5,])
```

Decorrelation Analysis

```
DEdataframe <- GDSTMDecorrelation(dataframe,thr=0.80,verbose = TRUE)
```

Included: 450 , Uni p: 0.005342585 , Uncorrelated Base: 275 , Outcome-Driven Size: 0 , Base Size: 275

1 <R=1.000,w= 1,N= 116>, Top: 58(1)1 : 58 : 0.975,<|>Tot Used: 116 , Added: 58 , Zero Std: 0 , Max Cor: 1.000 2 <R=1.000,w= 1,N= 116>, Top: 7(1)1 : 7 : 0.975,<|>Tot Used: 123 , Added: 7 , Zero Std: 0 , Max Cor: 1.000 3 <R=1.000,w= 2,N= 59>, Top: 29(1)1 : 29 : 0.950,<|>Tot Used: 166 , Added: 30 , Zero Std: 0 , Max Cor: 1.000 4 <R=1.000,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.950,<|>Tot Used: 166 , Added: 8 , Zero Std: 0 , Max Cor: 1.000 5 <R=1.000,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.950,<|>Tot Used: 166 , Added: 8 , Zero Std: 0 , Max Cor: 1.000 6 <R=1.000,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.950,<|>Tot Used: 166 , Added: 8 , Zero Std: 0 , Max Cor: 1.000 7 <R=1.000,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.950,<|>Tot Used: 166 , Added: 8 , Zero Std: 0 , Max Cor: 1.000 8 <R=1.000,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.950,<|>Tot Used: 166 , Added: 8 , Zero Std: 0 , Max Cor: 1.000 9 <R=1.000,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.950,<|>Tot Used: 166 , Added: 8 , Zero Std: 0 , Max Cor: 1.000 10 <R=1.000,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.950,<|>Tot Used: 166 , Added: 8 , Zero Std: 0 , Max Cor: 1.000 11 <R=1.000,w= 2,N= 59>, Top: 7(1)1 : 7 : 0.950,<|>Tot Used: 166 , Added: 7 , Zero Std: 0 , Max Cor: 0.988 12 <R=0.988,w= 2,N= 59>, Top: 14(1)1 : 14 : 0.944,<|>Tot Used: 176 , Added: 14 , Zero Std: 0 , Max Cor: 0.988 13 <R=0.988,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.944,<|>Tot Used: 176 , Added: 8 , Zero Std: 0 , Max Cor: 0.988 14 <R=0.988,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.944,<|>Tot Used: 176 , Added: 8 , Zero Std: 0 , Max Cor: 0.988 15 <R=0.988,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.944,<|>Tot Used: 176 , Added: 8 , Zero Std: 0 , Max Cor: 0.988 16 <R=0.988,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.944,<|>Tot Used: 176 , Added: 8 , Zero Std: 0 , Max Cor: 0.988 17 <R=0.988,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.944,<|>Tot Used: 176 , Added: 8 , Zero Std: 0 , Max Cor: 0.988 18 <R=0.988,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.944,<|>Tot Used: 176 , Added: 8 , Zero Std: 0 , Max Cor: 0.987 19 <R=0.987,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.944,<|>Tot Used: 176 , Added: 8 , Zero Std: 0 , Max Cor: 0.985 20 <R=0.985,w= 2,N= 59>, Top: 8(1)1 : 8 : 0.943,<|>Tot Used: 176 , Added: 8 , Zero Std: 0 , Max Cor: 0.984 21 <R=0.984,w= 2,N= 59>, Top: 7(1)1 : 7 : 0.942,<|>Tot Used: 176 , Added: 7 , Zero Std: 0 , Max Cor: 0.983 22 <R=0.983,w= 2,N= 59>, Top: 7(1)1 : 7 : 0.942,<|>Tot Used: 176 , Added: 7 , Zero Std: 0 , Max Cor: 0.983 23 <R=0.983,w= 2,N= 59>, Top: 5(1)1 : 5 : 0.941,<|>Tot Used: 176 , Added: 5 , Zero Std: 0 , Max Cor: 0.971 24 <R=0.971,w= 3,N= 89>, Top: 43(1)1 : 43 : 0.886,<|>Tot Used: 237 , Added: 44 , Zero Std: 0 , Max Cor: 0.992 25 <R=0.992,w= 3,N= 89>, Top: 12(1)1 : 12 : 0.896,<|>Tot Used: 238 , Added: 12 , Zero Std: 0 , Max Cor: 0.992 26 <R=0.992,w= 3,N= 89>, Top: 12(1)1 : 12 : 0.896,<|>Tot Used: 238 , Added: 12 , Zero Std: 0 , Max Cor: 0.992 27 <R=0.992,w= 3,N= 89>, Top: 12(1)1 : 12 : 0.896,<|>Tot Used: 238 , Added: 12 , Zero Std: 0 , Max Cor: 0.992 28 <R=0.992,w= 3,N= 89>, Top: 11(1)1 : 11 : 0.896,<|>Tot Used: 238 , Added: 11 , Zero Std: 0 , Max Cor: 0.992 29 <R=0.992,w= 3,N= 89>, Top: 10(1)1 : 10 : 0.896,<|>Tot Used: 238 , Added: 10 , Zero Std: 0 , Max Cor: 0.992 30 <R=0.992,w= 3,N= 89>, Top: 10(1)1 : 10 : 0.896,<|>Tot Used: 238 , Added: 10 , Zero Std: 0 , Max Cor: 0.992 31 <R=0.992,w= 3,N= 89>, Top: 10(1)1 : 10 : 0.896,<|>Tot Used: 238 , Added: 10 , Zero Std: 0 , Max Cor: 0.992 32 <R=0.992,w= 3,N= 89>, Top: 10(1)1 : 10 : 0.896,<|>Tot Used: 238 , Added: 10 , Zero Std: 0 , Max Cor: 0.992 33 <R=0.992,w= 3,N= 89>, Top: 10(1)1 : 10 : 0.896,<|>Tot Used: 238 , Added: 10 , Zero Std: 0 , Max Cor: 0.986 34 <R=0.986,w= 3,N= 89>, Top: 10(1)1 : 10 : 0.893,<|>Tot Used: 238 , Added: 10 , Zero Std: 0 , Max Cor:

0.984 35 <R=0.984,w= 3,N= 89>, Top: 9(1)1 : 9 : 0.892,<|>Tot Used: 238 , Added: 9 , Zero Std: 0 , Max Cor: 0.958 36 <R=0.958,w= 3,N= 89>, Top: 12(1)1 : 12 : 0.879,<|>Tot Used: 240 , Added: 12 , Zero Std: 0 , Max Cor: 0.968 37 <R=0.968,w= 3,N= 89>, Top: 10(1)1 : 10 : 0.884,<|>Tot Used: 240 , Added: 10 , Zero Std: 0 , Max Cor: 0.968 38 <R=0.968,w= 3,N= 89>, Top: 10(1)1 : 10 : 0.884,<|>Tot Used: 240 , Added: 10 , Zero Std: 0 , Max Cor: 0.968 39 <R=0.968,w= 3,N= 89>, Top: 10(1)1 : 10 : 0.884,<|>Tot Used: 240 , Added: 10 , Zero Std: 0 , Max Cor: 0.968 40 <R=0.968,w= 3,N= 89>, Top: 10(1)1 : 10 : 0.884,<|>Tot Used: 240 , Added: 10 , Zero Std: 0 , Max Cor: 0.968 41 <R=0.968,w= 3,N= 89>, Top: 9(1)1 : 9 : 0.884,<|>Tot Used: 240 , Added: 9 , Zero Std: 0 , Max Cor: 0.968 42 <R=0.968,w= 3,N= 89>, Top: 8(1)1 : 8 : 0.884,<|>Tot Used: 240 , Added: 8 , Zero Std: 0 , Max Cor: 0.968 43 <R=0.968,w= 4,N= 91>, Top: 45(1)1 : 45 : 0.834,<|>Tot Used: 289 , Added: 45 , Zero Std: 0 , Max Cor: 0.968 44 <R=0.968,w= 4,N= 91>, Top: 16(1)1 : 16 : 0.834,<|>Tot Used: 289 , Added: 16 , Zero Std: 0 , Max Cor: 0.968 45 <R=0.968,w= 4,N= 91>, Top: 16(1)1 : 16 : 0.834,<|>Tot Used: 289 , Added: 16 , Zero Std: 0 , Max Cor: 0.968 46 <R=0.968,w= 4,N= 91>, Top: 16(1)1 : 16 : 0.834,<|>Tot Used: 289 , Added: 16 , Zero Std: 0 , Max Cor: 0.968 47 <R=0.968,w= 4,N= 91>, Top: 15(1)1 : 15 : 0.834,<|>Tot Used: 289 , Added: 15 , Zero Std: 0 , Max Cor: 0.968 48 <R=0.968,w= 4,N= 91>, Top: 14(1)1 : 14 : 0.834,<|>Tot Used: 289 , Added: 14 , Zero Std: 0 , Max Cor: 0.967 49 <R=0.967,w= 4,N= 91>, Top: 12(1)1 : 12 : 0.834,<|>Tot Used: 289 , Added: 12 , Zero Std: 0 , Max Cor: 0.966 50 <R=0.966,w= 4,N= 91>, Top: 12(1)1 : 12 : 0.833,<|>Tot Used: 289 , Added: 12 , Zero Std: 0 , Max Cor: 0.945 51 <R=0.945,w= 4,N= 91>, Top: 15(1)1 : 15 : 0.823,<|>Tot Used: 292 , Added: 15 , Zero Std: 0 , Max Cor: 0.938 52 <R=0.938,w= 4,N= 91>, Top: 12(1)1 : 12 : 0.819,<|>Tot Used: 292 , Added: 12 , Zero Std: 0 , Max Cor: 0.938 53 <R=0.938,w= 4,N= 91>, Top: 12(1)1 : 12 : 0.819,<|>Tot Used: 292 , Added: 12 , Zero Std: 0 , Max Cor: 0.938 54 <R=0.938,w= 4,N= 91>, Top: 12(1)1 : 12 : 0.819,<|>Tot Used: 292 , Added: 12 , Zero Std: 0 , Max Cor: 0.938 55 <R=0.938,w= 4,N= 91>, Top: 12(1)1 : 12 : 0.819,<|>Tot Used: 292 , Added: 12 , Zero Std: 0 , Max Cor: 0.938 56 <R=0.938,w= 4,N= 91>, Top: 12(1)1 : 12 : 0.819,<|>Tot Used: 292 , Added: 12 , Zero Std: 0 , Max Cor: 0.938 57 <R=0.938,w= 4,N= 91>, Top: 12(1)1 : 12 : 0.819,<|>Tot Used: 292 , Added: 12 , Zero Std: 0 , Max Cor: 0.938 58 <R=0.938,w= 4,N= 91>, Top: 12(1)1 : 12 : 0.819,<|>Tot Used: 292 , Added: 12 , Zero Std: 0 , Max Cor: 0.938 59 <R=0.938,w= 4,N= 91>, Top: 12(1)1 : 12 : 0.819,<|>Tot Used: 292 , Added: 12 , Zero Std: 0 , Max Cor: 0.938 60 <R=0.938,w= 4,N= 91>, Top: 12(1)1 : 12 : 0.819,<|>Tot Used: 292 , Added: 12 , Zero Std: 0 , Max Cor: 0.937 61 <R=0.937,w= 4,N= 91>, Top: 11(1)1 : 11 : 0.819,<|>Tot Used: 292 , Added: 11 , Zero Std: 0 , Max Cor: 0.932 62 <R=0.932,w= 4,N= 91>, Top: 14(1)1 : 14 : 0.816,<|>Tot Used: 298 , Added: 14 , Zero Std: 0 , Max Cor: 0.913 63 <R=0.913,w= 4,N= 91>, Top: 19(1)1 : 19 : 0.806,<|>Tot Used: 305 , Added: 20 , Zero Std: 0 , Max Cor: 0.901 64 <R=0.901,w= 4,N= 91>, Top: 18(1)1 : 18 : 0.801,<|>Tot Used: 312 , Added: 19 , Zero Std: 0 , Max Cor: 0.890 65 <R=0.890,w= 4,N= 91>, Top: 10(1)1 : 10 : 0.800,<|>Tot Used: 312 , Added: 10 , Zero Std: 0 , Max Cor: 0.872 66 <R=0.872,w= 4,N= 91>, Top: 10(1)1 : 10 : 0.800,<|>Tot Used: 312 , Added: 10 , Zero Std: 0 , Max Cor: 0.870 67 <R=0.870,w= 4,N= 91>, Top: 9(1)1 : 9 : 0.800,<|>Tot Used: 312 , Added: 9 , Zero Std: 0 , Max Cor: 0.869 68 <R=0.869,w= 5,N= 16>, Top: 8(1)1 : 8 : 0.800,<|>Tot Used: 312 , Added: 8 , Zero Std: 0 , Max Cor: 0.866 69 <R=0.866,w= 5,N= 16>, Top: 8(1)1 : 8 : 0.800,<|>Tot Used: 312 , Added: 8 , Zero Std: 0 , Max Cor: 0.861 70 <R=0.861,w= 5,N= 16>, Top: 8(1)1 : 8 : 0.800,<|>Tot Used: 312 , Added: 8 , Zero Std: 0 , Max Cor: 0.852 71 <R=0.852,w= 5,N= 16>, Top: 8(1)1 : 8 : 0.800,<|>Tot Used: 312 , Added: 8 , Zero Std: 0 , Max Cor: 0.846 72 <R=0.846,w= 5,N= 16>, Top: 7(1)1 : 7 : 0.800,<|>Tot Used: 312 , Added: 7 , Zero Std: 0 , Max Cor: 0.846 73 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 74 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 75 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 76 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 77 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 78 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 79 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 80 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 81 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 82 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 83 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 84 <R=0.846,w= 5,N= 16>,

Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 85 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 86 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 87 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 88 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 89 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 90 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 91 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 92 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 93 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 94 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.846 95 <R=0.846,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.845 96 <R=0.845,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.841 97 <R=0.841,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.837 98 <R=0.837,w= 5,N= 16>, Top: 6(1)1 : 6 : 0.800,<|>Tot Used: 312 , Added: 6 , Zero Std: 0 , Max Cor: 0.833 99 <R=0.833,w= 5,N= 16>, Top: 4(1)1 : 4 : 0.800,<|>Tot Used: 312 , Added: 4 , Zero Std: 0 , Max Cor: 0.824 100 <R=0.824,w= 5,N= 16>, Top: 4(1)1 : 4 : 0.800,<|>Tot Used: 312 , Added: 4 , Zero Std: 0 , Max Cor: 0.824-{ air_time5 paper_time13 gmrt_on_paper17 disp_index18 air_time21 }- [100], 0.9949251 Decor Dimension: 312 . Cor to Base: 158 , ABase: 140 , Outcome Base: 0

```
demat <- attr(DEdataframe,"GDSTM")
```

```
pander::pander(c(Cols=ncol(demat),Rows=nrow(demat)))
```

Cols	Rows
312	312

```
totFe <- ncol(DEdataframe)-1
totBa <- sum(str_detect(colnames(DEdataframe),"Ba_"))
totDe <- sum(str_detect(colnames(DEdataframe),"La_"))
toUnmat <- sum(apply(demat!=0,2,sum)==1)
unaltered <- totFe - ncol(demat) + toUnmat
pander::pander(c(Features=totFe,totBa=totBa,totDe=totDe,unaltered=totFe-totBa-totDe,totuna=unaltered))
```

Features	totBa	totDe	unaltered	totuna
450	0	167	283	283

```
pander::pander(c(Decorrleated_Fraction=sum(str_detect(colnames(DEdataframe),"La_"))/(ncol(DEdataframe)-
```

Decorrleated_Fraction
0.371

```
pander::pander(c(Base_Fraction=sum(str_detect(colnames(DEdataframe),"Ba_"))/(ncol(DEdataframe)-1)))
```

Base_Fraction
0

```
pander::pander(c(Unaltered_Fraction=unaltered/totFe))
```

| Unaltered_Fraction |
|---|
| 0.629 |

```
pander::pander(c(sparcity=(totFe-ncol(demat)+sum(abs(demat)!=0))/totFe/totFe))
```

| sparcity |
|---|
| 0.00322 |

```
varlistDe <-  colnames(demat)[apply(demat!=0,2,sum)>1];
varlistDe <- as.data.frame(cbind(name=varlistDe,desc=varlistDe))
```

The heat maps.

```
par(cex=0.6,cex.main=0.85,cex.axis=0.7)
cormat <- cor(dataframe[,rownames(demat)],method="spearman")
cormat[is.na(cormat)] <- 0
gplots::heatmap.2(abs(cormat),
                  trace = "none",
#                   scale = "row",
                  mar = c(5,5),
                  col=rev(heat.colors(5)),
                  main = "Spearman Correlation Original",
                  cexRow = 0.35,
                  cexCol = 0.35,
                  key.title=NA,
                  key.xlab="Spearman Correlation",
                  xlab="Feature", ylab="Feature")
```

Spearman Correlation Original
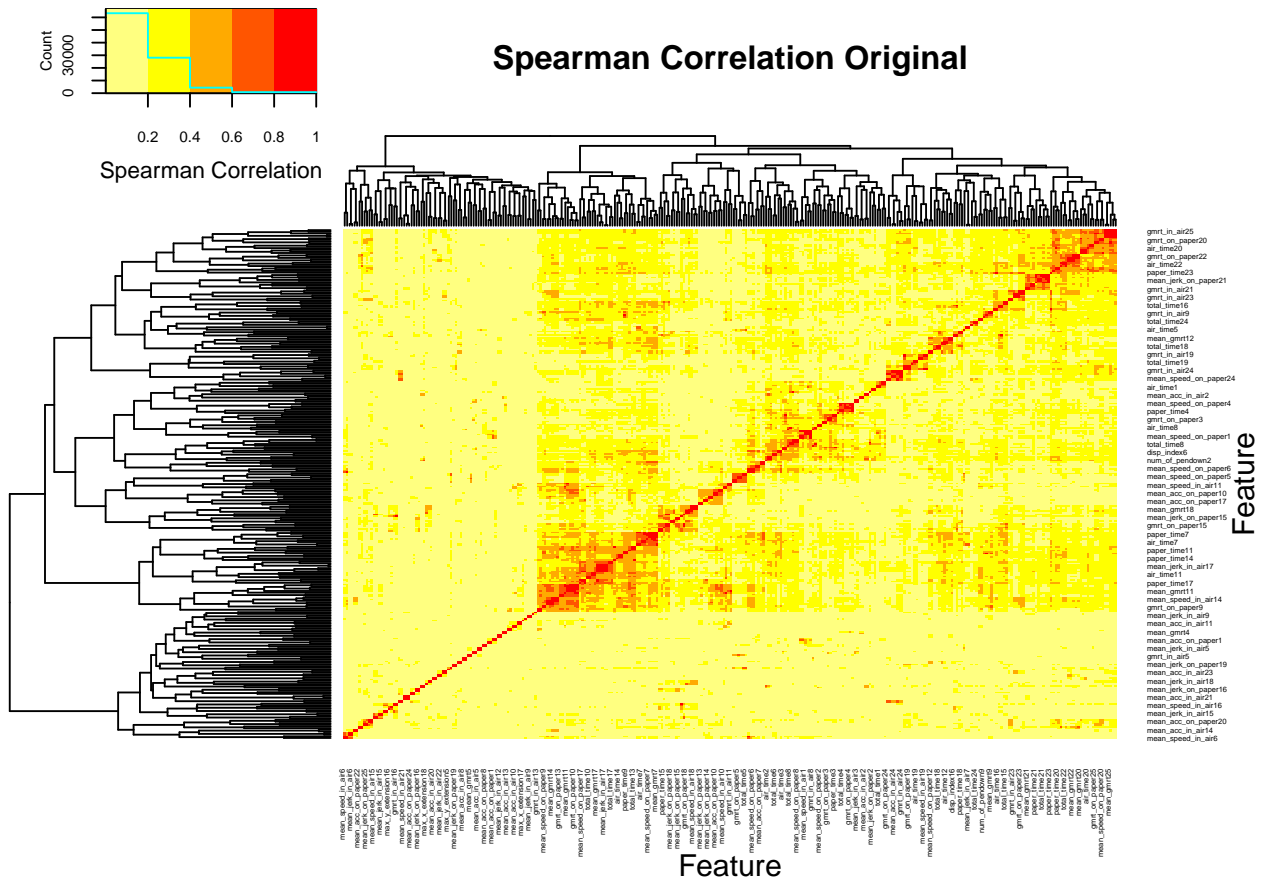
```r
cormat <- cor(DEdataframe[,colnames(demat)],method="spearman")
cormat[is.na(cormat)] <- 0
gplots::heatmap.2(abs(cormat),
                  trace = "none",
#                   scale = "none",
                  mar = c(5,5),
                  col=rev(heat.colors(5)),
                  main = "Spearman Correlation: After GDSTM",
                  cexRow = 0.35,
                  cexCol = 0.35,
                  key.title=NA,
                  key.xlab="Spearman Correlation",
                  xlab="Feature", ylab="Feature")
```

Spearman Correlation: After GDSTM
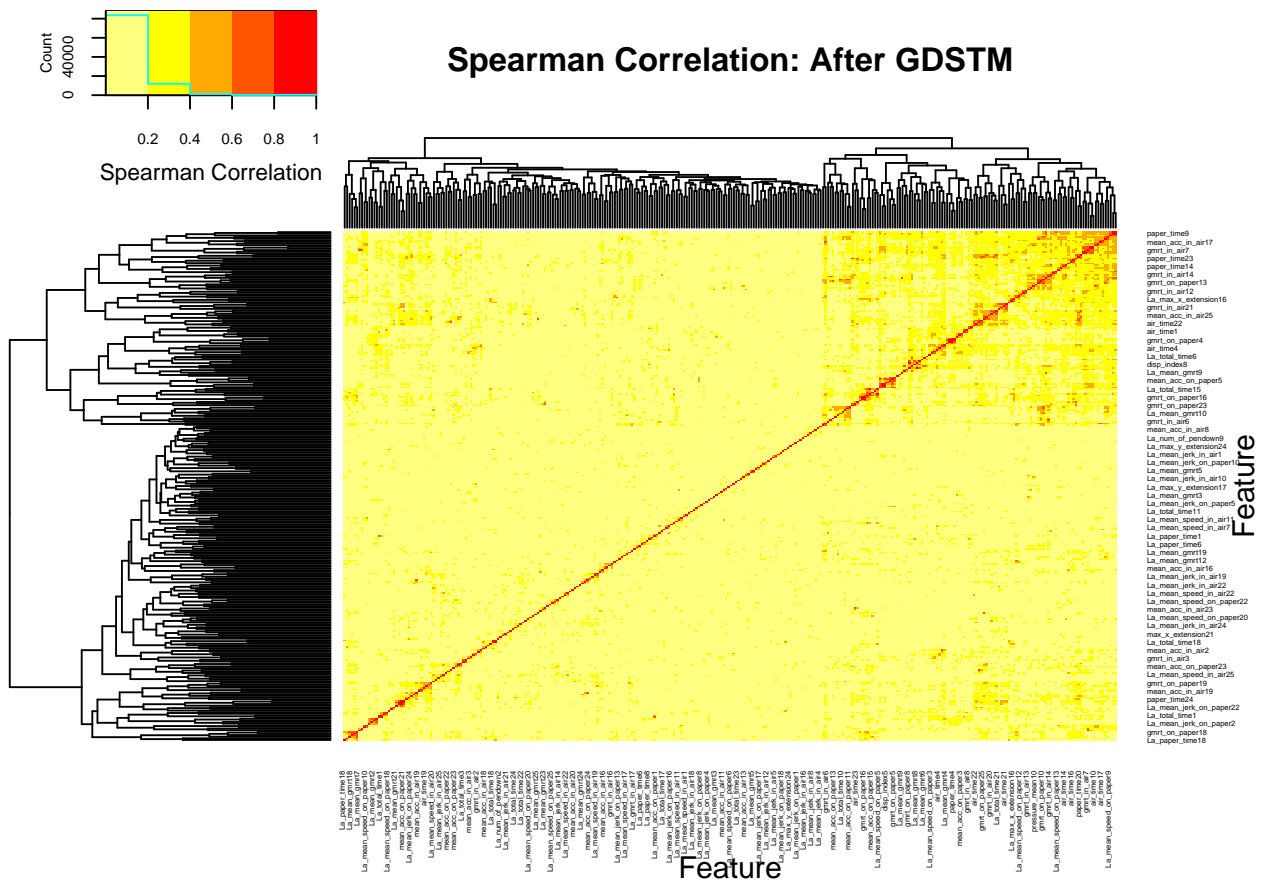
```
par(op)
```

Univariate Decorrelated

```r
univarDe <- uniRankVar(varlistDe,
            paste(outcome,"~1"),
              outcome,
            DEdataframe,
              categorizationType = "Raw",
              type = "LOGIT",
              rankingTest = "AUC",
              cateGroups = c(0.1, 0.9),
              raw.dataFrame = NULL,
              description = ".",
              uniType = "Binary")
```

100 : La_paper_time16

```r
pander::pander(univarDe$orderframe[1:20,univariate_columns])
```

	caseMean	caseStd	controlMean	controlStd	controlKS	ROCAUC	WilcoxRes.p	FRes.p
La_total_time9	5.78e-12	5.13e-12	2.47e-12	1.18e-12	1.88e-06	0.764	4.96e-11	5.79e-13

	caseMean	caseStd	controlMean	controlStd	controlKSP	ROCAUC	WilcoxRes.p	FRes.p
La_total_time7	3.96e-12	3.25e-12	3.70e-12	1.05e-11	1.11e-16	0.749	2.40e-06	4.05e-01
La_mean_speed_on_-paper13	1.03e-01	1.67e-01	5.98e-04	3.03e-01	7.19e-05	0.739	2.39e-08	9.79e-06
La_total_time5	7.00e-12	7.86e-12	3.03e-12	2.41e-12	8.72e-08	0.720	2.03e-07	1.13e-08
La_mean_speed_on_1paper2	1.03e-01	3.03e-01	2.71e-01	4.31e-01	2.26e-05	0.714	1.44e-06	2.00e-04
La_mean_speed_on_-paper9	1.52e-01	3.35e-01	3.71e-02	8.29e-02	5.69e-02	0.710	2.53e-07	1.88e-08
La_mean_speed_on_-paper3	2.62e-02	5.38e-01	2.76e-01	4.57e-01	5.50e-05	0.706	3.06e-06	1.48e-05
La_mean_speed_on_-paper5	7.73e-03	1.49e-01	4.90e-02	5.20e-02	1.57e-04	0.706	6.43e-07	3.78e-05
La_mean_gmrt23	2.82e+01	2.28e+01	4.21e+01	2.28e+01	6.35e-01	0.700	3.66e-06	1.76e-05
La_mean_speed_on_-paper12	9.58e-02	1.99e-01	3.05e-02	2.32e-01	8.71e-03	0.697	3.56e-06	1.23e-05
La_mean_speed_on_6paper16	6.80e-02	5.18e-01	3.16e-01	4.52e-01	1.20e-02	0.690	8.74e-06	7.97e-05
La_total_time21	3.94e+02	1.22e+04	-6.92e+03	6.10e+03	2.84e-01	0.679	3.36e-06	5.36e-07
La_max_x_extension16	1.57e+03	7.01e+02	-1.23e+03	6.40e+02	3.66e-02	0.678	2.51e-05	2.89e-04
La_mean_speed_on_-paper15	1.05e-01	4.58e-01	8.06e-02	2.82e-01	3.53e-01	0.677	3.20e-05	2.27e-04
La_paper_time17	9.43e+03	7.32e+03	6.89e+03	4.42e+03	1.63e-02	0.675	1.76e-05	2.08e-03
La_total_time1	5.59e+03	4.03e+03	3.61e+03	2.84e+03	9.60e-04	0.672	3.41e-05	2.32e-05
La_mean_jerk_on_paper15	2.02e-03	1.76e-03	4.24e-03	1.59e-03	9.49e-01	0.664	1.05e-04	4.16e-05
La_mean_jerk_on_paper5	6.60e-03	2.15e-03	5.76e-03	1.28e-03	7.08e-01	0.663	9.75e-05	6.15e-04
La_mean_gmrt11	5.49e+01	3.68e+01	7.65e+01	3.71e+01	6.73e-01	0.663	1.32e-04	6.76e-05
La_paper_time16	4.39e+02	2.11e+03	-4.98e+02	9.82e+02	2.88e-03	0.663	5.19e-05	1.74e-05

Comparing Decorrelation vs Original

```
pthr <- 0.20/(ncol(dataframe)-1)


topDecorNames <- rownames(univarDe$orderframe[univarDe$orderframe$FRes.p<pthr,])
topDecorNames <- unique(c(topDecorNames,rownames(univarDe$orderframe[1:5,])))

#topDecorNames <- rownames(univarDe$orderframe[univarDe$orderframe$FRes.p<1.0e-5,])
dc <- getLatentCoefficients(DEdataframe)
### 2a Get only the ones that in the top features
deNames_in_dc <- topDecorNames[topDecorNames %in% names(dc)]
selectedlist <- dc[deNames_in_dc]
```

```
theDeFormulas <- selectedlist

rawuniv <- univariate_Wilcoxon(dataframe,outcome,limit=-1)
deuniv <- univariate_Wilcoxon(DEdataframe,outcome,limit=-1)
matsize <- (ncol(dataframe)-1)^2
nocorrelated <- ncol(dataframe) - 1 - ncol(demat)
pander::pander(c(sparse_Fraction=(sum(demat != 0) + nocorrelated)/matsize))
```

sparse_Fraction
0.00322

```
pander::pander(c(raw=length(rawuniv),decor=length(deuniv)))
```

raw	decor
364	309

```
pander::pander(c(Number_Latent=length(dc)))
```

Number_Latent
167

```
pander::pander(c(meanSize=mean(sapply(dc,length))))
```

meanSize
2.21

CV ROC Analysis

```
par(op)
par(mfrow=c(1,2),cex=0.9)
fraction <-0.70
repetitions <- 100

fcout <- round(fraction*nrow(dataframe)/15+1.0)
pander::pander(c(NumberofFeatures=fcout))
```

NumberofFeatures
9

```
cvRaw <- randomCV(dataframe,
                  outcome,
                  fittingFunction= filteredFit,
                  classSamplingType = "Pro",
                  trainFraction = fraction,
                  repetitions = repetitions,
```

```
#                  fitmethod=  glm,
                 fitmethod=  KNN_method,
                 filtermethod=mRMR.classic_FRESA,
                 filtermethod.control=list(feature_count= fcout),
#                  family="binomial"
)
```

..........10 Tested: 171 Avg. Selected: 9 Min Tests: 1 Max Tests: 7 Mean Tests: 3.099415 . MAD: 0.2294936 ....20 Tested: 174 Avg. Selected: 9 Min Tests: 1 Max Tests: 14 Mean Tests: 6.091954 . MAD: 0.2335254 ....30 Tested: 174 Avg. Selected: 9 Min Tests: 3 Max Tests: 17 Mean Tests: 9.137931 . MAD: 0.2298267 ....40 Tested: 174 Avg. Selected: 9 Min Tests: 3 Max Tests: 20 Mean Tests: 12.18391 . MAD: 0.2276391 ....50 Tested: 174 Avg. Selected: 9 Min Tests: 3 Max Tests: 25 Mean Tests: 15.22989 . MAD: 0.2256373 ....60 Tested: 174 Avg. Selected: 9 Min Tests: 5 Max Tests: 27 Mean Tests: 18.27586 . MAD: 0.2277066 ....70 Tested: 174 Avg. Selected: 9 Min Tests: 6 Max Tests: 31 Mean Tests: 21.32184 . MAD: 0.2353455 ....80 Tested: 174 Avg. Selected: 9 Min Tests: 10 Max Tests: 35 Mean Tests: 24.36782 . MAD: 0.2360083 ....90 Tested: 174 Avg. Selected: 9 Min Tests: 13 Max Tests: 39 Mean Tests: 27.41379 . MAD: 0.2347917 ....100 Tested: 174 Avg. Selected: 9 Min Tests: 14 Max Tests: 42 Mean Tests: 30.45977 . MAD: 0.2340795

```
bpraw <- predictionStats_binary(cvRaw$medianTest,"RAW",cex=0.75)
```

RAW

```
pander::pander(bpraw$CM.analysis$tab)
```

	Outcome +	Outcome -	Total
Test +	60	3	63
Test -	29	82	111
Total	89	85	174

```
pander::pander(bpraw$accc)
```

est	lower	upper
0.816	0.75	0.871

```
pander::pander(bpraw$aucs)
```

est	lower	upper
0.929	0.893	0.966

```
pander::pander(bpraw$berror)
```

50%	2.5%	97.5%
0.18	0.13	0.234

```
cvDe <- randomCV(DEdataframe,
                 outcome,
                 fittingFunction= filteredFit,
                 trainSampleSets= cvRaw$trainSamplesSets,
#                  fitmethod=  glm,
                 fitmethod=  KNN_method,
                 filtermethod=mRMR.classic_FRESA,
                 filtermethod.control=list(feature_count= fcout),
#                  family="binomial"
)
```

..........10 Tested: 171 Avg. Selected: 9 Min Tests: 1 Max Tests: 7 Mean Tests: 3.099415 . MAD: 0.2563501 ....20 Tested: 174 Avg. Selected: 9 Min Tests: 1 Max Tests: 14 Mean Tests: 6.091954 . MAD: 0.2623377 ....30 Tested: 174 Avg. Selected: 9 Min Tests: 3 Max Tests: 17 Mean Tests: 9.137931 . MAD: 0.2582633 ....40 Tested: 174 Avg. Selected: 9 Min Tests: 3 Max Tests: 20 Mean Tests: 12.18391 . MAD: 0.2517571 ....50 Tested: 174 Avg. Selected: 9 Min Tests: 3 Max Tests: 25 Mean Tests: 15.22989 . MAD: 0.2519606 ....60 Tested: 174 Avg. Selected: 9 Min Tests: 5 Max Tests: 27 Mean Tests: 18.27586 . MAD: 0.2494289 ....70 Tested: 174 Avg. Selected: 9 Min Tests: 6 Max Tests: 31 Mean Tests: 21.32184 . MAD: 0.251215 ....80 Tested: 174 Avg. Selected: 9 Min Tests: 10 Max Tests: 35 Mean Tests: 24.36782 . MAD: 0.2538978 ....90 Tested: 174 Avg. Selected: 9 Min Tests: 13 Max Tests: 39 Mean Tests: 27.41379 . MAD: 0.2499321 ....100 Tested: 174 Avg. Selected: 9 Min Tests: 14 Max Tests: 42 Mean Tests: 30.45977 . MAD: 0.2513606

```
bpDecor <- predictionStats_binary(cvDe$medianTest,"Decorrelated",cex=0.75)
```
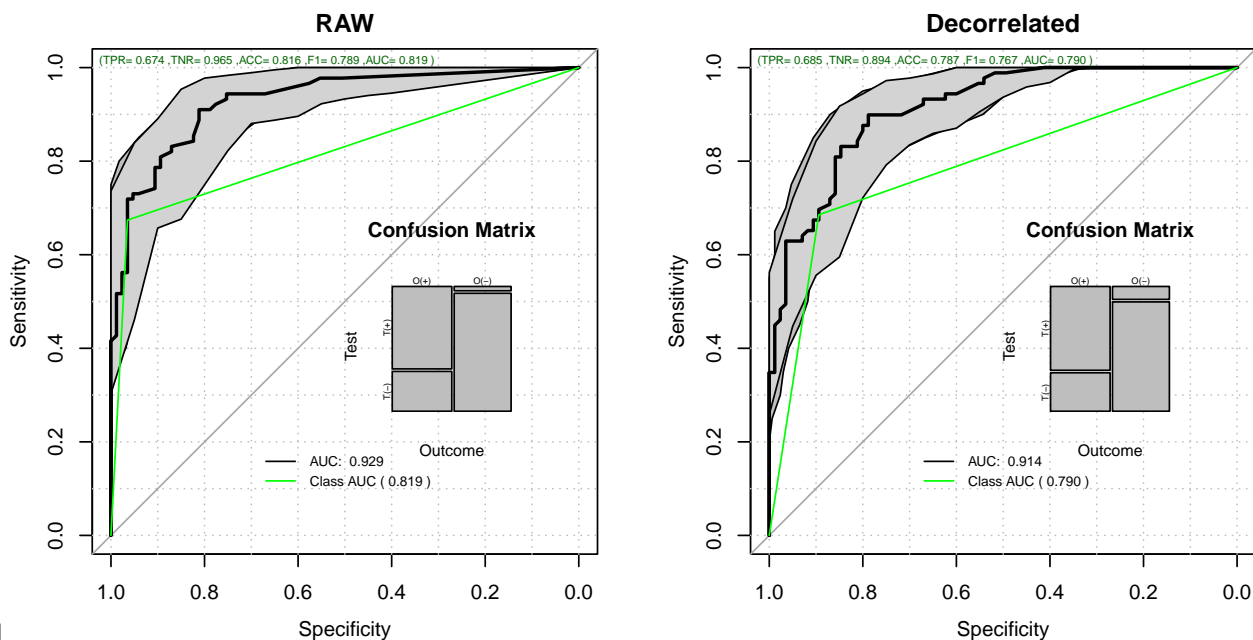

Decorrelated

```
par(op)
```

```
pander::pander(bpDecor$CM.analysis$tab)
```

	Outcome +	Outcome -	Total
Test +	61	9	70
Test -	28	76	104

12

	Outcome +	Outcome -	Total
Total	89	85	174

```
pander::pander(bpDecor$accc)
```

est	lower	upper
0.787	0.719	0.846

```
pander::pander(bpDecor$aucs)
```

est	lower	upper
0.914	0.874	0.953

```
pander::pander(bpDecor$berror)
```

50%	2.5%	97.5%
0.211	0.155	0.272

```
### Here we compute the probability that the outcome-driven decorrelation ROC is superior to the RAW ROC
pander::pander(roc.test(bpDecor$ROC.analysis$roc.predictor,bpraw$ROC.analysis$roc.predictor,alternative
```

Table 24: DeLong's test for two correlated ROC curves: bpDecor$ROC.analysis$roc.predictor and bpraw$ROC.analysis$roc.predictor

Test statistic	P value	Alternative hypothesis	AUC of roc1	AUC of roc2
-1.63	0.949	greater	0.914	0.929

Feature Frequency Plots

```
par(mfrow=c(2,1),cex=0.9,cex.axis=0.8)

rawtopf <- cvRaw$featureFrequency/repetitions
crawtopf <- rawtopf

if (length(rawtopf) > 30)
{
  rawtopf <- rawtopf[1:30]
}
barplot(100*rawtopf,las=2,main="Raw Features",ylim=c(0,100.0),cex.names = 0.35,cex.axis = 0.35,ylab="Sel

detopf <- cvDe$featureFrequency/repetitions
cdetopf <- detopf
names(cdetopf) <- str_remove_all(names(cdetopf),"Ba_")
names(cdetopf) <- str_remove_all(names(cdetopf),"La_")
```
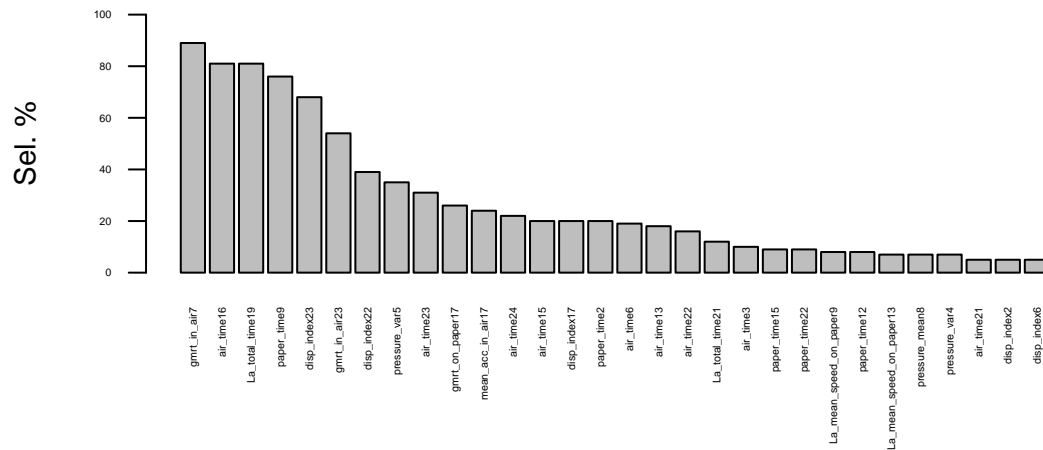
```
if (length(detopf) > 30)
{
  detopf <- detopf[1:30]
}

barplot(100*detopf,las=2,main="Decorrelated Features",ylim=c(0,100.0),cex.names = 0.35,cex.axis = 0.35,
```


Raw Features
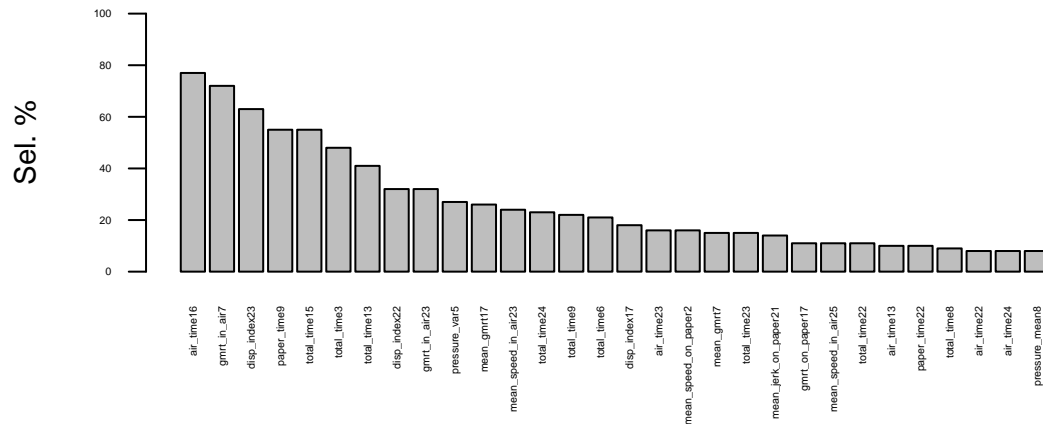
Decorrelated Features

```
par(op)
```

Final Table

```
unlistdecorr <- selectedlist
names(unlistdecorr) <- NULL
unlistdecorr <- unique(names(unlist(unlistdecorr)))

finalTableDe <- univarDe$orderframe[deNames_in_dc,univariate_columns]

finalTableOr <- univar$orderframe[unique(c(topfiveOrg,unlistdecorr,names(crawtopf)[1:2],names(cdetopf)[
```

```r
finalTable <- rbind(finalTableOr,finalTableDe)

deFromula <- character(length(theDeFormulas))
names(deFromula) <- names(theDeFormulas)

for (dx in names(deFromula))
{
  coef <- theDeFormulas[[dx]]
  cname <- names(theDeFormulas[[dx]])
  names(cname) <- cname
  for (cf in names(coef))
  {
    if (cf != dx)
    {
      if (coef[cf]>0)
      {
        deFromula[dx] <- paste(deFromula[dx],
                          sprintf("+ %5.3f*%s",coef[cf],cname[cf]))
      }
      else
      {
        deFromula[dx] <- paste(deFromula[dx],
                          sprintf("%5.3f*%s",coef[cf],cname[cf]))
      }
    }
  }
}
orgnamez <- rownames(finalTable)
orgnamez <- str_remove_all(orgnamez,"Ba_")
orgnamez <- str_remove_all(orgnamez,"La_")
finalTable$uAUC <- univar$orderframe[orgnamez,"ROCAUC"]
finalTable$raw_Freq <- crawtopf[orgnamez]
finalTable$La_Freq <- cdetopf[orgnamez]
finalTable$DecorFormula <- deFromula[rownames(finalTable)]
fscores <- attr(DEdataframe,"fscore")
finalTable$fscores <- fscores[rownames(finalTable)]

finalTable <- finalTable[order(-finalTable$ROCAUC),]

pander::pander(finalTable)
```

	caseMean	caseStd	controlMean	controlStd	controlKS	ROCAUC	WilcoxResp	s.puAUC	uAUC	raw_Freq	La_Freq	DecorFormula	fscores
total_time23	3.70e+04	4.10e+04	1.8e+03	3.15e+04	4.26e-13	0.863	1.40e-13	9.35e-05	0.863	0.15	NA	NA	NA
total_time15	5.34e+06	4.17e+04	4.8e+06	4.66e+03	3.42e-02	0.844	1.03e-15	0.00e+00	0.844	0.55	NA	NA	NA
air_time23	9.79e+07	3.42e+07	3.8e+03	3.14e+05	4.73e-14	0.844	7.90e-11	1.57e-01	0.844	0.16	0.31	NA	11
air_time15	4.38e+05	4.81e+04	3.9e+03	3.46e+03	3.71e-02	0.829	4.82e-15	0.00e+00	0.829	NA	0.20	NA	26
total_time17	7.44e+04	4.03e+05	5.50e+04	4.42e+04	4.39e-09	0.824	3.94e-12	6.39e-10	0.824	NA	NA	NA	NA

	caseMean	caseStd	controlMean	controlStd	control.KS	PCA	Wilcox	RER.ps.pu	AUC	raw_Fre	La_Fre	Decor	Formula	fscores
air_time16	1.03e+04	2.02e+04	9.91e+03	3.77e+03	2.89e-03	0.787	4.24e-12	5.01e-14	0.787	0.77	0.81	NA		2
total_time7	1.78e+04	5.52e+04	4.77e+05	5.43e+04	4.78e-15	0.785	6.19e-07	4.90e-01	0.785	NA	NA	NA		NA
air_time7	1.22e+04	4.14e+04	4.49e+05	5.40e+05	1.55e-16	0.779	1.00e+00	3.26e-01	0.779	NA	0.01	NA		11
total_time8	1.27e+04	4.34e+04	4.97e+03	3.15e+03	3.98e-03	0.776	1.06e-10	5.11e-12	0.776	0.09	NA	NA		NA
gmrt_in_air	2.21e+09	2.09e+01	1.39e+02	2.33e+02	2.14e-01	0.775	2.21e-10	1.53e-11	0.775	0.72	0.89	NA		1
total_time9	1.68e+04	4.45e+04	4.72e+03	3.40e+03	2.69e-01	0.774	5.06e-12	1.23e-13	0.774	0.22	0.04	NA		NA
paper_time9	9.89e+05	3.33e+04	4.83e+03	3.14e+03	8.65e-02	0.774	9.90e-11	4.73e-12	0.774	0.55	0.76	NA		29
mean_gmrt7	2.53e+02	2.20e+02	2.76e+02	2.20e+02	2.55e-01	0.773	4.52e-10	9.44e-11	0.773	0.15	NA	NA		NA
La_total_time9	5.79e-12	5.13e-12	2.47e-12	1.18e-12	1.88e-06	0.764	4.96e-11	5.79e-13	0.774	0.22	0.04		-1.000*air_time9 - 1.000*paper_time9 + 1.000*total_time9	-59
La_total_time7	2.07e-12	3.25e-12	3.70e-12	1.05e-11	1.11e-16	0.749	2.40e-06	4.05e-01	0.785	NA	NA		-1.000*air_time7 - 1.000*paper_time7 + 1.000*total_time7	-21
paper_time7	5.64e+04	3.83e+02	4.72e+03	3.07e+03	3.26e-02	0.746	3.39e-09	1.68e-10	0.746	NA	NA	NA		NA
air_time5	5.98e+09	3.38e+03	4.49e+03	3.17e+03	3.55e-09	0.744	2.05e-08	8.01e-09	0.744	0.01	NA	NA		28
La_mean_speed_on_paper13	1.67e-01	5.08e-13	3.03e-04	7.19e-01	7.19e-05	0.739	2.39e-08	9.79e-06	0.626	NA	0.07		-0.021*gmrt_on_paper13 + 1.000*mean_speed_on_paper13	-1
gmrt_on_paper7	2.86e+01	2.71e+02	2.13e+02	2.46e+02	2.51e-01	0.738	4.66e-08	5.63e-08	0.738	NA	0.03	NA		2
mean_gmrt8	1.86e+02	2.27e+02	2.83e+02	2.15e+02	2.25e-02	0.725	8.88e-07	5.59e-06	0.725	NA	NA	NA		NA
La_total_time5	7.05e-12	7.86e-12	3.03e-12	2.41e-12	8.72e-08	0.720	2.03e-07	1.13e-08	0.674	NA	NA		-1.000*air_time5 - 1.000*paper_time5 + 1.000*total_time5	-57
mean_speed_on_paper2	1.35e+00	1.47e-01	2.96e+00	9.38e-01	1.63e-01	0.720	7.59e-07	3.39e-07	0.720	0.16	NA	NA		NA
gmrt_on_paper8	2.88e+01	2.79e+01	1.98e+02	2.36e+02	1.04e-01	0.716	6.00e-07	4.46e-06	0.716	NA	0.05	NA		13
paper_time3	3.64e+04	3.81e+05	3.68e+03	3.63e+03	3.72e-01	0.715	2.65e-07	9.87e-08	0.715	0.01	NA	NA		NA

	caseMean	caseStd	controlMean	controlStd	KS	PCA	Wilcox	Resp.pu	AUC	raw_Flea	Lea_Freq	Decor	Formula	fscores
La_mean_speed_on_paper2	8.03e-01	2.72e-01	4.31e-01	2.26e-01		0.714	1.44e-06	2.00e-04	0.720	0.16	NA	-	$-0.016\,gmrt\_on\_paper2 + 1.000\,\mathrm{mean\_speed\_on\_paper2}$	-1
mean_gmrt23	2.67e+06	2.03e+01	1.11e+02	3.26e+01	1.10e-01	0.711	7.47e-07	3.63e-07	0.711	NA	NA	NA	NA	NA
air_time8	6.09e+03	3.41e+03	3.77e+03	3.34e+03	3.31e-05	0.710	3.46e-07	1.12e-07	0.710	NA	NA	NA	NA	1
La_mean_speed_on_paper9	1.52e-01	2.71e-01	8.29e-02	5.69e-02		0.710	2.53e-07	1.88e-08	0.703	NA	0.08	-	$-0.020\,gmrt\_on\_paper9 + 1.000\,\mathrm{mean\_speed\_on\_paper9}$	-1
mean_speed_on_paper30	1.99e+00		3.74e+00	4.24e+00	1.62e-01	0.709	2.24e-06	5.39e-06	0.709	0.01	0.01	NA	NA	
paper_time14	1.62e+03	3.21e+03	3.90e+03	3.33e+03	3.33e-06	0.707	8.05e-06	2.84e-04	0.707	NA	NA	NA	NA	
La_mean_speed_on_paper3	5.38e-01	2.62e-02	4.57e-01	5.50e-01		0.706	3.06e-06	1.48e-05	0.709	0.01	0.01	-	$-0.017\,gmrt\_on\_paper3 + 1.000\,\mathrm{mean\_speed\_on\_paper3}$	-1
La_mean_speed_on_paper5	6.49e-01	1.73e-03	5.20e-02	1.57e-02		0.706	6.43e-07	3.78e-05	0.635	NA	NA	-	$-0.019\,gmrt\_on\_paper5 + 1.000\,\mathrm{mean\_speed\_on\_paper5}$	-1
mean_speed_on_paper35	2.20e+00		5.05e+00	6.26e+00	1.61e-01	0.705	2.51e-06	2.53e-06	0.705	0.01	NA	NA	NA	
mean_speed_on_paper9	2.49e+00		4.28e+00	4.45e+00	6.11e-01	0.703	4.12e-06	2.61e-04	0.703	NA	0.08	NA	NA	
La_mean_gmrt23	2.82e+02	2.28e+01	2.21e+02	2.28e+02	1.35e-01	0.700	3.66e-06	1.76e-05	0.711	NA	NA	-	$-0.749\,gmrt\_on\_paper23 + 1.000\,\mathrm{mean\_gmrt23}$	-1
air_time9	7.89e+03	1.12e+04	1.88e+03	3.97e+03	3.96e-03	0.699	4.66e-08	2.32e-09	0.699	NA	NA	NA	NA	31
La_mean_speed_on_paper12	1.99e-01	8.58e-02	2.32e-01	8.71e-03		0.697	3.56e-06	1.23e-05	0.658	NA	NA	-	$-0.021\,gmrt\_on\_paper12 + 1.000\,\mathrm{mean\_speed\_on\_paper12}$	-1
mean_gmrt11	1.66e+07	2.84e+02	1.11e+07	7.21e+04	1.08e-01	0.691	1.00e-05	2.15e-05	0.691	NA	0.01	NA	NA	
La_mean_speed_on_paper16	6.80e-02	5.18e-01	6.16e-01	4.52e-01	1.20e-02	0.690	8.74e-06	7.97e-05	0.686	0.01	NA	-	$-0.016\,gmrt\_on\_paper16 + 1.000\,\mathrm{mean\_speed\_on\_paper16}$	-1
disp_index16	6.30e-06	2.95e-06	4.78e-06	3.53e-06	1.18e-07	0.687	1.08e-04	1.21e-01	0.687	NA	NA	NA	NA	3
mean_speed_on_paper26	2.06e+00		2.82e+00	4.29e+00	1.31e-01	0.686	1.29e-05	1.20e-05	0.686	0.01	NA	NA	NA	
La_total_time21	3.02e+04	2.22e+04	-6.92e+03	6.10e+03	3.84e-01	0.679	3.36e-06	5.36e-07	0.629	NA	0.12	-	$-1.393\,paper\_time21 + 1.000\,\mathrm{total\_time21}$	-1

	caseMean	caseStd	controlMean	controlStd	KS	PCA	Wilcox	cox	RES	pu_AUC	raw_Freq	La_Freq	DecorFormula	fscores
La_max_x_extension16	5.10e+02	1.57e+03	6.40e+02	1.23e+03	2.66e-02	0.678	2.51e-05	2.89e-04		0.606	NA	NA	$-497092323.214\,disp\_index16 + 1.000\,\mathrm{max\_x\_extension16}$	-1
gmrt_in_air8	2.33e+02	2.90e+02	2.69e+02	3.86e+02	2.68e-03	0.677	3.99e-05	2.47e-04		0.677	NA	NA	NA	13
La_mean_speed_on_paper15	6.58e-01	1.05e-01	8.06e-01	2.82e-01	3.53e-01	0.677	3.20e-05	2.27e-04		0.705	0.01	NA	$-0.017\,gmrt\_on\_paper15 + 1.000\,\mathrm{mean\_speed\_on\_paper15}$	-1
gmrt_on_paper9	2.33e+02	2.03e+02	2.60e+02	2.98e+02	1.29e-01	0.675	6.27e-05	5.27e-03		0.675	NA	NA	NA	14
total_time5	2.48e+04	2.78e+04	2.60e+04	7.42e+03	3.11e-02	0.674	5.84e-06	2.31e-06		0.674	NA	NA	NA	NA
La_total_time1	5.59e+04	3.03e+03	3.61e+03	3.84e+03	3.60e-04	0.672	3.41e-05	2.32e-05		0.656	NA	NA	$-1.207\,air\_time1 + 1.000\,\mathrm{total\_time1}$	-1
gmrt_on_paper15	1.57e+02	1.13e+01	1.72e+02	2.08e+01	1.43e-01	0.670	9.41e-05	1.34e-04		0.670	NA	NA	NA	12
gmrt_on_paper2	2.38e+02	2.14e+02	2.26e+00	3.03e+01	1.34e-01	0.670	1.19e-04	1.34e-04		0.670	NA	NA	NA	2
disp_index3	1.06e-05	3.16e-06	8.96e-06	3.28e-06	4.94e-01	0.669	6.55e-05	1.81e-04		0.669	NA	NA	NA	2
mean_jerk_on_paper15	7.22e-02	7.15e-03	1.92e-02	3.57e-03	8.68e-01	0.667	5.65e-05	1.19e-04		0.667	0.01	0.04	NA	NA
La_mean_jerk_on_paper15	2.22e-03	1.76e-03	2.15e-03	1.59e-03	9.49e-01	0.664	1.05e-04	4.16e-05		0.667	0.01	0.04	$-0.098\,mean\_acc\_on\_paper15 + 1.000\,\mathrm{mean\_jerk\_on\_paper15}$	-1
gmrt_on_paper2	7.84e+02	1.74e+01	1.06e+02	3.45e+01	1.68e-01	0.663	1.35e-04	5.35e-05		0.663	NA	0.01	NA	6
La_mean_gmrt11	5.49e+13	1.68e+07	1.65e+03	3.71e+06	1.73e-01	0.663	1.32e-04	6.76e-05		0.691	NA	0.01	$-0.716\,gmrt\_in\_air11 + 1.000\,\mathrm{mean\_gmrt11}$	-1
La_paper_time16	1.89e+02	2.11e+03	4.98e+02	9.82e+02	2.88e-03	0.663	5.19e-05	1.74e-05		0.707	NA	NA	$-712146289.713\,disp\_index16 + 1.000\,\mathrm{paper\_time16}$	0
mean_jerk_on_paper24	5.22e-02	9.72e-03	1.68e-02	2.71e-03	1.49e-01	0.662	1.34e-04	9.36e-05		0.662	0.01	0.02	NA	NA
La_mean_gmrt8	8.48e-08	6.01e-08	1.18e-07	7.59e-08	5.61e-01	0.662	8.55e-05	1.83e-04		0.725	NA	NA	$0.500\,gmrt\_in\_air8 - 0.500\,\mathrm{gmrt\_on\_paper8} + 1.000*\mathrm{mean\_gmrt8}$	-25
La_mean_jerk_on_paper24	2.33e-03	1.19e-03	2.82e-03	1.34e-03	9.90e-02	0.662	1.08e-04	2.50e-05		0.662	0.01	0.02	$-0.099\,mean\_acc\_on\_paper24 + 1.000\,\mathrm{mean\_jerk\_on\_paper24}$	-1

	caseMean	caseStd	controlMean	controlStd	controlKSP	CAW1	coxRes	Rps.pu	AUC	raw_Flea	La_Fre	DecorFormula	fscores
gmrt_in_air1	1.15e+0	2.80e+01	1.88e+02	2.07e+01	1.16e-02	0.659	4.78e-04	6.14e-03	0.659	NA	NA	NA	2
mean_speed_on_paper32	2.47e+00	6.60e-01	2.14e+00	1.49e+00	1.75e-01	0.658	3.59e-04	1.42e-03	0.658	NA	NA	NA	NA
total_time1	1.34e+04	8.84e+03	3.39e+03	3.21e+04	1.47e-07	0.656	8.04e-04	2.11e-02	0.656	NA	NA	NA	NA
La_total_time19	2.29e-12	3.40e-12	1.71e-13	9.57e-13	0.00e+00	0.643	1.16e-04	8.87e-08	0.596	NA	0.81	-1.000*air_time19 - 1.000*paper_time19 + 1.000*total_time19	-32
La_paper_time3	2.75e+03	2.60e+03	-3.80e+03	1.28e+03	3.97e-01	0.642	4.22e-04	8.11e-05	0.715	0.01	NA	-1058753997.512*disp_index3 + 1.000*paper_time3	-1
gmrt_on_paper5	2.03e-5	2.97e+01	1.46e+00	2.56e+07	1.70e-01	0.642	7.72e-04	2.35e-03	0.642	NA	NA	NA	7
La_mean_jerk_on_paper29	1.86e-03	1.28e-03	4.72e-03	9.55e-04	5.04e-01	0.642	6.88e-04	6.96e-05	0.594	NA	NA	-0.101*mean_acc_on_paper19 + 1.000*mean_jerk_on_paper19	-1
gmrt_on_paper12	2.27e-1	2.79e+01	1.50e+02	2.06e+02	1.72e-01	0.640	1.77e-03	7.10e-03	0.640	NA	NA	NA	10
La_mean_gmrt7	1.59e+3	1.65e+7	1.62e+05	1.88e+03	1.08e-02	0.639	2.75e-04	3.38e-05	0.773	0.15	NA	-0.726*gmrt_on_paper7 + 1.000*mean_gmrt7	-1
mean_speed_on_paper5	1.35e+00	8.99e-01	1.59e+07	7.25e-01	9.72e-03	0.635	4.75e-03	1.90e-02	0.635	NA	NA	NA	NA
air_time1	6.51e+03	3.34e+04	4.78e+03	3.19e+02	4.95e-09	0.633	2.42e-02	1.70e-01	0.633	NA	NA	NA	1
gmrt_on_paper16	2.22e-1	6.44e+01	1.53e+02	7.45e+08	1.97e-02	0.632	1.15e-03	1.36e-03	0.632	NA	NA	NA	10
total_time21	5.57e+3	5.51e+04	4.14e+02	2.06e+04	1.85e-01	0.629	2.01e-03	4.82e-04	0.629	NA	0.12	NA	NA
paper_time5	1.88e+04	1.10e+04	4.45e+04	4.07e+02	3.09e-01	0.629	6.30e-04	6.89e-04	0.629	NA	NA	NA	29
La_total_time8	4.68e+05	3.05e+02	3.57e+03	3.52e+03	3.42e-01	0.627	5.10e-04	3.41e-04	0.776	0.09	NA	-1.357*air_time8 + 1.000*total_time8	-1
mean_speed_on_paper30	2.52e+00	6.30e-01	3.08e+00	1.35e+00	1.51e-01	0.626	3.23e-03	3.00e-03	0.626	NA	0.07	NA	NA
gmrt_on_paper5	7.03e-4	1.65e+07	1.97e+03	3.68e+07	1.36e-03	0.620	1.48e-02	5.21e-02	0.620	NA	NA	NA	9
max_x_extension_on_paper18	1.86e+03	3.32e+03	1.14e+02	2.13e+03	3.03e-14	0.606	9.41e-01	3.86e-01	0.606	NA	NA	NA	NA
gmrt_on_paper13	2.25e-1	2.28e+01	1.47e+00	2.28e+03	1.73e-01	0.606	1.14e-02	1.17e-02	0.606	NA	NA	NA	13
mean_acc_on_paper5	4.42e-3	1.53e-02	3.39e-01	3.23e-02	3.23e-01	0.597	9.76e-03	1.93e-02	0.597	NA	NA	NA	1

	caseMean	caseStd	controlMean	controlStd	controlKS	PCA	Wilcox	Res	ps.pu	AUC	raw_Flea	Freq	Decor	Formula	fscores
total_time19	9.86e+07	4.37e+04	4.04e+02	3.83e+06	6.00e+00	0.596	4.03e-01	1.31e-03	0.596	NA	0.81	NA	NA		
mean_jerk_bn	4e-02	2.17e-03	2.01e-02	2.32e-03	9.20e-01	0.594	7.36e-03	1.44e-02	0.594	NA	NA	NA	NA		
paper_time19	2.55e+09	4.80e+03	3.11e+04	4.82e+05	3.17e-02	0.589	3.21e-02	1.48e-01	0.589	NA	NA	NA	16		
mean_acc_dr	1.23e-01	3.84e-02	1.30e-01	2.17e-02	1.75e-01	0.583	3.30e-02	2.32e-02	0.583	NA	NA	NA	1		
air_time19	7.31e+07	4.03e+04	4.02e+02	3.82e+06	6.00e+00	0.581	3.35e-01	1.24e-03	0.581	NA	NA	NA	16		
mean_acc_dr	1.52e-01	3.89e-02	1.53e-01	2.03e-02	9.09e-01	0.516	3.49e-01	3.94e-01	0.516	NA	NA	NA	1		
paper_time21	1.97e+07	4.31e+04	3.47e+04	4.60e+05	4.32e-01	0.458	1.79e-01	5.04e-02	0.458	NA	NA	NA	1		