Data Prep Normalization and Dummies

Open Libraries

```r
library("ggplot2", lib.loc="/Library/Frameworks/R.framework/Versions/3.4/Resources/library")
library("graphics", lib.loc="/Library/Frameworks/R.framework/Versions/3.4/Resources/library")
library("gplots", lib.loc="/Library/Frameworks/R.framework/Versions/3.4/Resources/library")
library("dplyr")
library("lattice", lib.loc="/Library/Frameworks/R.framework/Versions/3.4/Resources/library")
library("data.table", lib.loc="/Library/Frameworks/R.framework/Versions/3.4/Resources/library")
library("datasets")
library("readxl")
library("stats")
library("caret")
library("VIM")
library("dummies")
```

Create Dummies

```r
dfwithDummies <- dummy.data.frame(dfDataSetKNN[2:30], sep = ".")
names(dfwithDummies)
```

```
 [1] "Sex.F"
 [2] "Sex.M"
 [3] "Expel.N"
 [4] "Expel.Y"
 [5] "First.Gen.N"
 [6] "First.Gen.Y"
 [7] "Challenge Tag.N"
 [8] "Challenge Tag.Y"
 [9] "Boettcher.Semi.N"
[10] "Boettcher.Semi.Y"
```

```
 [11] "Boettcher.Final.N"
 [12] "Boettcher.Final.Y"
 [13] "Daniels.Semi.N"
 [14] "Daniels.Semi.Y"
 [15] "Daniels.Final.N"
 [16] "Daniels.Final.Y"
 [17] "Harvey.App.N"
 [18] "Harvey.App.Y"
 [19] "Harvey.Final.N"
 [20] "Harvey.Final.Y"
 [21] "FC.App.N"
 [22] "FC.App.Y"
 [23] "Thorson.App.N"
 [24] "Thorson.App.Y"
 [25] "Thorson.Admit.N"
 [26] "Thorson.Admit.Y"
 [27] "Summet.Participant.N"
 [28] "Summet.Participant.Y"
 [29] "Mines.Medal.N"
 [30] "Mines.Medal.Y"
 [31] "SPS.N"
 [32] "SPS.Y"
 [33] "Veteran.N"
 [34] "Veteran.Y"
 [35] "Legacy.N"
 [36] "Legacy.Y"
 [37] "Athlete.N"
 [38] "Athlete.Y"
 [39] "State.CO"
 [40] "State.Other"
 [41] "Citizenship.Foreign National/International"
 [42] "Citizenship.International"
 [43] "Citizenship.Missing"
 [44] "Citizenship.U.S. Citizen"
 [45] "Citizenship.U.S. Permanent Resident/Green Card Holder"
 [46] "Citizenship.Undocumented/DACA"
 [47] "Ethnicity.American Indian or Alaska Native"
 [48] "Ethnicity.Asian"
 [49] "Ethnicity.Black or African American"
 [50] "Ethnicity.Hispanic or Latino"
 [51] "Ethnicity.Missing"
 [52] "Ethnicity.Multiracial"
 [53] "Ethnicity.Native Hawaiian or Other Pacific Islander"
 [54] "Ethnicity.NotDeclared"
 [55] "Ethnicity.Unknown"
 [56] "Ethnicity.White"
 [57] "Major.App.Applied Mathematics & Statistics - Computational & Applied Mathemati
cs"
 [58] "Major.App.Applied Mathematics & Statistics - Statistics"
 [59] "Major.App.Chemical Engineering"
```

```
 [60] "Major.App.Chemical Engineering - Biological Engineering Specialty"
 [61] "Major.App.Chemistry"
 [62] "Major.App.Chemistry - Biochemistry Specialty"
 [63] "Major.App.Chemistry - Environmental Chemistry Specialty"
 [64] "Major.App.Civil Engineering"
 [65] "Major.App.Computer Science"
 [66] "Major.App.Economics"
 [67] "Major.App.Electrical Engineering"
 [68] "Major.App.Engineering Physics"
 [69] "Major.App.Environmental Engineering"
 [70] "Major.App.Geological Engineering"
 [71] "Major.App.Geophysical Engineering"
 [72] "Major.App.Mechanical Engineering"
 [73] "Major.App.Metallurgical & Materials Engineering"
 [74] "Major.App.Mining Engineering"
 [75] "Major.App.Missing"
 [76] "Major.App.Petroleum Engineering"
 [77] "Major.App.Undecided"
 [78] "First Contact.ACT"
 [79] "First Contact.Application"
 [80] "First Contact.Athlete Form"
 [81] "First Contact.Campus Visit"
 [82] "First Contact.College Fair"
 [83] "First Contact.FUF"
 [84] "First Contact.Girls Lead the Way"
 [85] "First Contact.GPA Form"
 [86] "First Contact.Inquiry Form"
 [87] "First Contact.Mailing"
 [88] "First Contact.Materials"
 [89] "First Contact.MEP"
 [90] "First Contact.Phone"
 [91] "First Contact.Preview Mines"
 [92] "First Contact.Royall Search"
 [93] "First Contact.SAT"
 [94] "First Contact.TOEFL"
 [95] "First Visit.Campus Tour"
 [96] "First Visit.Campus Visit"
 [97] "First Visit.Class Shadow"
 [98] "First Visit.Discover Mines"
 [99] "First Visit.Discovery Mines in Your City"
[100] "First Visit.Girls Lead the Way"
[101] "First Visit.Launch"
[102] "First Visit.Making The Connection"
[103] "First Visit.Meet Me at Mines"
[104] "First Visit.None"
[105] "First Visit.Preview Mines"
[106] "First Visit.Preview Mines In Your City"
[107] "Sport.Men's Varsity Baseball"
[108] "Sport.Men's Varsity Basketball"
[109] "Sport.Men's Varsity Football"
```

```
[110] "Sport.Men's Varsity Golf"
[111] "Sport.Men's Varsity Soccer"
[112] "Sport.Men's Varsity Wrestling"
[113] "Sport.None"
[114] "Sport.Varsity Swimming/Diving"
[115] "Sport.Varsity Track/Field"
[116] "Sport.Varsity XCountry"
[117] "Sport.Women's Varsity Basketball"
[118] "Sport.Women's Varsity Soccer"
[119] "Sport.Women's Varsity Softball"
[120] "Sport.Women's Varsity Volleyball"
```

Hide

Hide

```
summary(dfwithDummies)
```

```
     Sex.F              Sex.M              Expel.N            Expel.Y             First.Gen.N
First.Gen.Y        Challenge Tag.N
 Min.   :0.0000    Min.   :0.0000    Min.   :0.0000    Min.    :0.00000    Min.    :0.0000
Min.    :0.00000   Min.    :0.0000
 1st Qu.:0.0000    1st Qu.:0.0000    1st Qu.:1.0000    1st Qu.:0.00000    1st Qu.:1.0000
1st Qu.:0.00000   1st Qu.:1.0000
 Median :0.0000    Median :1.0000    Median :1.0000    Median :0.00000    Median :1.0000
Median :0.00000   Median :1.0000
 Mean   :0.3281    Mean   :0.6719    Mean   :0.9877    Mean    :0.01235    Mean    :0.9105
Mean    :0.08949   Mean    :0.9798
 3rd Qu.:1.0000    3rd Qu.:1.0000    3rd Qu.:1.0000    3rd Qu.:0.00000    3rd Qu.:1.0000
3rd Qu.:0.00000   3rd Qu.:1.0000
 Max.   :1.0000    Max.   :1.0000    Max.   :1.0000    Max.    :1.00000    Max.    :1.0000
Max.    :1.00000   Max.    :1.0000
 Challenge Tag.Y   Boettcher.Semi.N Boettcher.Semi.Y  Boettcher.Final.N Boettcher.Fin
al.Y Daniels.Semi.N   Daniels.Semi.Y
 Min.   :0.00000   Min.   :0.0000   Min.   :0.00000   Min.   :0.000    Min.    :0.000
00   Min.    :0.0000   Min.    :0.00000
 1st Qu.:0.00000   1st Qu.:1.0000   1st Qu.:0.00000   1st Qu.:1.000    1st Qu.:0.000
00   1st Qu.:1.0000   1st Qu.:0.00000
 Median :0.00000   Median :1.0000   Median :0.00000   Median :1.000    Median :0.000
00   Median :1.0000   Median :0.00000
 Mean   :0.02021   Mean   :0.9843   Mean   :0.01572   Mean   :0.996    Mean    :0.004
01   Mean    :0.9883   Mean    :0.01171
 3rd Qu.:0.00000   3rd Qu.:1.0000   3rd Qu.:0.00000   3rd Qu.:1.000    3rd Qu.:0.000
00   3rd Qu.:1.0000   3rd Qu.:0.00000
 Max.   :1.00000   Max.   :1.0000   Max.   :1.00000   Max.   :1.000    Max.    :1.000
00   Max.    :1.0000   Max.    :1.00000
 Daniels.Final.N Daniels.Final.Y    Harvey.App.N      Harvey.App.Y       Harvey.Final.N
Harvey.Final.Y        FC.App.N
 Min.   :0.000    Min.   :0.00000   Min.   :0.0000    Min.   :0.00000   Min.    :0.0000
Min.    :0.000000   Min.    :0.000
```

```
  1st Qu.:1.000    1st Qu.:0.00000    1st Qu.:1.0000    1st Qu.:0.00000    1st Qu.:1.0000
 1st Qu.:0.000000   1st Qu.:1.000
 Median :1.000    Median :0.00000    Median :1.0000    Median :0.00000    Median :1.0000
 Median :0.000000   Median :1.000
 Mean   :0.996    Mean   :0.00401    Mean   :0.9102    Mean   :0.08982    Mean   :0.9925
 Mean   :0.007538   Mean   :0.986
 3rd Qu.:1.000    3rd Qu.:0.00000    3rd Qu.:1.0000    3rd Qu.:0.00000    3rd Qu.:1.0000
 3rd Qu.:0.000000   3rd Qu.:1.000
 Max.   :1.000    Max.   :1.00000    Max.   :1.0000    Max.   :1.00000    Max.   :1.0000
 Max.   :1.000000   Max.   :1.000
     FC.App.Y        Thorson.App.N     Thorson.App.Y      Thorson.Admit.N   Thorson.Admit.
Y    Summet.Participant.N Summet.Participant.Y
 Min.   :0.00000   Min.   :0.0000    Min.   :0.00000    Min.   :0.0000    Min.   :0.0000
0   Min.   :0.0000     Min.   :0.000000
 1st Qu.:0.00000   1st Qu.:1.0000    1st Qu.:0.00000    1st Qu.:1.0000    1st Qu.:0.0000
0   1st Qu.:1.0000     1st Qu.:0.000000
 Median :0.00000   Median :1.0000    Median :0.00000    Median :1.0000    Median :0.0000
0   Median :1.0000     Median :0.000000
 Mean   :0.01395   Mean   :0.9578    Mean   :0.04218    Mean   :0.9751    Mean   :0.0248
6   Mean   :0.9966     Mean   :0.003368
 3rd Qu.:0.00000   3rd Qu.:1.0000    3rd Qu.:0.00000    3rd Qu.:1.0000    3rd Qu.:0.0000
0   3rd Qu.:1.0000     3rd Qu.:0.000000
 Max.   :1.00000   Max.   :1.0000    Max.   :1.00000    Max.   :1.0000    Max.   :1.0000
0   Max.   :1.0000     Max.   :1.000000
 Mines.Medal.N     Mines.Medal.Y           SPS.N            SPS.Y            Veteran.N
Veteran.Y         Legacy.N
 Min.   :0.0000    Min.   :0.0000000   Min.   :0.0000    Min.   :0.000000    Min.   :0.0
000    Min.   :0.00000   Min.   :0.0000
 1st Qu.:1.0000    1st Qu.:0.0000000   1st Qu.:1.0000    1st Qu.:0.000000    1st Qu.:1.0
000    1st Qu.:0.00000   1st Qu.:1.0000
 Median :1.0000    Median :0.0000000   Median :1.0000    Median :0.000000    Median :1.0
000    Median :0.00000   Median :1.0000
 Mean   :0.9995    Mean   :0.0004812   Mean   :0.9933    Mean   :0.006736    Mean   :0.9
315    Mean   :0.06848   Mean   :0.9267
 3rd Qu.:1.0000    3rd Qu.:0.0000000   3rd Qu.:1.0000    3rd Qu.:0.000000    3rd Qu.:1.0
000    3rd Qu.:0.00000   3rd Qu.:1.0000
 Max.   :1.0000    Max.   :1.0000000   Max.   :1.0000    Max.   :1.000000    Max.   :1.0
000    Max.   :1.00000   Max.   :1.0000
    Legacy.Y         Athlete.N         Athlete.Y          State.CO         State.Other
Citizenship.Foreign National/International
 Min.   :0.0000    Min.   :0.0000    Min.   :0.00000    Min.   :0.0000    Min.   :0.0000
Min.   :0.00000
 1st Qu.:0.0000    1st Qu.:1.0000    1st Qu.:0.00000    1st Qu.:0.0000    1st Qu.:0.0000
1st Qu.:0.00000
 Median :0.0000    Median :1.0000    Median :0.00000    Median :0.0000    Median :1.0000
Median :0.00000
 Mean   :0.0733    Mean   :0.9739    Mean   :0.02614    Mean   :0.3026    Mean   :0.6974
Mean   :0.03368
 3rd Qu.:0.0000    3rd Qu.:1.0000    3rd Qu.:0.00000    3rd Qu.:1.0000    3rd Qu.:1.0000
3rd Qu.:0.00000
```

```
 Max.   :1.0000    Max.   :1.0000    Max.   :1.00000   Max.   :1.0000   Max.   :1.0000
 Max.   :1.00000
 Citizenship.International Citizenship.Missing Citizenship.U.S. Citizen Citizenship.U
.S. Permanent Resident/Green Card Holder
 Min.   :0.000000          Min.   :0.000000    Min.   :0.0000          Min.   :0.000
00
 1st Qu.:0.000000          1st Qu.:0.000000    1st Qu.:1.0000          1st Qu.:0.000
00
 Median :0.000000          Median :0.000000    Median :1.0000          Median :0.000
00
 Mean   :0.001604          Mean   :0.001925    Mean   :0.9471          Mean   :0.013
63
 3rd Qu.:0.000000          3rd Qu.:0.000000    3rd Qu.:1.0000          3rd Qu.:0.000
00
 Max.   :1.000000          Max.   :1.000000    Max.   :1.0000          Max.   :1.000
00
 Citizenship.Undocumented/DACA Ethnicity.American Indian or Alaska Native Ethnicity.A
sian   Ethnicity.Black or African American
 Min.   :0.000000              Min.   :0.00000                         Min.   :0.0
0000   Min.   :0.00000
 1st Qu.:0.000000              1st Qu.:0.00000                         1st Qu.:0.0
0000   1st Qu.:0.00000
 Median :0.000000              Median :0.00000                         Median :0.0
0000   Median :0.00000
 Mean   :0.002085             Mean   :0.01299                          Mean   :0.0
9992   Mean   :0.01716
 3rd Qu.:0.000000             3rd Qu.:0.00000                          3rd Qu.:0.0
0000   3rd Qu.:0.00000
 Max.   :1.000000             Max.   :1.00000                          Max.   :1.0
0000   Max.   :1.00000
 Ethnicity.Hispanic or Latino Ethnicity.Missing  Ethnicity.Multiracial Ethnicity.Nati
ve Hawaiian or Other Pacific Islander
 Min.   :0.00000              Min.   :0.000000   Min.   :0.0000000    Min.   :0.0000
00
 1st Qu.:0.00000              1st Qu.:0.000000   1st Qu.:0.0000000    1st Qu.:0.0000
00
 Median :0.00000              Median :0.000000   Median :0.0000000    Median :0.0000
00
 Mean   :0.05164              Mean   :0.003368   Mean   :0.0001604    Mean   :0.0036
89
 3rd Qu.:0.00000              3rd Qu.:0.000000   3rd Qu.:0.0000000    3rd Qu.:0.0000
00
 Max.   :1.00000              Max.   :1.000000   Max.   :1.0000000    Max.   :1.0000
00
 Ethnicity.NotDeclared Ethnicity.Unknown   Ethnicity.White
 Min.   :0.00000       Min.   :0.0000000    Min.   :0.0000
 1st Qu.:0.00000       1st Qu.:0.0000000    1st Qu.:1.0000
 Median :0.00000       Median :0.0000000    Median :1.0000
 Mean   :0.04731       Mean   :0.0003208    Mean   :0.7634
 3rd Qu.:0.00000       3rd Qu.:0.0000000    3rd Qu.:1.0000
```

```
 Max.   :1.00000       Max.    :1.0000000   Max.    :1.0000
 Major.App.Applied Mathematics & Statistics - Computational & Applied Mathematics
 Min.   :0.0000
 1st Qu.:0.0000
 Median :0.0000
 Mean   :0.0247
 3rd Qu.:0.0000
 Max.   :1.0000
 Major.App.Applied Mathematics & Statistics - Statistics Major.App.Chemical Engineeri
 ng
 Min.   :0.000000                                    Min.   :0.00000
 1st Qu.:0.000000                                    1st Qu.:0.00000
 Median :0.000000                                    Median :0.00000
 Mean   :0.007698                                    Mean   :0.08677
 3rd Qu.:0.000000                                    3rd Qu.:0.00000
 Max.   :1.000000                                    Max.   :1.00000
 Major.App.Chemical Engineering - Biological Engineering Specialty Major.App.Chemistr
 y
 Min.   :0.00000                                     Min.   :0.00000
 1st Qu.:0.00000                                     1st Qu.:0.00000
 Median :0.00000                                     Median :0.00000
 Mean   :0.08051                                     Mean   :0.01235
 3rd Qu.:0.00000                                     3rd Qu.:0.00000
 Max.   :1.00000                                     Max.   :1.00000
 Major.App.Chemistry - Biochemistry Specialty Major.App.Chemistry - Environmental Che
 mistry Specialty Major.App.Civil Engineering
 Min.   :0.0000                     Min.   :0.000000
Min.   :0.00000
 1st Qu.:0.0000                     1st Qu.:0.000000
1st Qu.:0.00000
 Median :0.0000                     Median :0.000000
Median :0.00000
 Mean   :0.0255                     Mean   :0.003368
Mean   :0.06287
 3rd Qu.:0.0000                     3rd Qu.:0.000000
3rd Qu.:0.00000
 Max.   :1.0000                     Max.   :1.000000
Max.   :1.00000
 Major.App.Computer Science Major.App.Economics Major.App.Electrical Engineering Majo
 r.App.Engineering Physics
 Min.   :0.0000         Min.   :0.00000    Min.   :0.00000              Min.
:0.00000
 1st Qu.:0.0000         1st Qu.:0.00000    1st Qu.:0.00000              1st
Qu.:0.00000
 Median :0.0000         Median :0.00000    Median :0.00000              Medi
an :0.00000
 Mean   :0.1007         Mean   :0.01299    Mean   :0.06977              Mean
:0.04683
 3rd Qu.:0.0000         3rd Qu.:0.00000    3rd Qu.:0.00000              3rd
Qu.:0.00000
```

```
    Max.   :1.0000                   Max.    :1.00000       Max.    :1.00000                      Max.
:1.00000
 Major.App.Environmental Engineering Major.App.Geological Engineering Major.App.Geoph
ysical Engineering
 Min.   :0.00000                     Min.    :0.0000                  Min.    :0.00000
0
 1st Qu.:0.00000                     1st Qu.:0.0000                   1st Qu.:0.00000
0
 Median :0.00000                     Median :0.0000                   Median :0.00000
0
 Mean   :0.05437                     Mean    :0.0162                  Mean    :0.00545
3
 3rd Qu.:0.00000                     3rd Qu.:0.0000                   3rd Qu.:0.00000
0
 Max.   :1.00000                     Max.    :1.0000                  Max.    :1.00000
0
 Major.App.Mechanical Engineering Major.App.Metallurgical & Materials Engineering Maj
or.App.Mining Engineering Major.App.Missing
 Min.   :0.0000                      Min.    :0.00000                               Min
.   :0.000000        Min.    :0.000000
 1st Qu.:0.0000                      1st Qu.:0.00000                                1st
Qu.:0.000000        1st Qu.:0.000000
 Median :0.0000                      Median :0.00000                                Med
ian :0.000000        Median :0.000000
 Mean   :0.2388                      Mean    :0.01973                               Mea
n   :0.009784        Mean    :0.003208
 3rd Qu.:0.0000                      3rd Qu.:0.00000                                3rd
Qu.:0.000000        3rd Qu.:0.000000
 Max.   :1.0000                      Max.    :1.00000                               Max
.   :1.000000        Max.    :1.000000
 Major.App.Petroleum Engineering Major.App.Undecided First Contact.ACT First Contact.
Application First Contact.Athlete Form
 Min.   :0.00000                     Min.    :0.00000     Min.    :0.00000   Min.    :0.0000
Min.    :0.000000
 1st Qu.:0.00000                     1st Qu.:0.00000      1st Qu.:0.00000    1st Qu.:0.0000
1st Qu.:0.000000
 Median :0.00000                     Median :0.00000      Median :0.00000    Median :0.0000
Median :0.000000
 Mean   :0.03801                     Mean    :0.08035     Mean    :0.09447   Mean    :0.1524
Mean    :0.006897
 3rd Qu.:0.00000                     3rd Qu.:0.00000      3rd Qu.:0.00000    3rd Qu.:0.0000
3rd Qu.:0.000000
 Max.   :1.00000                     Max.    :1.00000     Max.    :1.00000   Max.    :1.0000
Max.    :1.000000
 First Contact.Campus Visit First Contact.College Fair First Contact.FUF First Contac
t.Girls Lead the Way First Contact.GPA Form
 Min.   :0.0000                      Min.    :0.000000                Min.    :0.0000    Min.    :0.00
0000                  Min.    :0.000000
 1st Qu.:0.0000                      1st Qu.:0.000000                 1st Qu.:0.0000     1st Qu.:0.00
0000                  1st Qu.:0.000000
```

```
 Median :0.0000          Median :0.000000          Median :0.0000      Median :0.00
0000          Median :0.000000
 Mean   :0.1254          Mean   :0.003368          Mean   :0.1545      Mean    :0.00
1443          Mean   :0.003368
 3rd Qu.:0.0000          3rd Qu.:0.000000          3rd Qu.:0.0000      3rd Qu.:0.00
0000          3rd Qu.:0.000000
 Max.   :1.0000          Max.   :1.000000          Max.   :1.0000      Max.    :1.00
0000          Max.   :1.000000
 First Contact.Inquiry Form First Contact.Mailing First Contact.Materials First Conta
ct.MEP   First Contact.Phone
 Min.   :0.00000          Min.   :0.0000000          Min.   :0.000000          Min.    :0.0
00000   Min.   :0.0000000
 1st Qu.:0.00000          1st Qu.:0.0000000          1st Qu.:0.000000          1st Qu.:0.0
00000   1st Qu.:0.0000000
 Median :0.00000          Median :0.0000000          Median :0.000000          Median :0.0
00000   Median :0.0000000
 Mean   :0.01588          Mean   :0.0004812          Mean   :0.003368          Mean    :0.0
02727   Mean   :0.0001604
 3rd Qu.:0.00000          3rd Qu.:0.0000000          3rd Qu.:0.000000          3rd Qu.:0.0
00000   3rd Qu.:0.0000000
 Max.   :1.00000          Max.   :1.0000000          Max.   :1.000000          Max.    :1.0
00000   Max.   :1.0000000
 First Contact.Preview Mines First Contact.Royall Search First Contact.SAT First Cont
act.TOEFL First Visit.Campus Tour
 Min.   :0.00000          Min.   :0.0000          Min.   :0.00000   Min.   :0.
0000000   Min.   :0.00000
 1st Qu.:0.00000          1st Qu.:0.0000          1st Qu.:0.00000   1st Qu.:0.
0000000   1st Qu.:0.00000
 Median :0.00000          Median :0.0000          Median :0.00000   Median :0.
0000000   Median :0.00000
 Mean   :0.01395          Mean   :0.3973          Mean   :0.02422   Mean   :0.
0001604   Mean   :0.08613
 3rd Qu.:0.00000          3rd Qu.:1.0000          3rd Qu.:0.00000   3rd Qu.:0.
0000000   3rd Qu.:0.00000
 Max.   :1.00000          Max.   :1.0000          Max.   :1.00000   Max.   :1.
0000000   Max.   :1.00000
 First Visit.Campus Visit First Visit.Class Shadow First Visit.Discover Mines First V
isit.Discovery Mines in Your City
 Min.   :0.0000          Min.   :0.000000          Min.   :0.00000          Min.
:0.000000
 1st Qu.:0.0000          1st Qu.:0.000000          1st Qu.:0.00000          1st Qu.
:0.000000
 Median :0.0000          Median :0.000000          Median :0.00000          Median
:0.000000
 Mean   :0.1511          Mean   :0.004972          Mean   :0.03352          Mean
:0.005453
 3rd Qu.:0.0000          3rd Qu.:0.000000          3rd Qu.:0.00000          3rd Qu.
:0.000000
 Max.   :1.0000          Max.   :1.000000          Max.   :1.00000          Max.
:1.000000
```

```
 First Visit.Girls Lead the Way First Visit.Launch First Visit.Making The Connection
First Visit.Meet Me at Mines First Visit.None
 Min.   :0.000000                    Min.   :0.00000     Min.   :0.0000
Min.   :0.000000                  Min.   :0.0000
 1st Qu.:0.000000                    1st Qu.:0.00000     1st Qu.:0.0000
1st Qu.:0.000000                  1st Qu.:0.0000
 Median :0.000000                    Median :0.00000     Median :0.0000
Median :0.000000                  Median :1.0000
 Mean   :0.003528                    Mean   :0.03176     Mean   :0.0154
Mean   :0.005293                  Mean   :0.5931
 3rd Qu.:0.000000                    3rd Qu.:0.00000     3rd Qu.:0.0000
3rd Qu.:0.000000                  3rd Qu.:1.0000
 Max.   :1.000000                    Max.   :1.00000     Max.   :1.0000
Max.   :1.000000                  Max.   :1.0000
 First Visit.Preview Mines First Visit.Preview Mines In Your City Sport.Men's Varsity
Baseball Sport.Men's Varsity Basketball
 Min.   :0.00000        Min.   :0.00000                       Min.   :0.0000000
Min.   :0.000000
 1st Qu.:0.00000        1st Qu.:0.00000                       1st Qu.:0.0000000
1st Qu.:0.000000
 Median :0.00000        Median :0.00000                       Median :0.0000000
Median :0.000000
 Mean   :0.03111        Mean   :0.03865                       Mean   :0.0009623
Mean   :0.001443
 3rd Qu.:0.00000        3rd Qu.:0.00000                       3rd Qu.:0.0000000
3rd Qu.:0.000000
 Max.   :1.00000        Max.   :1.00000                       Max.   :1.0000000
Max.   :1.000000
 Sport.Men's Varsity Football Sport.Men's Varsity Golf Sport.Men's Varsity Soccer Spo
rt.Men's Varsity Wrestling   Sport.None
 Min.   :0.00000             Min.   :0.0000000     Min.   :0.0000000         Min
.   :0.000000             Min.   :0.0000
 1st Qu.:0.00000             1st Qu.:0.0000000     1st Qu.:0.0000000         1st
Qu.:0.000000             1st Qu.:1.0000
 Median :0.00000             Median :0.0000000     Median :0.0000000         Med
ian :0.000000             Median :1.0000
 Mean   :0.01363             Mean   :0.0004812     Mean   :0.0009623         Mea
n   :0.002406             Mean   :0.9739
 3rd Qu.:0.00000             3rd Qu.:0.0000000     3rd Qu.:0.0000000         3rd
Qu.:0.000000             3rd Qu.:1.0000
 Max.   :1.00000             Max.   :1.0000000     Max.   :1.0000000         Max
.   :1.000000             Max.   :1.0000
 Sport.Varsity Swimming/Diving Sport.Varsity Track/Field Sport.Varsity XCountry Sport
.Women's Varsity Basketball
 Min.   :0.0000000             Min.   :0.000000        Min.   :0.0000000        Min.
:0.000000
 1st Qu.:0.0000000             1st Qu.:0.000000        1st Qu.:0.0000000        1st Q
u.:0.000000
 Median :0.0000000             Median :0.000000        Median :0.0000000        Media
n :0.000000
```

```
 Mean    :0.0001604            Mean    :0.002406          Mean    :0.0006415         Mean
:0.001123
 3rd Qu.:0.0000000             3rd Qu.:0.000000           3rd Qu.:0.0000000          3rd Q
u.:0.000000
 Max.    :1.0000000            Max.    :1.000000          Max.    :1.0000000         Max.
:1.000000
 Sport.Women's Varsity Soccer Sport.Women's Varsity Softball Sport.Women's Varsity Vo
lleyball
 Min.    :0.0000000            Min.    :0.0000000             Min.    :0.0000000
 1st Qu.:0.0000000             1st Qu.:0.0000000              1st Qu.:0.0000000
 Median :0.0000000             Median :0.0000000              Median :0.0000000
 Mean    :0.0006415            Mean    :0.0004812             Mean    :0.0008019
 3rd Qu.:0.0000000             3rd Qu.:0.0000000              3rd Qu.:0.0000000
 Max.    :1.0000000            Max.    :1.0000000             Max.    :1.0000000
```

Hide

Hide

```
str(dfwithDummies)
```

```
'data.frame':    6235 obs. of   120 variables:
 $ Sex.F                                                                       :
int  0 0 0 0 0 0 1 0 1 1 ...
 $ Sex.M                                                                       :
int  1 1 1 1 1 1 0 1 0 0 ...
 $ Expel.N                                                                     :
int  1 1 1 1 1 1 0 1 1 1 ...
 $ Expel.Y                                                                     :
int  0 0 0 0 0 0 1 0 0 0 ...
 $ First.Gen.N                                                                 :
int  1 1 1 1 1 1 0 1 1 1 ...
 $ First.Gen.Y                                                                 :
int  0 0 0 0 0 0 1 0 0 0 ...
 $ Challenge Tag.N                                                             :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Challenge Tag.Y                                                             :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Boettcher.Semi.N                                                            :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Boettcher.Semi.Y                                                            :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Boettcher.Final.N                                                           :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Boettcher.Final.Y                                                           :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Daniels.Semi.N                                                              :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Daniels.Semi.Y                                                              :
int  0 0 0 0 0 0 0 0 0 0 ...
```

```
 $ Daniels.Final.N                                          :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Daniels.Final.Y                                          :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Harvey.App.N                                             :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Harvey.App.Y                                             :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Harvey.Final.N                                           :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Harvey.Final.Y                                           :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ FC.App.N                                                 :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ FC.App.Y                                                 :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Thorson.App.N                                            :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Thorson.App.Y                                            :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Thorson.Admit.N                                          :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Thorson.Admit.Y                                          :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Summet.Participant.N                                     :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Summet.Participant.Y                                     :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Mines.Medal.N                                            :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Mines.Medal.Y                                            :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ SPS.N                                                    :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ SPS.Y                                                    :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Veteran.N                                                :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Veteran.Y                                                :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Legacy.N                                                 :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Legacy.Y                                                 :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Athlete.N                                                :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Athlete.Y                                                :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ State.CO                                                 :
int  1 0 0 1 0 1 0 0 0 0 ...
```

```
 $ State.Other                                                           :
int  0 1 1 0 1 0 1 1 1 1 ...
 $ Citizenship.Foreign National/International                            :
int  0 0 0 0 0 0 1 0 0 0 ...
 $ Citizenship.International                                             :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Citizenship.Missing                                                   :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Citizenship.U.S. Citizen                                              :
int  1 1 1 1 1 1 0 1 1 1 ...
 $ Citizenship.U.S. Permanent Resident/Green Card Holder                 :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Citizenship.Undocumented/DACA                                         :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.American Indian or Alaska Native                            :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Asian                                                       :
int  1 0 0 0 0 0 1 0 0 0 ...
 $ Ethnicity.Black or African American                                  :
int  0 0 0 0 1 0 0 0 0 0 ...
 $ Ethnicity.Hispanic or Latino                                         :
int  0 0 0 0 0 0 0 1 0 0 ...
 $ Ethnicity.Missing                                                     :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Multiracial                                                 :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Native Hawaiian or Other Pacific Islander                   :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.NotDeclared                                                 :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Unknown                                                     :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.White                                                       :
int  0 1 1 1 0 1 0 0 1 1 ...
 $ Major.App.Applied Mathematics & Statistics - Computational & Applied Mathematics:
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Applied Mathematics & Statistics - Statistics              :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Chemical Engineering                                        :
int  0 0 0 0 0 0 0 1 0 0 ...
 $ Major.App.Chemical Engineering - Biological Engineering Specialty     :
int  0 0 0 0 0 0 0 0 1 0 ...
 $ Major.App.Chemistry                                                   :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Chemistry - Biochemistry Specialty                         :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Chemistry - Environmental Chemistry Specialty              :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Civil Engineering                                           :
int  1 0 0 0 0 0 0 0 0 1 ...
```

```
 $ Major.App.Computer Science                                        :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Economics                                               :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Electrical Engineering                                  :
int  0 0 0 0 0 0 0 1 0 0 0 ...
 $ Major.App.Engineering Physics                                     :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Environmental Engineering                               :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Geological Engineering                                  :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Geophysical Engineering                                 :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Mechanical Engineering                                  :
int  0 1 1 1 1 0 0 0 0 0 0 ...
 $ Major.App.Metallurgical & Materials Engineering                   :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Mining Engineering                                      :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Missing                                                 :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Petroleum Engineering                                   :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Undecided                                               :
int  0 0 0 0 0 1 0 0 0 0 0 ...
 $ First Contact.ACT                                                 :
int  1 1 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Application                                         :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Athlete Form                                        :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Campus Visit                                        :
int  0 0 0 1 0 1 0 0 1 1 ...
 $ First Contact.College Fair                                        :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.FUF                                                 :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Girls Lead the Way                                  :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.GPA Form                                            :
int  0 0 1 0 0 0 0 0 0 0 0 ...
 $ First Contact.Inquiry Form                                        :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Mailing                                             :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Materials                                           :
int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.MEP                                                 :
int  0 0 0 0 0 0 0 0 0 0 0 ...
```

```
 $ First Contact.Phone                                              :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Preview Mines                                      :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Royall Search                                      :
int  0 0 0 0 1 0 0 1 0 0 ...
 $ First Contact.SAT                                                :
int  0 0 0 0 0 0 1 0 0 0 ...
 $ First Contact.TOEFL                                              :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Visit.Campus Tour                                          :
int  0 1 0 0 0 0 0 0 0 0 ...
 $ First Visit.Campus Visit                                         :
int  0 0 0 1 0 1 0 0 1 1 ...
 $ First Visit.Class Shadow                                         :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Visit.Discover Mines                                       :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Visit.Discovery Mines in Your City                         :
int  0 0 0 0 0 0 0 0 0 0 ...
  [list output truncated]
 - attr(*, "dummies")=List of 26
  ..$ Sex                : int  1 2
  ..$ Expel              : int  3 4
  ..$ First.Gen          : int  5 6
  ..$ Challenge Tag      : int  7 8
  ..$ Boettcher.Semi     : int  9 10
  ..$ Boettcher.Final    : int  11 12
  ..$ Daniels.Semi       : int  13 14
  ..$ Daniels.Final      : int  15 16
  ..$ Harvey.App         : int  17 18
  ..$ Harvey.Final       : int  19 20
  ..$ FC.App             : int  21 22
  ..$ Thorson.App        : int  23 24
  ..$ Thorson.Admit      : int  25 26
  ..$ Summet.Participant : int  27 28
  ..$ Mines.Medal        : int  29 30
  ..$ SPS                : int  31 32
  ..$ Veteran            : int  33 34
  ..$ Legacy             : int  35 36
  ..$ Athlete            : int  37 38
  ..$ State              : int  39 40
  ..$ Citizenship        : int  41 42 43 44 45 46
  ..$ Ethnicity          : int  47 48 49 50 51 52 53 54 55 56
  ..$ Major.App          : int  57 58 59 60 61 62 63 64 65 66 ...
  ..$ First Contact      : Mint  78 79 80 81 82 83 84 85 86 87 ...
  ..$ First Visit        : int  95 96 97 98 99 100 101 102 103 104 ...
  ..$ Sport              : int  107 108 109 110 111 112 113 114 115 116 ...
```

Hide

```
dfJustNum <- dfDataSetKNN[31:48]
str(dfJustNum)
```

```
'data.frame':    6235 obs. of  18 variables:
 $ App.Created.Days      : num  339 339 339 339 335 335 333 333 333 333 ...
 $ Age                   : num  20 24 31 35 35 23 33 18 19 19 ...
 $ HS.GPA                : num  3.88 3.48 4 3.16 3.9 ...
 $ SATR.Converted        : num  1370 1400 1400 1460 1370 1540 1190 1370 1430 1350 ...
 $ Review.OutsideActivity: num  3 3 1 3 1 2 3 2 2 3 ...
 $ Review.Leadership     : num  2 1 0 0 1 2 3 0 1 3 ...
 $ Review.WorkExp        : num  2 2 0 1 0 0 0 1 0 3 ...
 $ Review.WorkEthic      : num  3 3 0 0 2 2 2 1 2 3 ...
 $ Review.ExpDiversity   : num  3 2 0 1 1 1 3 1 2 2 ...
 $ Review.DesireAttend   : num  2 2 0 2 1 3 3 1 3 3 ...
 $ Review.Affinity       : num  2 2 1 0 1 2 3 1 2 3 ...
 $ Review.InnovEntrep    : num  1 0 0 0 0 0 1 0 1 3 ...
 $ Review.Teamwork       : num  3 2 0 1 1 2 3 3 2 3 ...
 $ Review.OverallFit     : num  7 8 7 8 8 7 5 6 8 10 ...
 $ Logins.60Days         : num  0 0 0 0 0 0 0 0 0 0 ...
 $ EventCount.All        : num  0 1 0 0 0 0 0 0 0 2 ...
 $ EventCount.Admitted   : num  0 0 0 0 0 0 0 0 0 2 ...
 $ EventCount.Campus     : num  0 1 0 0 0 0 0 0 0 2 ...
```

```
dfNumAndDummies <- cbind(dfwithDummies, dfJustNum)
str(dfNumAndDummies)
```

```
'data.frame':    6235 obs. of  138 variables:
 $ Sex.F                                                                :
int  0 0 0 0 0 0 1 0 1 1 ...
 $ Sex.M                                                                :
int  1 1 1 1 1 1 0 1 0 0 ...
 $ Expel.N                                                              :
int  1 1 1 1 1 1 0 1 1 1 ...
 $ Expel.Y                                                              :
int  0 0 0 0 0 0 1 0 0 0 ...
 $ First.Gen.N                                                          :
int  1 1 1 1 1 1 0 1 1 1 ...
 $ First.Gen.Y                                                          :
int  0 0 0 0 0 0 1 0 0 0 ...
 $ Challenge Tag.N                                                      :
int  1 1 1 1 1 1 1 1 1 1 ...
 $ Challenge Tag.Y                                                      :
int  0 0 0 0 0 0 0 0 0 0 ...
 $ Boettcher.Semi.N                                                     :
```

```
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ Boettcher.Semi.Y                                          :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ Boettcher.Final.N                                         :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ Boettcher.Final.Y                                         :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ Daniels.Semi.N                                            :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ Daniels.Semi.Y                                            :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ Daniels.Final.N                                           :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ Daniels.Final.Y                                           :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ Harvey.App.N                                              :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ Harvey.App.Y                                              :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ Harvey.Final.N                                            :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ Harvey.Final.Y                                            :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ FC.App.N                                                  :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ FC.App.Y                                                  :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ Thorson.App.N                                             :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ Thorson.App.Y                                             :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ Thorson.Admit.N                                           :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ Thorson.Admit.Y                                           :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ Summet.Participant.N                                      :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ Summet.Participant.Y                                      :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ Mines.Medal.N                                             :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ Mines.Medal.Y                                             :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ SPS.N                                                     :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ SPS.Y                                                     :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ Veteran.N                                                 :
 int  1 1 1 1 1 1 1 1 1 1 ...
 $ Veteran.Y                                                 :
```

```
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Legacy.N                                                                                        :
 int  1 1 1 1 1 1 1 1 1 1 1 ...
 $ Legacy.Y                                                                                        :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Athlete.N                                                                                       :
 int  1 1 1 1 1 1 1 1 1 1 1 ...
 $ Athlete.Y                                                                                       :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ State.CO                                                                                         :
 int  1 0 0 1 0 1 0 0 0 0 0 ...
 $ State.Other                                                                                      :
 int  0 1 1 0 1 0 1 1 1 1 1 ...
 $ Citizenship.Foreign National/International                                                       :
 int  0 0 0 0 0 0 1 0 0 0 0 ...
 $ Citizenship.International                                                                        :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Citizenship.Missing                                                                              :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Citizenship.U.S. Citizen                                                                         :
 int  1 1 1 1 1 1 0 1 1 1 ...
 $ Citizenship.U.S. Permanent Resident/Green Card Holder                                            :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Citizenship.Undocumented/DACA                                                                    :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.American Indian or Alaska Native                                                       :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Asian                                                                                  :
 int  1 0 0 0 0 0 0 1 0 0 0 ...
 $ Ethnicity.Black or African American                                                             :
 int  0 0 0 0 1 0 0 0 0 0 0 ...
 $ Ethnicity.Hispanic or Latino                                                                     :
 int  0 0 0 0 0 0 0 0 1 0 0 ...
 $ Ethnicity.Missing                                                                                :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Multiracial                                                                            :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Native Hawaiian or Other Pacific Islander                                              :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.NotDeclared                                                                            :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Unknown                                                                                :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.White                                                                                  :
 int  0 1 1 1 0 1 0 0 1 1 1 ...
 $ Major.App.Applied Mathematics & Statistics - Computational & Applied Mathematics:
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Applied Mathematics & Statistics - Statistics                                          :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Chemical Engineering                                                                   :
```

```
 int  0 0 0 0 0 0 0 0 1 0 0 ...
  $ Major.App.Chemical Engineering - Biological Engineering Specialty                  :
 int  0 0 0 0 0 0 0 0 0 1 0 ...
  $ Major.App.Chemistry                                                                :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Chemistry - Biochemistry Specialty                                       :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Chemistry - Environmental Chemistry Specialty                            :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Civil Engineering                                                        :
 int  1 0 0 0 0 0 0 0 0 0 1 ...
  $ Major.App.Computer Science                                                         :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Economics                                                                :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Electrical Engineering                                                   :
 int  0 0 0 0 0 0 0 1 0 0 0 ...
  $ Major.App.Engineering Physics                                                      :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Environmental Engineering                                                :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Geological Engineering                                                   :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Geophysical Engineering                                                  :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Mechanical Engineering                                                   :
 int  0 1 1 1 1 0 0 0 0 0 0 ...
  $ Major.App.Metallurgical & Materials Engineering                                    :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Mining Engineering                                                       :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Missing                                                                  :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Petroleum Engineering                                                    :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Major.App.Undecided                                                                :
 int  0 0 0 0 0 1 0 0 0 0 0 ...
  $ First Contact.ACT                                                                  :
 int  1 1 0 0 0 0 0 0 0 0 0 ...
  $ First Contact.Application                                                          :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ First Contact.Athlete Form                                                         :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ First Contact.Campus Visit                                                         :
 int  0 0 0 1 0 1 0 0 1 1 ...
  $ First Contact.College Fair                                                         :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ First Contact.FUF                                                                  :
 int  0 0 0 0 0 0 0 0 0 0 0 ...
  $ First Contact.Girls Lead the Way                                                   :
```

```
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.GPA Form                                    :
 int  0 0 1 0 0 0 0 0 0 0 ...
 $ First Contact.Inquiry Form                                :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Mailing                                     :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Materials                                   :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.MEP                                         :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Phone                                       :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Preview Mines                               :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Contact.Royall Search                               :
 int  0 0 0 0 1 0 0 1 0 0 ...
 $ First Contact.SAT                                         :
 int  0 0 0 0 0 0 1 0 0 0 ...
 $ First Contact.TOEFL                                       :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Visit.Campus Tour                                   :
 int  0 1 0 0 0 0 0 0 0 0 ...
 $ First Visit.Campus Visit                                  :
 int  0 0 0 1 0 1 0 0 1 1 ...
 $ First Visit.Class Shadow                                  :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Visit.Discover Mines                                :
 int  0 0 0 0 0 0 0 0 0 0 ...
 $ First Visit.Discovery Mines in Your City                  :
 int  0 0 0 0 0 0 0 0 0 0 ...
   [list output truncated]
```

Normalize Function

Hide

Hide

```
normalize <- function(x) {
    return ((x - min(x)) / (max(x) - min(x)))
  }
```

Hide

Hide

```
dfNormData <- as.data.frame(lapply(dfNumAndDummies, normalize))
str(dfNormData)
```

```
'data.frame':    6235 obs. of  138 variables:
 $ Sex.F                                                   :
num  0 0 0 0 0 0 1 0 1 1 ...
 $ Sex.M                                                   :
num  1 1 1 1 1 1 0 1 0 0 ...
 $ Expel.N                                                 :
num  1 1 1 1 1 1 0 1 1 1 ...
 $ Expel.Y                                                 :
num  0 0 0 0 0 0 1 0 0 0 ...
 $ First.Gen.N                                             :
num  1 1 1 1 1 1 0 1 1 1 ...
 $ First.Gen.Y                                             :
num  0 0 0 0 0 0 1 0 0 0 ...
 $ Challenge.Tag.N                                         :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Challenge.Tag.Y                                         :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Boettcher.Semi.N                                        :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Boettcher.Semi.Y                                        :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Boettcher.Final.N                                       :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Boettcher.Final.Y                                       :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Daniels.Semi.N                                          :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Daniels.Semi.Y                                          :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Daniels.Final.N                                         :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Daniels.Final.Y                                         :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Harvey.App.N                                            :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Harvey.App.Y                                            :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Harvey.Final.N                                          :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Harvey.Final.Y                                          :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ FC.App.N                                                :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ FC.App.Y                                                :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Thorson.App.N                                           :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Thorson.App.Y                                           :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Thorson.Admit.N                                         :
```

```
 num  1 1 1 1 1 1 1 1 1 1 1 ...
  $ Thorson.Admit.Y                                                              :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Summet.Participant.N                                                         :
 num  1 1 1 1 1 1 1 1 1 1 1 ...
  $ Summet.Participant.Y                                                         :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Mines.Medal.N                                                                :
 num  1 1 1 1 1 1 1 1 1 1 1 ...
  $ Mines.Medal.Y                                                                :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ SPS.N                                                                        :
 num  1 1 1 1 1 1 1 1 1 1 1 ...
  $ SPS.Y                                                                        :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Veteran.N                                                                    :
 num  1 1 1 1 1 1 1 1 1 1 1 ...
  $ Veteran.Y                                                                    :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Legacy.N                                                                     :
 num  1 1 1 1 1 1 1 1 1 1 1 ...
  $ Legacy.Y                                                                     :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Athlete.N                                                                    :
 num  1 1 1 1 1 1 1 1 1 1 1 ...
  $ Athlete.Y                                                                    :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ State.CO                                                                     :
 num  1 0 0 1 0 1 0 0 0 0 0 ...
  $ State.Other                                                                  :
 num  0 1 1 0 1 0 1 1 1 1 1 ...
  $ Citizenship.Foreign.National.International                                   :
 num  0 0 0 0 0 0 1 0 0 0 0 ...
  $ Citizenship.International                                                    :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Citizenship.Missing                                                          :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Citizenship.U.S..Citizen                                                     :
 num  1 1 1 1 1 1 0 1 1 1 1 ...
  $ Citizenship.U.S..Permanent.Resident.Green.Card.Holder                       :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Citizenship.Undocumented.DACA                                                :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Ethnicity.American.Indian.or.Alaska.Native                                   :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
  $ Ethnicity.Asian                                                             :
 num  1 0 0 0 0 0 0 1 0 0 0 ...
  $ Ethnicity.Black.or.African.American                                          :
 num  0 0 0 0 0 1 0 0 0 0 0 ...
  $ Ethnicity.Hispanic.or.Latino                                                 :
```

```
 num  0 0 0 0 0 0 0 1 0 0 ...
 $ Ethnicity.Missing                                                              :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Multiracial                                                          :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Native.Hawaiian.or.Other.Pacific.Islander                           :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.NotDeclared                                                         :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Unknown                                                             :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.White                                                               :
 num  0 1 1 1 0 1 0 0 1 1 ...
 $ Major.App.Applied.Mathematics...Statistics...Computational...Applied.Mathematics:
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Applied.Mathematics...Statistics...Statistics                       :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Chemical.Engineering                                                :
 num  0 0 0 0 0 0 0 1 0 0 ...
 $ Major.App.Chemical.Engineering...Biological.Engineering.Specialty             :
 num  0 0 0 0 0 0 0 0 1 0 ...
 $ Major.App.Chemistry                                                           :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Chemistry...Biochemistry.Specialty                                  :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Chemistry...Environmental.Chemistry.Specialty                       :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Civil.Engineering                                                   :
 num  1 0 0 0 0 0 0 0 0 1 ...
 $ Major.App.Computer.Science                                                    :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Economics                                                           :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Electrical.Engineering                                              :
 num  0 0 0 0 0 0 1 0 0 0 ...
 $ Major.App.Engineering.Physics                                                 :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Environmental.Engineering                                           :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Geological.Engineering                                              :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Geophysical.Engineering                                             :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Mechanical.Engineering                                              :
 num  0 1 1 1 1 0 0 0 0 0 ...
 $ Major.App.Metallurgical...Materials.Engineering                               :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Mining.Engineering                                                  :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Missing                                                             :
```

```
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Petroleum.Engineering                          :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Undecided                                      :
num  0 0 0 0 0 1 0 0 0 0 ...
 $ First.Contact.ACT                                        :
num  1 1 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Application                                :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Athlete.Form                               :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Campus.Visit                               :
num  0 0 0 1 0 1 0 0 1 1 ...
 $ First.Contact.College.Fair                               :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.FUF                                        :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Girls.Lead.the.Way                         :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.GPA.Form                                   :
num  0 0 1 0 0 0 0 0 0 0 ...
 $ First.Contact.Inquiry.Form                               :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Mailing                                    :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Materials                                  :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.MEP                                        :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Phone                                      :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Preview.Mines                              :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Royall.Search                              :
num  0 0 0 0 1 0 0 1 0 0 ...
 $ First.Contact.SAT                                        :
num  0 0 0 0 0 0 1 0 0 0 ...
 $ First.Contact.TOEFL                                      :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Visit.Campus.Tour                                  :
num  0 1 0 0 0 0 0 0 0 0 ...
 $ First.Visit.Campus.Visit                                 :
num  0 0 0 1 0 1 0 0 1 1 ...
 $ First.Visit.Class.Shadow                                 :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Visit.Discover.Mines                               :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ First.Visit.Discovery.Mines.in.Your.City                 :
num  0 0 0 0 0 0 0 0 0 0 ...
   [list output truncated]
```

```
summary(dfNormData)
```

```
     Sex.F             Sex.M             Expel.N           Expel.Y           First.Gen.N
First.Gen.Y        Challenge.Tag.N
 Min.   :0.0000   Min.   :0.0000   Min.   :0.0000   Min.   :0.00000   Min.   :0.0000
Min.   :0.00000   Min.   :0.0000
 1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:1.0000   1st Qu.:0.00000   1st Qu.:1.0000
1st Qu.:0.00000   1st Qu.:1.0000
 Median :0.0000   Median :1.0000   Median :1.0000   Median :0.00000   Median :1.0000
Median :0.00000   Median :1.0000
 Mean   :0.3281   Mean   :0.6719   Mean   :0.9877   Mean   :0.01235   Mean   :0.9105
Mean   :0.08949   Mean   :0.9798
 3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:0.00000   3rd Qu.:1.0000
3rd Qu.:0.00000   3rd Qu.:1.0000
 Max.   :1.0000   Max.   :1.0000   Max.   :1.0000   Max.   :1.00000   Max.   :1.0000
Max.   :1.00000   Max.   :1.0000
 Challenge.Tag.Y  Boettcher.Semi.N Boettcher.Semi.Y  Boettcher.Final.N Boettcher.Fin
al.Y Daniels.Semi.N   Daniels.Semi.Y
 Min.   :0.00000   Min.   :0.0000   Min.   :0.00000   Min.   :0.000    Min.   :0.000
00   Min.   :0.0000   Min.   :0.00000
 1st Qu.:0.00000   1st Qu.:1.0000   1st Qu.:0.00000   1st Qu.:1.000    1st Qu.:0.000
00   1st Qu.:1.0000   1st Qu.:0.00000
 Median :0.00000   Median :1.0000   Median :0.00000   Median :1.000    Median :0.000
00   Median :1.0000   Median :0.00000
 Mean   :0.02021   Mean   :0.9843   Mean   :0.01572   Mean   :0.996    Mean   :0.004
01   Mean   :0.9883   Mean   :0.01171
 3rd Qu.:0.00000   3rd Qu.:1.0000   3rd Qu.:0.00000   3rd Qu.:1.000    3rd Qu.:0.000
00   3rd Qu.:1.0000   3rd Qu.:0.00000
 Max.   :1.00000   Max.   :1.0000   Max.   :1.00000   Max.   :1.000    Max.   :1.000
00   Max.   :1.0000   Max.   :1.00000
 Daniels.Final.N Daniels.Final.Y   Harvey.App.N      Harvey.App.Y      Harvey.Final.N
Harvey.Final.Y        FC.App.N
 Min.   :0.000   Min.   :0.00000   Min.   :0.0000   Min.   :0.00000   Min.   :0.0000
Min.   :0.000000   Min.   :0.000
 1st Qu.:1.000   1st Qu.:0.00000   1st Qu.:1.0000   1st Qu.:0.00000   1st Qu.:1.0000
1st Qu.:0.000000   1st Qu.:1.000
 Median :1.000   Median :0.00000   Median :1.0000   Median :0.00000   Median :1.0000
Median :0.000000   Median :1.000
 Mean   :0.996   Mean   :0.00401   Mean   :0.9102   Mean   :0.08982   Mean   :0.9925
Mean   :0.007538   Mean   :0.986
 3rd Qu.:1.000   3rd Qu.:0.00000   3rd Qu.:1.0000   3rd Qu.:0.00000   3rd Qu.:1.0000
3rd Qu.:0.000000   3rd Qu.:1.000
 Max.   :1.000   Max.   :1.00000   Max.   :1.0000   Max.   :1.00000   Max.   :1.0000
Max.   :1.000000   Max.   :1.000
    FC.App.Y        Thorson.App.N    Thorson.App.Y     Thorson.Admit.N   Thorson.Admit.
Y   Summet.Participant.N Summet.Participant.Y
```

```
 Min.   :0.00000   Min.   :0.0000   Min.   :0.00000   Min.   :0.0000   Min.   :0.0000
0  Min.   :0.0000        Min.   :0.000000
 1st Qu.:0.00000   1st Qu.:1.0000   1st Qu.:0.00000   1st Qu.:1.0000   1st Qu.:0.0000
0  1st Qu.:1.0000        1st Qu.:0.000000
 Median :0.00000   Median :1.0000   Median :0.00000   Median :1.0000   Median :0.0000
0  Median :1.0000        Median :0.000000
 Mean   :0.01395   Mean   :0.9578   Mean   :0.04218   Mean   :0.9751   Mean   :0.0248
6  Mean   :0.9966        Mean   :0.003368
 3rd Qu.:0.00000   3rd Qu.:1.0000   3rd Qu.:0.00000   3rd Qu.:1.0000   3rd Qu.:0.0000
0  3rd Qu.:1.0000        3rd Qu.:0.000000
 Max.   :1.00000   Max.   :1.0000   Max.   :1.00000   Max.   :1.0000   Max.   :1.0000
0  Max.   :1.0000        Max.   :1.000000
 Mines.Medal.N    Mines.Medal.Y         SPS.N            SPS.Y            Veteran.N
Veteran.Y         Legacy.N
 Min.   :0.0000   Min.   :0.0000000   Min.   :0.0000   Min.   :0.000000   Min.   :0.0
000   Min.   :0.00000   Min.   :0.0000
 1st Qu.:1.0000   1st Qu.:0.0000000   1st Qu.:1.0000   1st Qu.:0.000000   1st Qu.:1.0
000   1st Qu.:0.00000   1st Qu.:1.0000
 Median :1.0000   Median :0.0000000   Median :1.0000   Median :0.000000   Median :1.0
000   Median :0.00000   Median :1.0000
 Mean   :0.9995   Mean   :0.0004812   Mean   :0.9933   Mean   :0.006736   Mean   :0.9
315   Mean   :0.06848   Mean   :0.9267
 3rd Qu.:1.0000   3rd Qu.:0.0000000   3rd Qu.:1.0000   3rd Qu.:0.000000   3rd Qu.:1.0
000   3rd Qu.:0.00000   3rd Qu.:1.0000
 Max.   :1.0000   Max.   :1.0000000   Max.   :1.0000   Max.   :1.000000   Max.   :1.0
000   Max.   :1.00000   Max.   :1.0000
    Legacy.Y         Athlete.N         Athlete.Y         State.CO         State.Other
Citizenship.Foreign.National.International
 Min.   :0.0000   Min.   :0.0000   Min.   :0.00000   Min.   :0.0000   Min.   :0.0000
Min.   :0.00000
 1st Qu.:0.0000   1st Qu.:1.0000   1st Qu.:0.00000   1st Qu.:0.0000   1st Qu.:0.0000
1st Qu.:0.00000
 Median :0.0000   Median :1.0000   Median :0.00000   Median :0.0000   Median :1.0000
Median :0.00000
 Mean   :0.0733   Mean   :0.9739   Mean   :0.02614   Mean   :0.3026   Mean   :0.6974
Mean   :0.03368
 3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.:0.00000   3rd Qu.:1.0000   3rd Qu.:1.0000
3rd Qu.:0.00000
 Max.   :1.0000   Max.   :1.0000   Max.   :1.00000   Max.   :1.0000   Max.   :1.0000
Max.   :1.00000
 Citizenship.International Citizenship.Missing Citizenship.U.S..Citizen Citizenship.U
.S..Permanent.Resident.Green.Card.Holder
 Min.   :0.000000          Min.   :0.000000    Min.   :0.0000          Min.   :0.000
00
 1st Qu.:0.000000          1st Qu.:0.000000    1st Qu.:1.0000          1st Qu.:0.000
00
 Median :0.000000          Median :0.000000    Median :1.0000          Median :0.000
00
 Mean   :0.001604          Mean   :0.001925    Mean   :0.9471          Mean   :0.013
63
```

```
   3rd Qu.:0.000000        3rd Qu.:0.000000    3rd Qu.:1.0000        3rd Qu.:0.000
00
   Max.   :1.000000        Max.   :1.000000    Max.   :1.0000        Max.   :1.000
00
 Citizenship.Undocumented.DACA Ethnicity.American.Indian.or.Alaska.Native Ethnicity.A
sian   Ethnicity.Black.or.African.American
 Min.   :0.000000              Min.   :0.00000                           Min.   :0.0
0000   Min.   :0.00000
 1st Qu.:0.000000              1st Qu.:0.00000                           1st Qu.:0.0
0000   1st Qu.:0.00000
 Median :0.000000              Median :0.00000                           Median :0.0
0000   Median :0.00000
 Mean   :0.002085              Mean   :0.01299                           Mean   :0.0
9992   Mean   :0.01716
 3rd Qu.:0.000000              3rd Qu.:0.00000                           3rd Qu.:0.0
0000   3rd Qu.:0.00000
 Max.   :1.000000              Max.   :1.00000                           Max.   :1.0
0000   Max.   :1.00000
 Ethnicity.Hispanic.or.Latino Ethnicity.Missing  Ethnicity.Multiracial Ethnicity.Nati
ve.Hawaiian.or.Other.Pacific.Islander
 Min.   :0.00000              Min.   :0.000000   Min.   :0.0000000     Min.   :0.0000
00
 1st Qu.:0.00000              1st Qu.:0.000000   1st Qu.:0.0000000     1st Qu.:0.0000
00
 Median :0.00000              Median :0.000000   Median :0.0000000     Median :0.0000
00
 Mean   :0.05164              Mean   :0.003368   Mean   :0.0001604     Mean   :0.0036
89
 3rd Qu.:0.00000              3rd Qu.:0.000000   3rd Qu.:0.0000000     3rd Qu.:0.0000
00
 Max.   :1.00000              Max.   :1.000000   Max.   :1.0000000     Max.   :1.0000
00
 Ethnicity.NotDeclared Ethnicity.Unknown   Ethnicity.White
 Min.   :0.00000       Min.   :0.0000000   Min.   :0.0000
 1st Qu.:0.00000       1st Qu.:0.0000000   1st Qu.:1.0000
 Median :0.00000       Median :0.0000000   Median :1.0000
 Mean   :0.04731       Mean   :0.0003208   Mean   :0.7634
 3rd Qu.:0.00000       3rd Qu.:0.0000000   3rd Qu.:1.0000
 Max.   :1.00000       Max.   :1.0000000   Max.   :1.0000
 Major.App.Applied.Mathematics...Statistics...Computational...Applied.Mathematics
 Min.   :0.0000
 1st Qu.:0.0000
 Median :0.0000
 Mean   :0.0247
 3rd Qu.:0.0000
 Max.   :1.0000
 Major.App.Applied.Mathematics...Statistics...Statistics Major.App.Chemical.Engineeri
ng
 Min.   :0.000000                                        Min.   :0.00000
 1st Qu.:0.000000                                        1st Qu.:0.00000
```

```
 Median :0.000000                                           Median :0.00000
 Mean   :0.007698                                           Mean   :0.08677
 3rd Qu.:0.000000                                           3rd Qu.:0.00000
 Max.   :1.000000                                           Max.   :1.00000
 Major.App.Chemical.Engineering...Biological.Engineering.Specialty Major.App.Chemistr
y
 Min.   :0.00000                                            Min.   :0.00000
 1st Qu.:0.00000                                            1st Qu.:0.00000
 Median :0.00000                                            Median :0.00000
 Mean   :0.08051                                            Mean   :0.01235
 3rd Qu.:0.00000                                            3rd Qu.:0.00000
 Max.   :1.00000                                            Max.   :1.00000
 Major.App.Chemistry...Biochemistry.Specialty Major.App.Chemistry...Environmental.Che
mistry.Specialty Major.App.Civil.Engineering
 Min.   :0.0000                              Min.   :0.000000
Min.   :0.00000
 1st Qu.:0.0000                              1st Qu.:0.000000
1st Qu.:0.00000
 Median :0.0000                              Median :0.000000
Median :0.00000
 Mean   :0.0255                              Mean   :0.003368
Mean   :0.06287
 3rd Qu.:0.0000                              3rd Qu.:0.000000
3rd Qu.:0.00000
 Max.   :1.0000                              Max.   :1.000000
Max.   :1.00000
 Major.App.Computer.Science Major.App.Economics Major.App.Electrical.Engineering Majo
r.App.Engineering.Physics
 Min.   :0.0000             Min.   :0.00000    Min.   :0.00000                  Min.
:0.00000
 1st Qu.:0.0000             1st Qu.:0.00000    1st Qu.:0.00000                  1st
Qu.:0.00000
 Median :0.0000             Median :0.00000    Median :0.00000                  Medi
an :0.00000
 Mean   :0.1007             Mean   :0.01299    Mean   :0.06977                  Mean
:0.04683
 3rd Qu.:0.0000             3rd Qu.:0.00000    3rd Qu.:0.00000                  3rd
Qu.:0.00000
 Max.   :1.0000             Max.   :1.00000    Max.   :1.00000                  Max.
:1.00000
 Major.App.Environmental.Engineering Major.App.Geological.Engineering Major.App.Geoph
ysical.Engineering
 Min.   :0.00000                     Min.   :0.0000                  Min.   :0.00000
0
 1st Qu.:0.00000                     1st Qu.:0.0000                  1st Qu.:0.00000
0
 Median :0.00000                     Median :0.0000                  Median :0.00000
0
 Mean   :0.05437                     Mean   :0.0162                  Mean   :0.00545
3
```

```
  3rd Qu.:0.00000                         3rd Qu.:0.0000                          3rd Qu.:0.00000
0
  Max.   :1.00000                         Max.   :1.0000                          Max.   :1.00000
0
 Major.App.Mechanical.Engineering Major.App.Metallurgical...Materials.Engineering Maj
or.App.Mining.Engineering Major.App.Missing
  Min.   :0.0000                           Min.   :0.00000                                    Min
.   :0.000000           Min.   :0.000000
  1st Qu.:0.0000                           1st Qu.:0.00000                                    1st
Qu.:0.000000           1st Qu.:0.000000
  Median :0.0000                           Median :0.00000                                    Med
ian :0.000000           Median :0.000000
  Mean   :0.2388                           Mean   :0.01973                                    Mea
n   :0.009784           Mean   :0.003208
  3rd Qu.:0.0000                           3rd Qu.:0.00000                                    3rd
Qu.:0.000000           3rd Qu.:0.000000
  Max.   :1.0000                           Max.   :1.00000                                    Max
.   :1.000000           Max.   :1.000000
 Major.App.Petroleum.Engineering Major.App.Undecided First.Contact.ACT First.Contact.
Application First.Contact.Athlete.Form
  Min.   :0.00000                         Min.   :0.00000     Min.   :0.00000    Min.   :0.0000
Min.   :0.000000
  1st Qu.:0.00000                         1st Qu.:0.00000     1st Qu.:0.00000    1st Qu.:0.0000
1st Qu.:0.000000
  Median :0.00000                         Median :0.00000     Median :0.00000    Median :0.0000
Median :0.000000
  Mean   :0.03801                         Mean   :0.08035     Mean   :0.09447    Mean   :0.1524
Mean   :0.006897
  3rd Qu.:0.00000                         3rd Qu.:0.00000     3rd Qu.:0.00000    3rd Qu.:0.0000
3rd Qu.:0.000000
  Max.   :1.00000                         Max.   :1.00000     Max.   :1.00000    Max.   :1.0000
Max.   :1.000000
 First.Contact.Campus.Visit First.Contact.College.Fair First.Contact.FUF First.Contac
t.Girls.Lead.the.Way First.Contact.GPA.Form
  Min.   :0.0000                           Min.   :0.000000                       Min.   :0.0000     Min.   :0.00
0000                   Min.   :0.000000
  1st Qu.:0.0000                           1st Qu.:0.000000                       1st Qu.:0.0000     1st Qu.:0.00
0000                   1st Qu.:0.000000
  Median :0.0000                           Median :0.000000                       Median :0.0000     Median :0.00
0000                   Median :0.000000
  Mean   :0.1254                           Mean   :0.003368                       Mean   :0.1545     Mean   :0.00
1443                   Mean   :0.003368
  3rd Qu.:0.0000                           3rd Qu.:0.000000                       3rd Qu.:0.0000     3rd Qu.:0.00
0000                   3rd Qu.:0.000000
  Max.   :1.0000                           Max.   :1.000000                       Max.   :1.0000     Max.   :1.00
0000                   Max.   :1.000000
 First.Contact.Inquiry.Form First.Contact.Mailing First.Contact.Materials First.Conta
ct.MEP  First.Contact.Phone
  Min.   :0.00000                         Min.   :0.0000000     Min.   :0.000000       Min.   :0.0
00000   Min.   :0.0000000
```

```
 1st Qu.:0.00000          1st Qu.:0.0000000      1st Qu.:0.000000          1st Qu.:0.0
00000   1st Qu.:0.0000000
 Median :0.00000          Median :0.0000000      Median :0.000000          Median :0.0
00000   Median :0.0000000
 Mean   :0.01588          Mean   :0.0004812      Mean   :0.003368          Mean   :0.0
02727   Mean   :0.0001604
 3rd Qu.:0.00000          3rd Qu.:0.0000000      3rd Qu.:0.000000          3rd Qu.:0.0
00000   3rd Qu.:0.0000000
 Max.   :1.00000          Max.   :1.0000000      Max.   :1.000000          Max.   :1.0
00000   Max.   :1.0000000
 First.Contact.Preview.Mines First.Contact.Royall.Search First.Contact.SAT First.Cont
act.TOEFL First.Visit.Campus.Tour
 Min.   :0.00000          Min.   :0.0000          Min.   :0.00000   Min.   :0.
0000000   Min.   :0.00000
 1st Qu.:0.00000          1st Qu.:0.0000          1st Qu.:0.00000   1st Qu.:0.
0000000   1st Qu.:0.00000
 Median :0.00000          Median :0.0000          Median :0.00000   Median :0.
0000000   Median :0.00000
 Mean   :0.01395          Mean   :0.3973          Mean   :0.02422   Mean   :0.
0001604   Mean   :0.08613
 3rd Qu.:0.00000          3rd Qu.:1.0000          3rd Qu.:0.00000   3rd Qu.:0.
0000000   3rd Qu.:0.00000
 Max.   :1.00000          Max.   :1.0000          Max.   :1.00000   Max.   :1.
0000000   Max.   :1.00000
 First.Visit.Campus.Visit First.Visit.Class.Shadow First.Visit.Discover.Mines First.V
isit.Discovery.Mines.in.Your.City
 Min.   :0.0000          Min.   :0.000000          Min.   :0.00000          Min.
:0.000000
 1st Qu.:0.0000          1st Qu.:0.000000          1st Qu.:0.00000          1st Qu.
:0.000000
 Median :0.0000          Median :0.000000          Median :0.00000          Median
:0.000000
 Mean   :0.1511          Mean   :0.004972          Mean   :0.03352          Mean
:0.005453
 3rd Qu.:0.0000          3rd Qu.:0.000000          3rd Qu.:0.00000          3rd Qu.
:0.000000
 Max.   :1.0000          Max.   :1.000000          Max.   :1.00000          Max.
:1.000000
 First.Visit.Girls.Lead.the.Way First.Visit.Launch First.Visit.Making.The.Connection
First.Visit.Meet.Me.at.Mines First.Visit.None
 Min.   :0.000000          Min.   :0.00000   Min.   :0.0000
Min.   :0.000000          Min.   :0.0000
 1st Qu.:0.000000          1st Qu.:0.00000   1st Qu.:0.0000
1st Qu.:0.000000          1st Qu.:0.0000
 Median :0.000000          Median :0.00000   Median :0.0000
Median :0.000000          Median :1.0000
 Mean   :0.003528          Mean   :0.03176   Mean   :0.0154
Mean   :0.005293          Mean   :0.5931
 3rd Qu.:0.000000          3rd Qu.:0.00000   3rd Qu.:0.0000
3rd Qu.:0.000000          3rd Qu.:1.0000
```

```
 Max.   :1.000000                          Max.    :1.00000     Max.    :1.0000
 Max.   :1.000000                 Max.    :1.0000
 First.Visit.Preview.Mines First.Visit.Preview.Mines.In.Your.City Sport.Men.s.Varsity
.Baseball Sport.Men.s.Varsity.Basketball
 Min.   :0.00000            Min.    :0.00000                               Min.    :0.0000000
 Min.   :0.000000
 1st Qu.:0.00000            1st Qu.:0.00000                               1st Qu.:0.0000000
 1st Qu.:0.000000
 Median :0.00000            Median :0.00000                               Median :0.0000000
 Median :0.000000
 Mean   :0.03111            Mean    :0.03865                              Mean    :0.0009623
 Mean   :0.001443
 3rd Qu.:0.00000            3rd Qu.:0.00000                               3rd Qu.:0.0000000
 3rd Qu.:0.000000
 Max.   :1.00000            Max.    :1.00000                              Max.    :1.0000000
 Max.   :1.000000
 Sport.Men.s.Varsity.Football Sport.Men.s.Varsity.Golf Sport.Men.s.Varsity.Soccer Spo
rt.Men.s.Varsity.Wrestling   Sport.None
 Min.   :0.00000             Min.    :0.0000000        Min.    :0.0000000          Min
.   :0.000000         Min.    :0.0000
 1st Qu.:0.00000             1st Qu.:0.0000000         1st Qu.:0.0000000           1st
Qu.:0.000000         1st Qu.:1.0000
 Median :0.00000             Median :0.0000000         Median :0.0000000           Med
ian :0.000000         Median :1.0000
 Mean   :0.01363             Mean    :0.0004812        Mean    :0.0009623          Mea
n   :0.002406         Mean    :0.9739
 3rd Qu.:0.00000             3rd Qu.:0.0000000         3rd Qu.:0.0000000           3rd
Qu.:0.000000         3rd Qu.:1.0000
 Max.   :1.00000             Max.    :1.0000000        Max.    :1.0000000          Max
.   :1.000000         Max.    :1.0000
 Sport.Varsity.Swimming.Diving Sport.Varsity.Track.Field Sport.Varsity.XCountry Sport
.Women.s.Varsity.Basketball
 Min.   :0.0000000           Min.    :0.000000         Min.    :0.0000000          Min.
:0.000000
 1st Qu.:0.0000000           1st Qu.:0.000000          1st Qu.:0.0000000           1st Q
u.:0.000000
 Median :0.0000000           Median :0.000000          Median :0.0000000           Media
n :0.000000
 Mean   :0.0001604           Mean    :0.002406         Mean    :0.0006415          Mean
:0.001123
 3rd Qu.:0.0000000           3rd Qu.:0.000000          3rd Qu.:0.0000000           3rd Q
u.:0.000000
 Max.   :1.0000000           Max.    :1.000000         Max.    :1.0000000          Max.
:1.000000
 Sport.Women.s.Varsity.Soccer Sport.Women.s.Varsity.Softball Sport.Women.s.Varsity.Vo
lleyball App.Created.Days        Age
 Min.   :0.0000000           Min.    :0.0000000                         Min.    :0.0000000
 Min.   :0.000000   Min.    :0.00000
 1st Qu.:0.0000000           1st Qu.:0.0000000                          1st Qu.:0.0000000
 1st Qu.:0.004872   1st Qu.:0.09615
```

```
 Median :0.0000000            Median :0.0000000               Median :0.0000000
Median :0.005385    Median :0.19231
 Mean   :0.0006415            Mean   :0.0004812               Mean   :0.0008019
Mean   :0.005386    Mean   :0.18908
 3rd Qu.:0.0000000            3rd Qu.:0.0000000               3rd Qu.:0.0000000
3rd Qu.:0.006038    3rd Qu.:0.26923
 Max.   :1.0000000            Max.   :1.0000000               Max.   :1.0000000
Max.   :1.000000    Max.   :1.00000
     HS.GPA        SATR.Converted   Review.OutsideActivity Review.Leadership Review.Wo
rkExp   Review.WorkEthic Review.ExpDiversity
 Min.   :0.0000   Min.   :0.0000   Min.   :0.0000          Min.   :0.0000    Min.   :0
.0000   Min.   :0.0000   Min.   :0.0000
 1st Qu.:0.8772   1st Qu.:0.6176   1st Qu.:0.6667          1st Qu.:0.0000    1st Qu.:0
.3333   1st Qu.:0.6667   1st Qu.:0.6667
 Median :0.9472   Median :0.7059   Median :1.0000          Median :0.3333    Median :0
.3333   Median :1.0000   Median :0.6667
 Mean   :0.9208   Mean   :0.6974   Mean   :0.7998          Mean   :0.4473    Mean   :0
.4332   Mean   :0.8087   Mean   :0.7406
 3rd Qu.:0.9914   3rd Qu.:0.7941   3rd Qu.:1.0000          3rd Qu.:0.6667    3rd Qu.:0
.6667   3rd Qu.:1.0000   3rd Qu.:1.0000
 Max.   :1.0000   Max.   :1.0000   Max.   :1.0000          Max.   :1.0000    Max.   :1
.0000   Max.   :1.0000   Max.   :1.0000
 Review.DesireAttend Review.Affinity  Review.InnovEntrep Review.Teamwork   Review.Over
allFit Logins.60Days       EventCount.All
 Min.   :0.0000      Min.   :0.0000   Min.   :0.0000      Min.   :0.0000    Min.   :0.0
000    Min.   :0.0000000   Min.   :0.00000
 1st Qu.:0.3333      1st Qu.:0.3333   1st Qu.:0.0000      1st Qu.:0.3333    1st Qu.:0.7
000    1st Qu.:0.0000000   1st Qu.:0.00000
 Median :0.6667      Median :0.6667   Median :0.0000      Median :0.6667    Median :0.8
000    Median :0.0000000   Median :0.00000
 Mean   :0.5927      Mean   :0.5322   Mean   :0.2156      Mean   :0.6583    Mean   :0.7
732    Mean   :0.0008096   Mean   :0.08222
 3rd Qu.:1.0000      3rd Qu.:0.6667   3rd Qu.:0.3333      3rd Qu.:1.0000    3rd Qu.:0.9
000    3rd Qu.:0.0000000   3rd Qu.:0.16667
 Max.   :1.0000      Max.   :1.0000   Max.   :1.0000      Max.   :1.0000    Max.   :1.0
000    Max.   :1.0000000   Max.   :1.00000
 EventCount.Admitted EventCount.Campus
 Min.   :0.00000     Min.   :0.00000
 1st Qu.:0.00000     1st Qu.:0.00000
 Median :0.00000     Median :0.00000
 Mean   :0.06796     Mean   :0.07549
 3rd Qu.:0.00000     3rd Qu.:0.16667
 Max.   :1.00000     Max.   :1.00000
```

Hide

Hide

```
dfNormDatAndFactor <- cbind(dfDataSetKNN[1], dfNormData)
str(dfNormDatAndFactor)
```

```
'data.frame':   6235 obs. of  139 variables:
 $ Enrolling                                                             :
Factor w/ 2 levels "N","Y": 1 1 1 1 1 1 1 1 1 2 ...
 $ Sex.F                                                                 :
num  0 0 0 0 0 0 1 0 1 1 ...
 $ Sex.M                                                                 :
num  1 1 1 1 1 1 0 1 0 0 ...
 $ Expel.N                                                               :
num  1 1 1 1 1 1 0 1 1 1 ...
 $ Expel.Y                                                               :
num  0 0 0 0 0 0 1 0 0 0 ...
 $ First.Gen.N                                                           :
num  1 1 1 1 1 1 0 1 1 1 ...
 $ First.Gen.Y                                                           :
num  0 0 0 0 0 0 1 0 0 0 ...
 $ Challenge.Tag.N                                                       :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Challenge.Tag.Y                                                       :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Boettcher.Semi.N                                                      :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Boettcher.Semi.Y                                                      :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Boettcher.Final.N                                                     :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Boettcher.Final.Y                                                     :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Daniels.Semi.N                                                        :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Daniels.Semi.Y                                                        :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Daniels.Final.N                                                       :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Daniels.Final.Y                                                       :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Harvey.App.N                                                          :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Harvey.App.Y                                                          :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Harvey.Final.N                                                        :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Harvey.Final.Y                                                        :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ FC.App.N                                                              :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ FC.App.Y                                                              :
num  0 0 0 0 0 0 0 0 0 0 ...
 $ Thorson.App.N                                                         :
num  1 1 1 1 1 1 1 1 1 1 ...
 $ Thorson.App.Y                                                         :
```

```
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Thorson.Admit.N                                                                          :
num  1 1 1 1 1 1 1 1 1 1 1 ...
 $ Thorson.Admit.Y                                                                          :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Summet.Participant.N                                                                     :
num  1 1 1 1 1 1 1 1 1 1 1 ...
 $ Summet.Participant.Y                                                                     :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Mines.Medal.N                                                                            :
num  1 1 1 1 1 1 1 1 1 1 1 ...
 $ Mines.Medal.Y                                                                            :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ SPS.N                                                                                     :
num  1 1 1 1 1 1 1 1 1 1 1 ...
 $ SPS.Y                                                                                     :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Veteran.N                                                                                 :
num  1 1 1 1 1 1 1 1 1 1 1 ...
 $ Veteran.Y                                                                                 :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Legacy.N                                                                                  :
num  1 1 1 1 1 1 1 1 1 1 1 ...
 $ Legacy.Y                                                                                  :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Athlete.N                                                                                 :
num  1 1 1 1 1 1 1 1 1 1 1 ...
 $ Athlete.Y                                                                                 :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ State.CO                                                                                  :
num  1 0 0 1 0 1 0 0 0 0 0 ...
 $ State.Other                                                                               :
num  0 1 1 0 1 0 1 0 1 1 1 ...
 $ Citizenship.Foreign.National.International                                                :
num  0 0 0 0 0 0 0 1 0 0 0 ...
 $ Citizenship.International                                                                 :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Citizenship.Missing                                                                       :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Citizenship.U.S..Citizen                                                                  :
num  1 1 1 1 1 1 0 1 1 1 1 ...
 $ Citizenship.U.S..Permanent.Resident.Green.Card.Holder                                     :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Citizenship.Undocumented.DACA                                                             :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.American.Indian.or.Alaska.Native                                                :
num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Asian                                                                           :
num  1 0 0 0 0 0 0 1 0 0 0 ...
 $ Ethnicity.Black.or.African.American                                                       :
```

```
 num  0 0 0 0 1 0 0 0 0 0 0 ...
 $ Ethnicity.Hispanic.or.Latino                                                          :
 num  0 0 0 0 0 0 0 0 1 0 0 ...
 $ Ethnicity.Missing                                                                     :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Multiracial                                                                 :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Native.Hawaiian.or.Other.Pacific.Islander                                   :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.NotDeclared                                                                 :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.Unknown                                                                     :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Ethnicity.White                                                                       :
 num  0 1 1 1 0 1 0 0 1 1 ...
 $ Major.App.Applied.Mathematics...Statistics...Computational...Applied.Mathematics:
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Applied.Mathematics...Statistics...Statistics                              :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Chemical.Engineering                                                        :
 num  0 0 0 0 0 0 0 0 1 0 0 ...
 $ Major.App.Chemical.Engineering...Biological.Engineering.Specialty                     :
 num  0 0 0 0 0 0 0 0 0 1 0 ...
 $ Major.App.Chemistry                                                                   :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Chemistry...Biochemistry.Specialty                                          :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Chemistry...Environmental.Chemistry.Specialty                               :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Civil.Engineering                                                           :
 num  1 0 0 0 0 0 0 0 0 0 1 ...
 $ Major.App.Computer.Science                                                            :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Economics                                                                   :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Electrical.Engineering                                                      :
 num  0 0 0 0 0 0 1 0 0 0 ...
 $ Major.App.Engineering.Physics                                                         :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Environmental.Engineering                                                   :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Geological.Engineering                                                      :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Geophysical.Engineering                                                     :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Mechanical.Engineering                                                      :
 num  0 1 1 1 1 0 0 0 0 0 ...
 $ Major.App.Metallurgical...Materials.Engineering                                       :
 num  0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Mining.Engineering                                                          :
```

```
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Missing                                          :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Petroleum.Engineering                            :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ Major.App.Undecided                                        :
num   0 0 0 0 0 1 0 0 0 0 0 ...
 $ First.Contact.ACT                                          :
num   1 1 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Application                                  :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Athlete.Form                                 :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Campus.Visit                                 :
num   0 0 0 1 0 1 0 0 0 1 1 ...
 $ First.Contact.College.Fair                                 :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.FUF                                          :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Girls.Lead.the.Way                           :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.GPA.Form                                     :
num   0 0 1 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Inquiry.Form                                 :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Mailing                                      :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Materials                                    :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.MEP                                          :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Phone                                        :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Preview.Mines                                :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Contact.Royall.Search                                :
num   0 0 0 0 1 0 0 1 0 0 0 ...
 $ First.Contact.SAT                                          :
num   0 0 0 0 0 0 1 0 0 0 0 ...
 $ First.Contact.TOEFL                                        :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Visit.Campus.Tour                                    :
num   0 1 0 0 0 0 0 0 0 0 0 ...
 $ First.Visit.Campus.Visit                                   :
num   0 0 0 1 0 1 0 0 0 1 1 ...
 $ First.Visit.Class.Shadow                                   :
num   0 0 0 0 0 0 0 0 0 0 0 ...
 $ First.Visit.Discover.Mines                                 :
num   0 0 0 0 0 0 0 0 0 0 0 ...
  [list output truncated]
```