MixAll (PMS + log transform (no other variables))

PMS

20 May, 2023

Assumptions of the Alogrithm

The clusterDiagGaussian() model assumes that the data is generated from a mixture of Gaussian distributions. It assumes independence and diagonal covariance thus meaning no correlation between variables. Each component follows a Gaussian distribution with estimated mean and standard deviation parameters. The model represents a mixture of K components, allowing for equal or different standard deviations within each component.

How it works

The MixAll model is basically a mixture model. Mixture models assume data is generated from a combination of probability distributions. Parameter estimation is achieved by maximizing the observed log-likelihood or integrated log-likelihood for data with missing values. Estimation algorithms like EM, SEM, and CEM are used and the default is EM which is highlighted below, involving steps such as imputation, conditional probability calculation, and parameter updates. The EM algorithm iteratively performs these steps until convergence.

1. **I step:** Impute the missing values x_i^m using the current MAP value provided by the current parameter θ^{m-1}.
2. **E step:** Compute the current conditional probabilities t_{ik}^m for $i = 1, \ldots, n$ and $k = 1, \ldots, K$ using the current parameter θ^{m-1}.
3. **M step:** Update the maximum likelihood estimate θ^m of θ using the conditional probabilities t_{ik}^m as conditional mixing weights, aiming to maximize the log-likelihood function, where $t^m = (t_{ik}^m, i = 1, \ldots, n, k = 1, \ldots, K)$.
4. **Parameter update:** The updated expression of mixture proportions p_k^m for $k = 1, \ldots, K$ are computed. Detailed formulas for updating the parameters λ_k and α depend on the component parameterization.
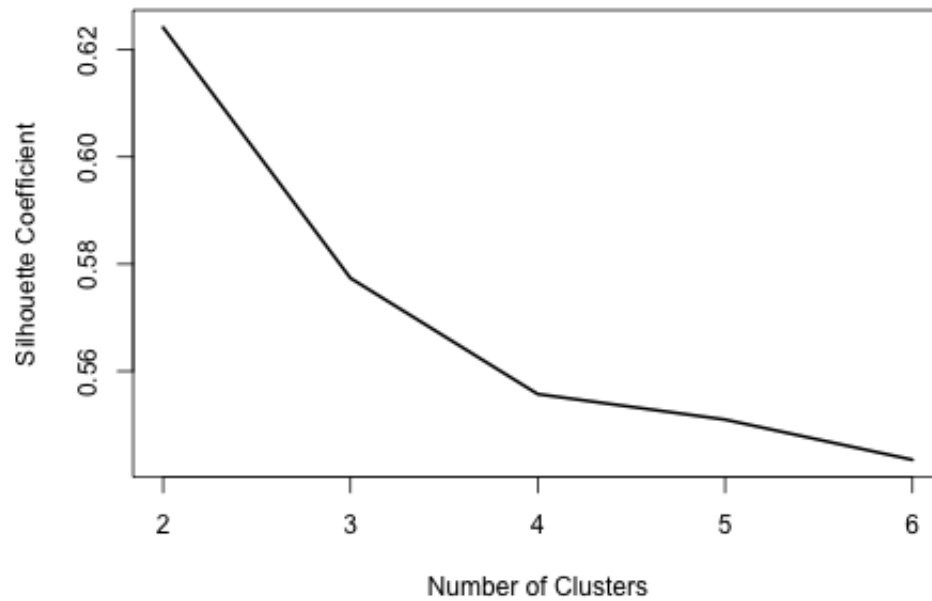
Note that there are one of two strategies that can be used as a function call: clusterFastStrategy() and clusterSemiSEMStrategy(). When using the clusterFastStrategy(), result is not guaranteed if the model is quite difficult to estimate (overlapping class for examples). If there are lots of missing values its suggested that the fff is used as it uses a MonteCarlo estimator to estimate unbiased estimators. In our case the fast strategy was used as the other would take way too long and we dont have the computing power especially for all 10 measures and trying numerous different number of clusters. . .

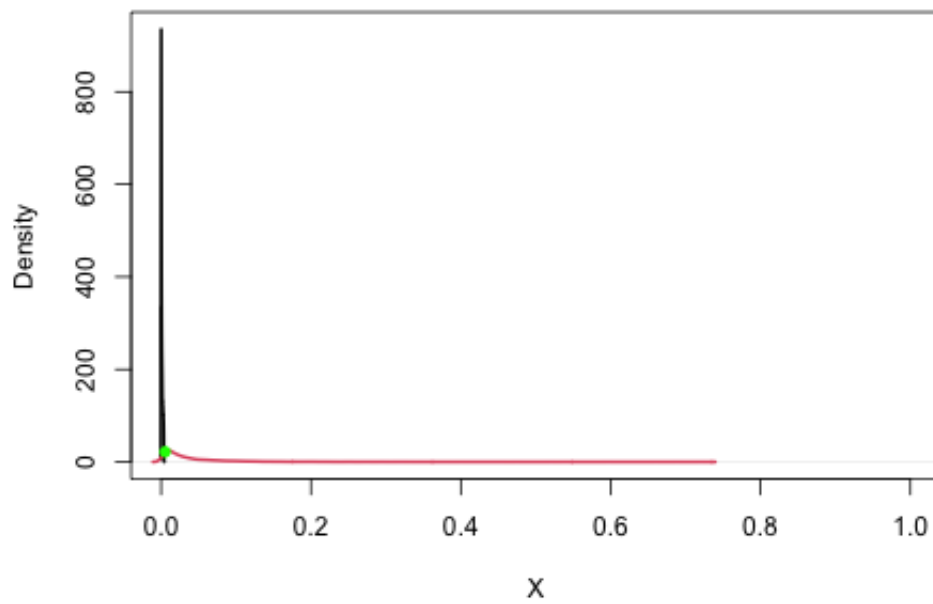More information can be found here
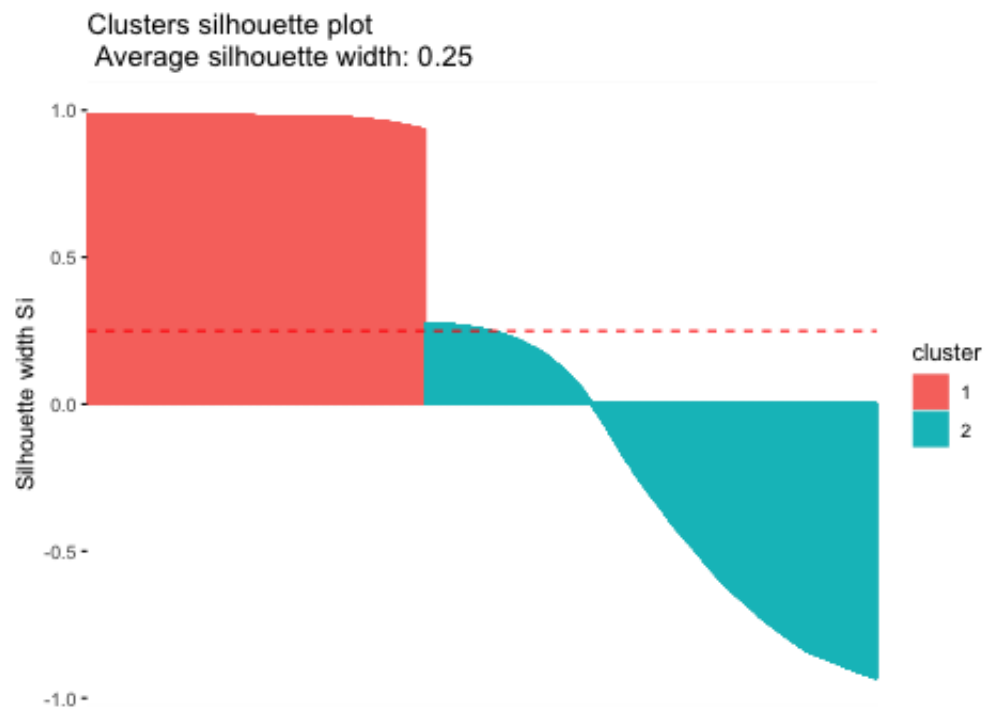

Amenities

Employment


```
## [1] "Maximum silhouete coefficient: 0.62416982312449 For 2 clusters."
```

```
## [1] "Segment cutoff values:"
## [1] 0.005357282
##    cluster size ave.sil.width
## 1       1 5410          0.98
## 2       2 7243         -0.29
```


Clusters silhouette plot
Average silhouette width: 0.25

```
## [1] "Cluster profiles:"
## [1] "Num of DBs:"
##   Cluster 1 Cluster 2
##        6309      8381
##
##
##
##   DB Population:
##   Cluster 1 Cluster 2
##        71.9        73
##
##
##
##   CSD Population:
##   Cluster 1 Cluster 2
##    241592.9    228831
##
##
##
##   CMA Type:
##     Cluster 1 Cluster 2
##          2750      3688
## B        2618      3497
## D         721       897
## K         220       299
##
##
##
##   Index of Remoteness:
##   Cluster 1 Cluster 2
##       0.227     0.229
##
##
##
##   Provinces:
##                        Cluster 1 Cluster 2
## Alberta                      194       264
## BritishColumbia              312       411
## NewBrunswick                  48        74
## NorthwestTerritories           3         4
## NovaScotia                   204       246
## Ontario                      971      1269
## Quebec                       369       489
## Saskatchewan                  38        33
## NA's                        4170      5591
##
##
##
##   Amenity dense:
##     Cluster 1 Cluster 2
## 0        5697      7597
## 1         468       616
## 2          69        78
## F          75        90
```
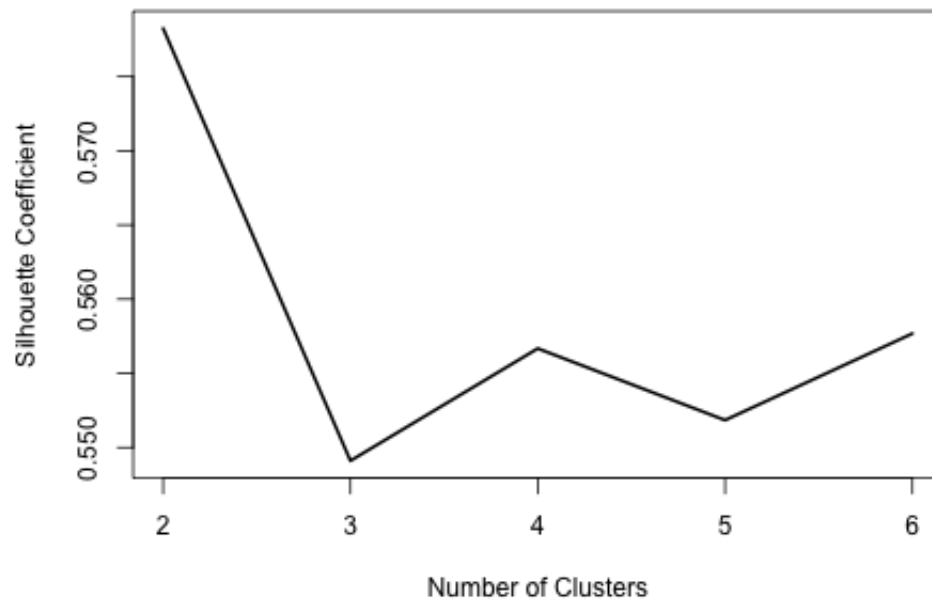
```
## 
## 
## 
##  PMS_prox_idx_emp :
## Cluster 1 Cluster 2
##    0.02555   0.02518
## 
## 
## 
##  PMS_prox_idx_pharma :
## Cluster 1 Cluster 2
##     0.0458    0.0443
## 
## 
## 
##  PMS_prox_idx_childcare :
## Cluster 1 Cluster 2
##    0.07592   0.07695
## 
## 
## 
##  PMS_prox_idx_health :
## Cluster 1 Cluster 2
##    0.01391   0.01368
## 
## 
## 
##  PMS_prox_idx_grocery :
## Cluster 1 Cluster 2
##    0.07203   0.07004
## 
## 
## 
##  PMS_prox_idx_educpri :
## Cluster 1 Cluster 2
##    0.11806   0.11607
## 
## 
## 
##  PMS_prox_idx_educsec :
## Cluster 1 Cluster 2
##    0.10284   0.10397
## 
## 
## 
##  PMS_prox_idx_lib :
## Cluster 1 Cluster 2
##    0.11602   0.11146
## 
## 
## 
##  PMS_prox_idx_parks :
## Cluster 1 Cluster 2
##    0.07016   0.06712
```
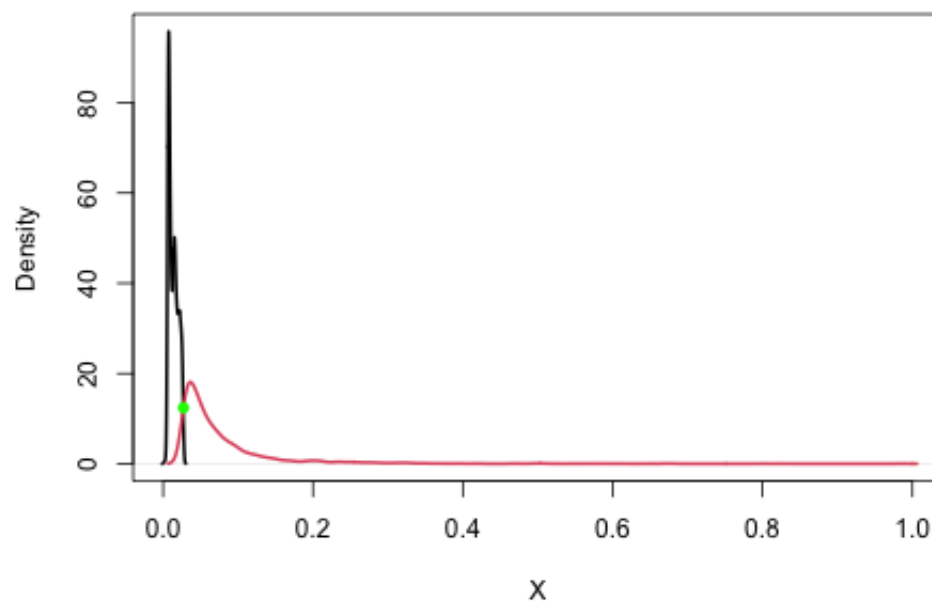
```
## 
## 
## 
## PMS_prox_idx_transit :
## Cluster 1 Cluster 2
##    0.0178   0.01817
```
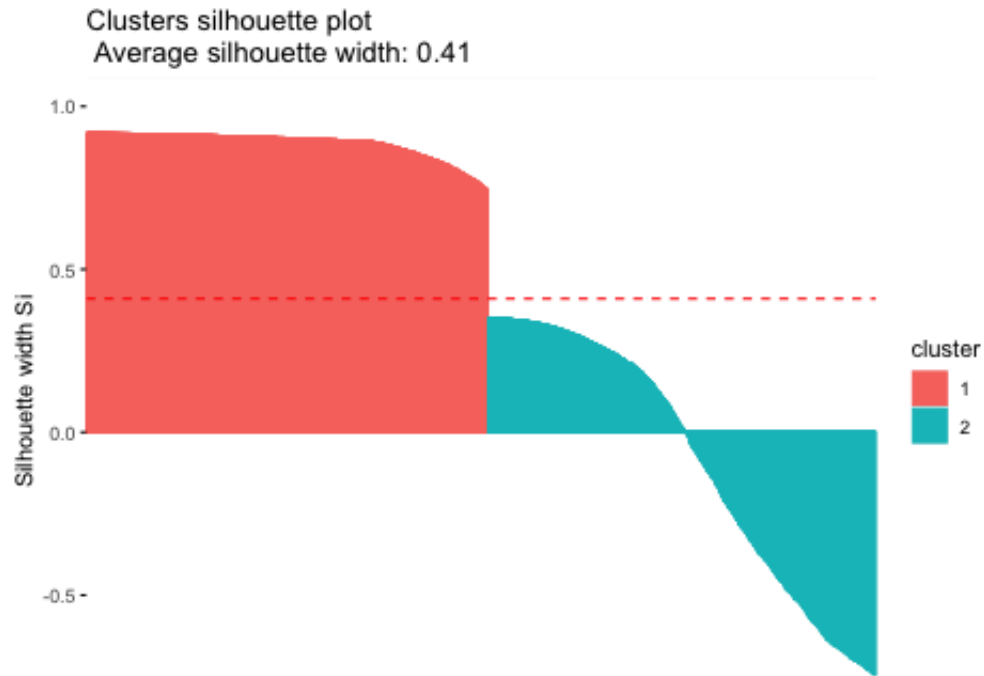
_____

Pharmacy


```
## [1] "Maximum silhouete coefficient: 0.578246901617834 For 2 clusters."
```



```
## [1] "Segment cutoff values:"
```

```
## [1] 0.02711432
##   cluster size ave.sil.width
## 1       1 2660          0.89
## 2       2 2571         -0.08
```

Clusters silhouette plot
Average silhouette width: 0.41


```
## [1] "Cluster profiles:"
## [1] "Num of DBs:"
##  Cluster 1 Cluster 2
##       7480      7210
##
##
##
##  DB Population:
##  Cluster 1 Cluster 2
##        73        72
##
##
##
##  CSD Population:
##  Cluster 1 Cluster 2
##   232349.2  236345.7
##
##
##
##  CMA Type:
##    Cluster 1 Cluster 2
##         3250      3188
## B       3152      2963
## D        815       803
```

```
## K         263        256
##
##
##
##  Index of Remoteness:
##  Cluster 1 Cluster 2
##     0.229     0.227
##
##
##
##  Provinces:
##                      Cluster 1 Cluster 2
## Alberta                    235       223
## BritishColumbia            381       342
## NewBrunswick                59        63
## NorthwestTerritories         5         2
## NovaScotia                 222       228
## Ontario                   1101      1139
## Quebec                     446       412
## Saskatchewan                35        36
## NA's                      4996      4765
##
##
##
##  Amenity dense:
##    Cluster 1 Cluster 2
## 0      6745      6549
## 1       574       510
## 2        77        70
## F        84        81
##
##
##
##  PMS_prox_idx_emp :
##  Cluster 1 Cluster 2
##    0.02567   0.02499
##
##
##
##  PMS_prox_idx_pharma :
##  Cluster 1 Cluster 2
##    0.04641   0.04343
##
##
##
##  PMS_prox_idx_childcare :
##  Cluster 1 Cluster 2
##    0.07717   0.07582
##
##
##
##  PMS_prox_idx_health :
##  Cluster 1 Cluster 2
##    0.01384   0.01371
```
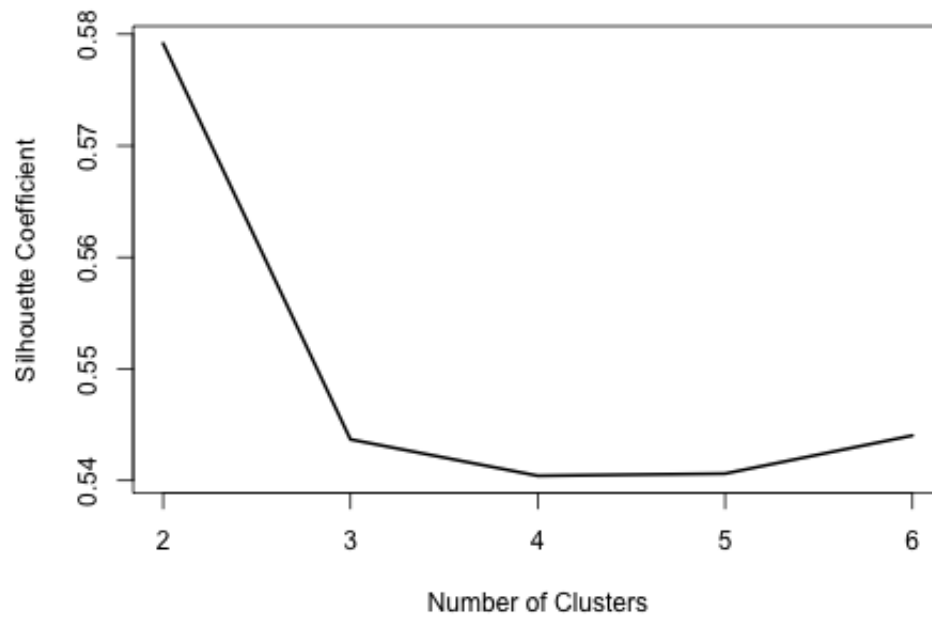
```
## 
## 
## 
##  PMS_prox_idx_grocery :
##  Cluster 1 Cluster 2
##     0.07303    0.06869
## 
## 
## 
##  PMS_prox_idx_educpri :
##  Cluster 1 Cluster 2
##     0.12011    0.11358
## 
## 
## 
##  PMS_prox_idx_educsec :
##  Cluster 1 Cluster 2
##     0.10503    0.10175
## 
## 
## 
##  PMS_prox_idx_lib :
##  Cluster 1 Cluster 2
##     0.11091    0.11606
## 
## 
## 
##  PMS_prox_idx_parks :
##  Cluster 1 Cluster 2
##     0.06778    0.06908
## 
## 
## 
##  PMS_prox_idx_transit :
##  Cluster 1 Cluster 2
##     0.01804    0.01797
```
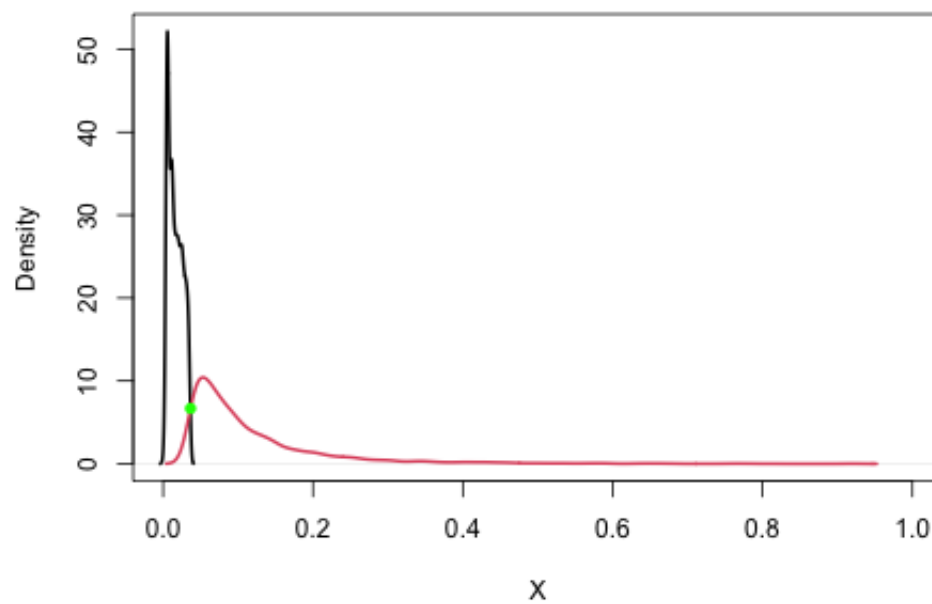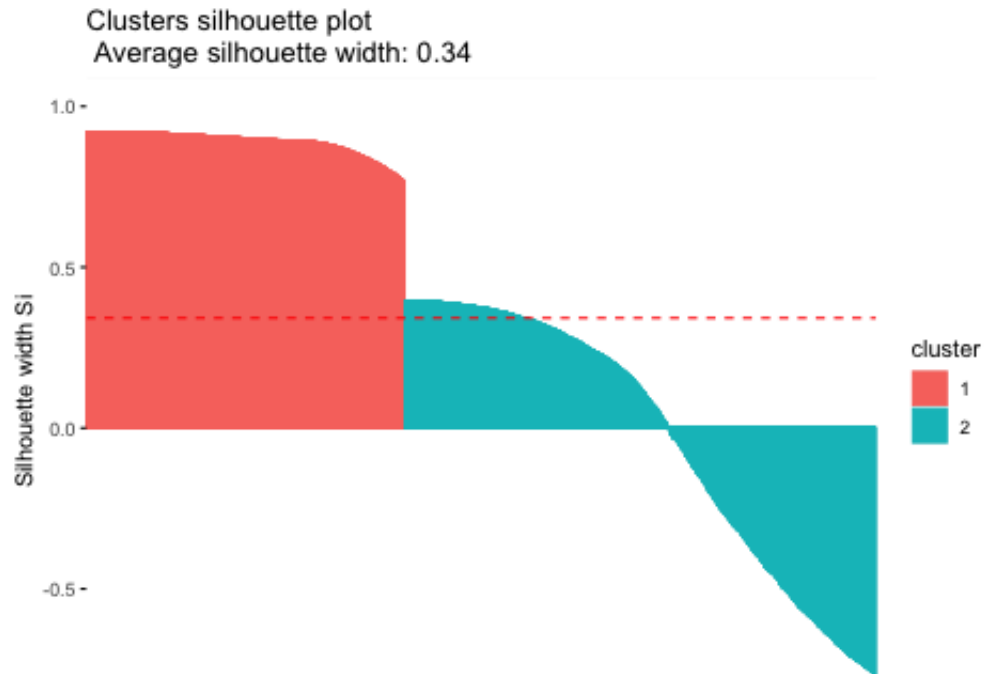
Childcare

[1] "Maximum silhouete coefficient: 0.579170989394048 For 2 clusters."

[1] "Segment cutoff values:"

```
## [1] 0.0366373
##   cluster size ave.sil.width
## 1       1 2914          0.89
## 2       2 4317         -0.03
```

Clusters silhouette plot
Average silhouette width: 0.34


```
## [1] "Cluster profiles:"
## [1] "Num of DBs:"
##  Cluster 1 Cluster 2
##       5920      8770
##
##
##
##  DB Population:
##  Cluster 1 Cluster 2
##         75      70.8
##
##
##
##  CSD Population:
##  Cluster 1 Cluster 2
##   237386.5  232234.2
##
##
##
##  CMA Type:
##    Cluster 1 Cluster 2
##         2550      3888
## B       2518      3597
## D        649       969
```

```
## K           203        316
##
##
##
##   Index of Remoteness:
##   Cluster 1 Cluster 2
##      0.225     0.231
##
##
##
##   Provinces:
##                          Cluster 1 Cluster 2
## Alberta                        196       262
## BritishColumbia                302       421
## NewBrunswick                    50        72
## NorthwestTerritories             2         5
## NovaScotia                     191       259
## Ontario                        937      1303
## Quebec                         350       508
## Saskatchewan                    27        44
## NA's                          3865      5896
##
##
##
##   Amenity dense:
##    Cluster 1 Cluster 2
## 0      5341      7953
## 1       444       640
## 2        59        88
## F        76        89
##
##
##
##   PMS_prox_idx_emp :
##   Cluster 1 Cluster 2
##     0.02554    0.0252
##
##
##
##   PMS_prox_idx_pharma :
##   Cluster 1 Cluster 2
##     0.04628   0.04402
##
##
##
##   PMS_prox_idx_childcare :
##   Cluster 1 Cluster 2
##     0.07569   0.07708
##
##
##
##   PMS_prox_idx_health :
##   Cluster 1 Cluster 2
##     0.01412   0.01354
```
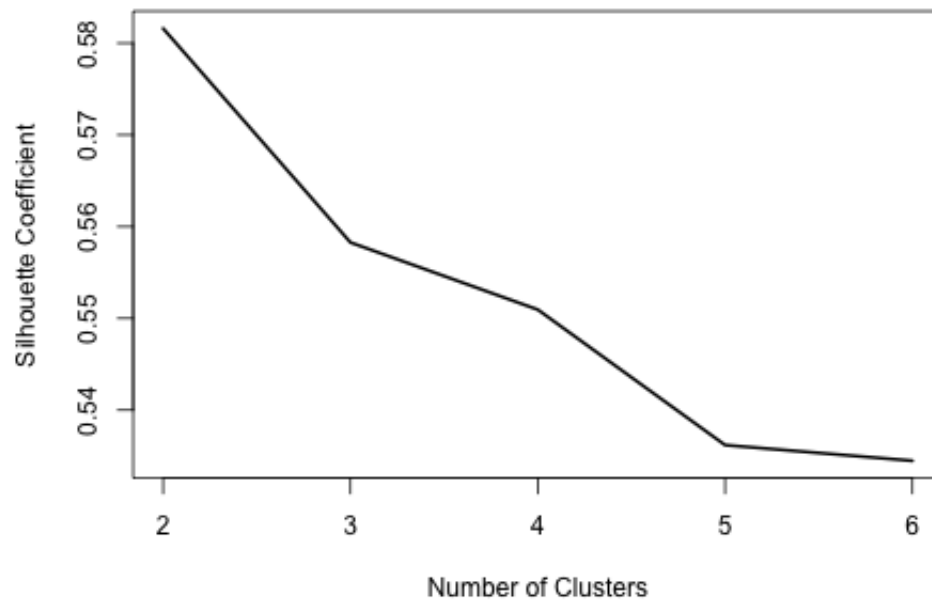
```
## 
## 
## 
##  PMS_prox_idx_grocery :
##  Cluster 1 Cluster 2
##     0.07252    0.06978
## 
## 
## 
##  PMS_prox_idx_educpri :
##  Cluster 1 Cluster 2
##     0.11639    0.11728
## 
## 
## 
##  PMS_prox_idx_educsec :
##  Cluster 1 Cluster 2
##     0.10368    0.10334
## 
## 
## 
##  PMS_prox_idx_lib :
##  Cluster 1 Cluster 2
##     0.11489    0.11239
## 
## 
## 
##  PMS_prox_idx_parks :
##  Cluster 1 Cluster 2
##     0.06792    0.06876
## 
## 
## 
##  PMS_prox_idx_transit :
##  Cluster 1 Cluster 2
##     0.01851    0.01766
```
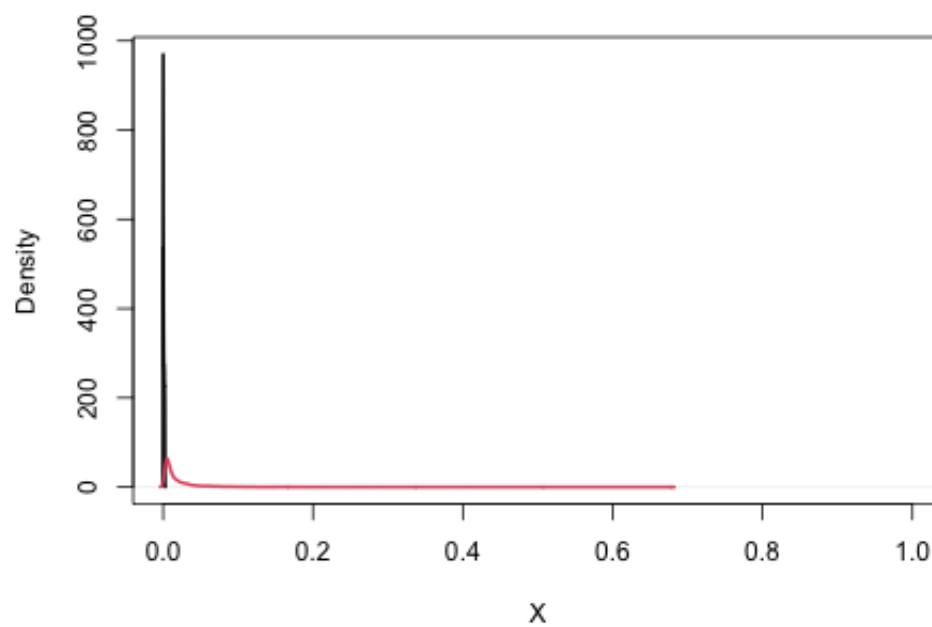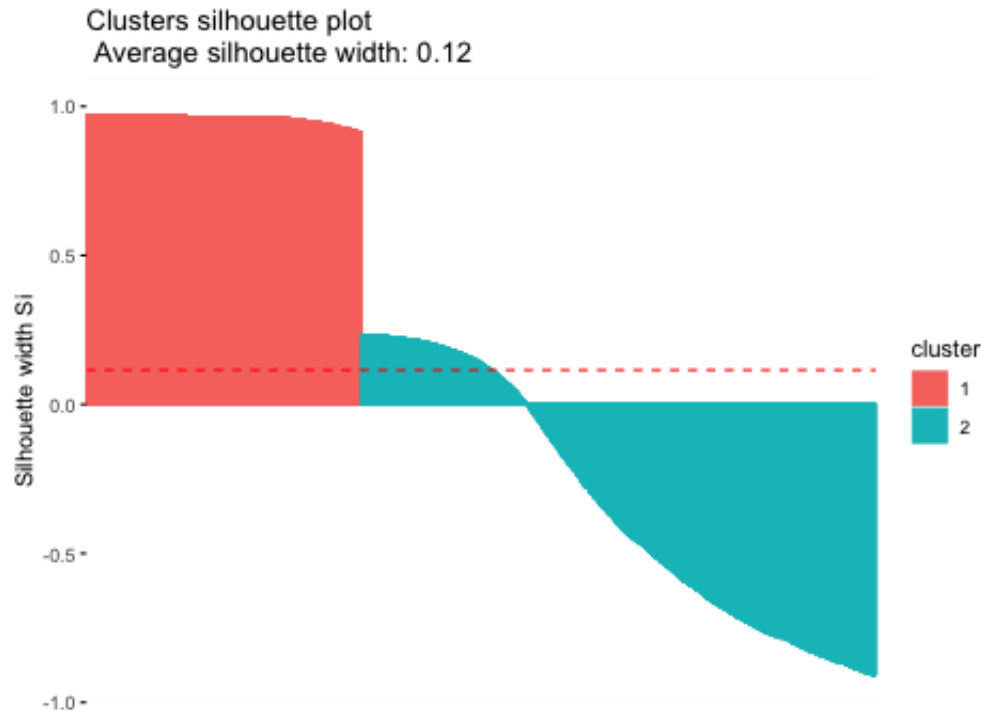

Health

[1] "Maximum silhouete coefficient: 0.581603902641992 For 2 clusters."

[1] "Segment cutoff values:"

```
## [1] NA
##   cluster size ave.sil.width
## 1       1 3105          0.96
## 2       2 5808         -0.34
```

Clusters silhouette plot
Average silhouette width: 0.12


```
## [1] "Cluster profiles:"
## [1] "Num of DBs:"
##  Cluster 1 Cluster 2
##       5117      9573
##
##
##
##  DB Population:
##  Cluster 1 Cluster 2
##       72.2      72.7
##
##
##
##  CSD Population:
##  Cluster 1 Cluster 2
##   229785.3  236731.2
##
##
##
##  CMA Type:
##    Cluster 1 Cluster 2
##         2280      4158
## B       2109      4006
## D        562      1056
```

```
## K           166         353
##
##
##
##  Index of Remoteness:
##  Cluster 1 Cluster 2
##      0.228     0.229
##
##
##
##  Provinces:
##                       Cluster 1 Cluster 2
## Alberta                     169       289
## BritishColumbia             225       498
## NewBrunswick                 41        81
## NorthwestTerritories          3         4
## NovaScotia                  175       275
## Ontario                     800      1440
## Quebec                      296       562
## Saskatchewan                 20        51
## NA's                       3388      6373
##
##
##
##  Amenity dense:
##    Cluster 1 Cluster 2
## 0      4656      8638
## 1       363       721
## 2        44       103
## F        54       111
##
##
##
##  PMS_prox_idx_emp :
##  Cluster 1 Cluster 2
##    0.02486   0.02559
##
##
##
##  PMS_prox_idx_pharma :
##  Cluster 1 Cluster 2
##    0.04392   0.04547
##
##
##
##  PMS_prox_idx_childcare :
##  Cluster 1 Cluster 2
##    0.07675   0.07639
##
##
##
##  PMS_prox_idx_health :
##  Cluster 1 Cluster 2
##    0.01309   0.01415
```
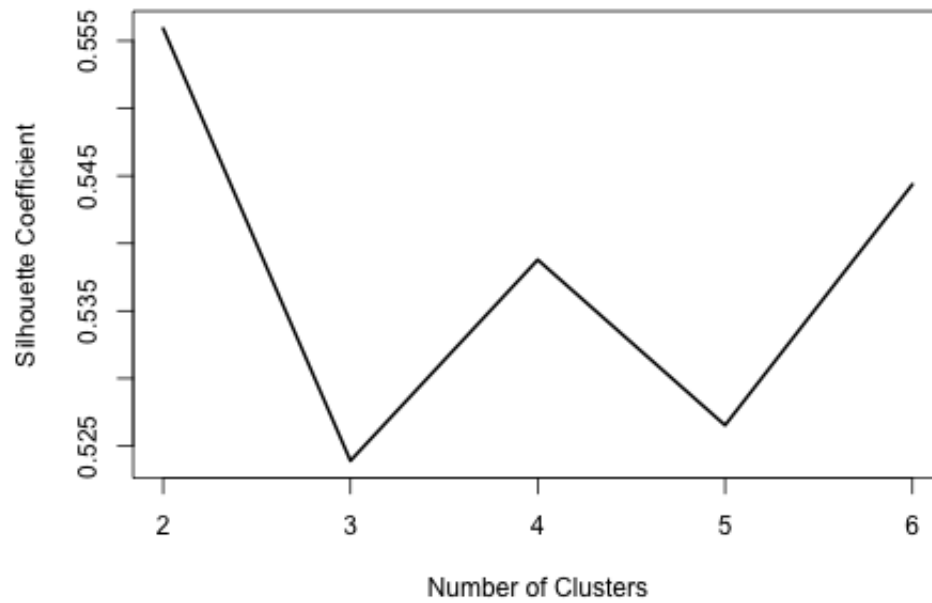
```
##
##
##
##  PMS_prox_idx_grocery :
## Cluster 1 Cluster 2
##    0.07094    0.07086
##
##
##
##  PMS_prox_idx_educpri :
## Cluster 1 Cluster 2
##    0.11731    0.11671
##
##
##
##  PMS_prox_idx_educsec :
## Cluster 1 Cluster 2
##    0.10443    0.10297
##
##
##
##  PMS_prox_idx_lib :
## Cluster 1 Cluster 2
##    0.11318    0.11352
##
##
##
##  PMS_prox_idx_parks :
## Cluster 1 Cluster 2
##    0.06907    0.06808
##
##
##
##  PMS_prox_idx_transit :
## Cluster 1 Cluster 2
##    0.01774    0.01815
```
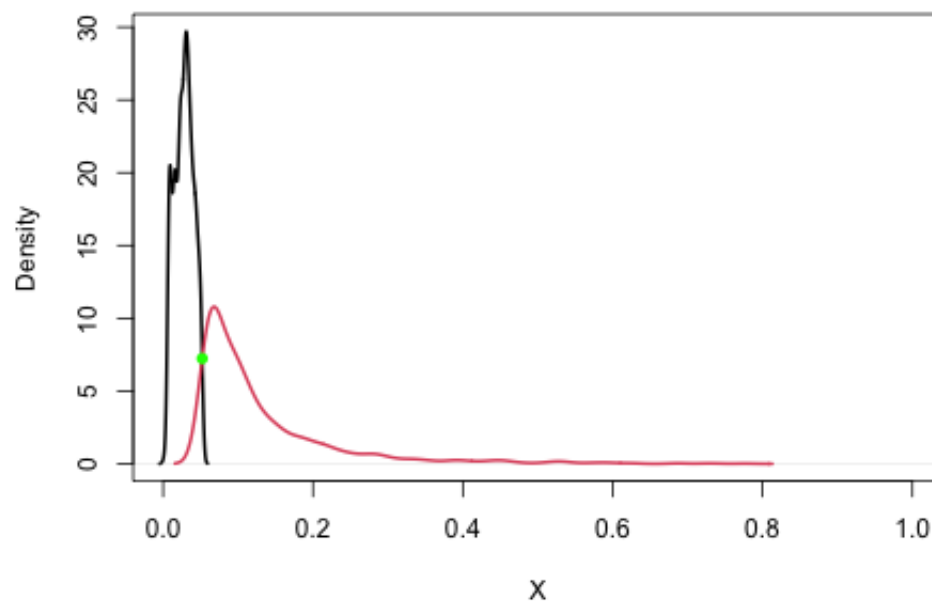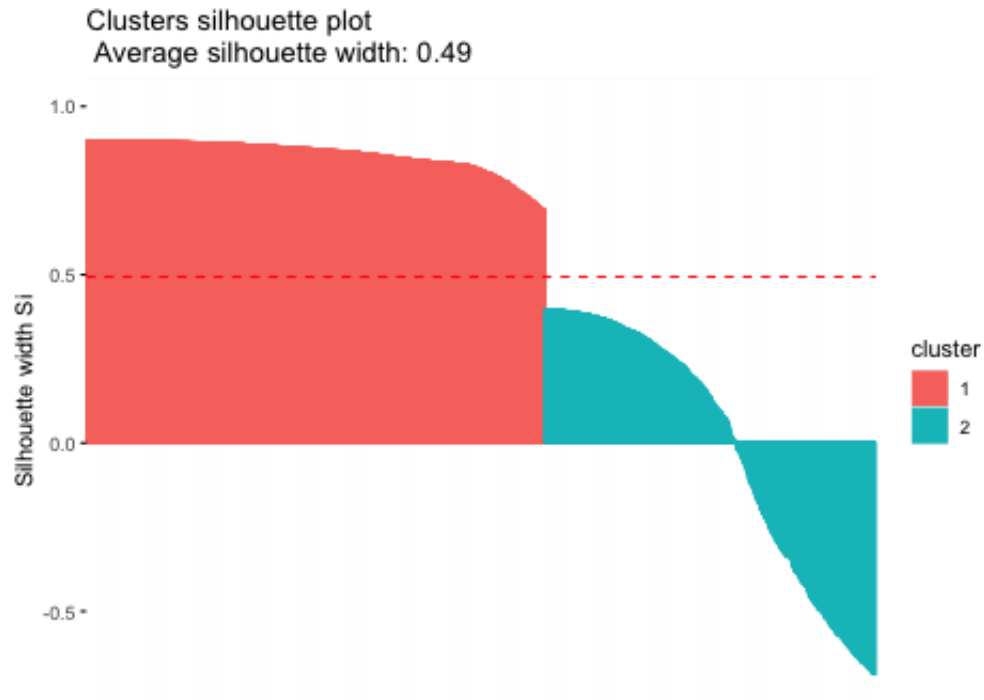
Grocery


```
## [1] "Maximum silhouete coefficient: 0.555919113100562 For 2 clusters."
```



```
## [1] "Segment cutoff values:"
```

```
## [1] 0.05222631
##   cluster size ave.sil.width
## 1       1 2435          0.86
## 2       2 1760         -0.01
```

Clusters silhouette plot
Average silhouette width: 0.49


```
## [1] "Cluster profiles:"
## [1] "Num of DBs:"
##  Cluster 1 Cluster 2
##       8520      6170
##
##
##
##  DB Population:
##  Cluster 1 Cluster 2
##       72.9        72
##
##
##
##  CSD Population:
##  Cluster 1 Cluster 2
##     231835  237729.8
##
##
##
##  CMA Type:
##    Cluster 1 Cluster 2
##         3720      2718
## B       3548      2567
## D        960       658
```

```
## K           292         227
##
##
##
##   Index of Remoteness:
##   Cluster 1 Cluster 2
##       0.227       0.23
##
##
##
##   Provinces:
##                         Cluster 1 Cluster 2
## Alberta                      268       190
## BritishColumbia              414       309
## NewBrunswick                  76        46
## NorthwestTerritories           4         3
## NovaScotia                   262       188
## Ontario                     1328       912
## Quebec                       491       367
## Saskatchewan                  42        29
## NA's                        5635      4126
##
##
##
##   Amenity dense:
##    Cluster 1 Cluster 2
## 0      7698      5596
## 1       638       446
## 2        86        61
## F        98        67
##
##
##
##   PMS_prox_idx_emp :
##   Cluster 1 Cluster 2
##     0.02495   0.02588
##
##
##
##   PMS_prox_idx_pharma :
##   Cluster 1 Cluster 2
##     0.04478   0.04513
##
##
##
##   PMS_prox_idx_childcare :
##   Cluster 1 Cluster 2
##     0.07689     0.076
##
##
##
##   PMS_prox_idx_health :
##   Cluster 1 Cluster 2
##     0.01362   0.01399
```
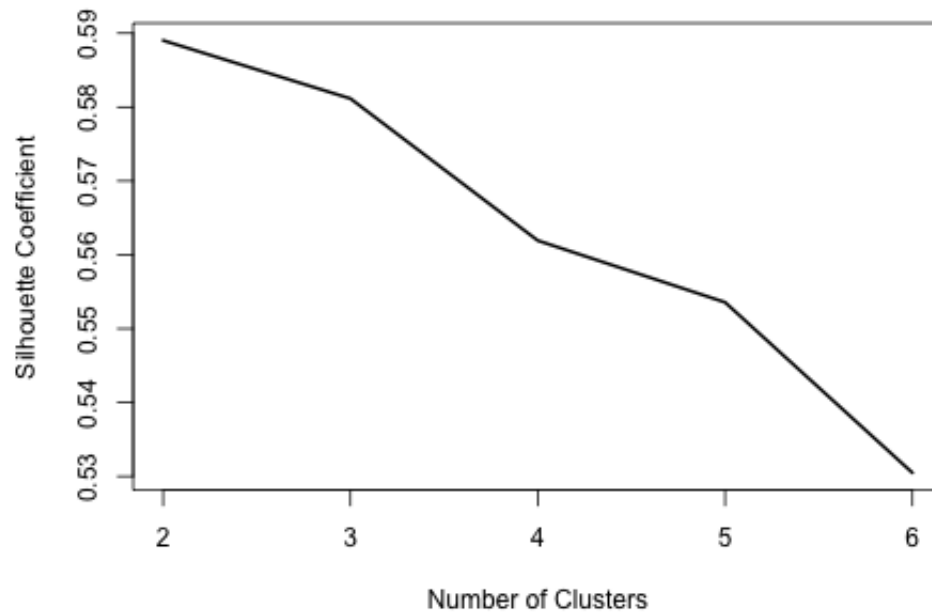
```
## 
## 
## 
##  PMS_prox_idx_grocery :
##  Cluster 1 Cluster 2
##    0.07114   0.07054
## 
## 
## 
##  PMS_prox_idx_educpri :
##  Cluster 1 Cluster 2
##    0.11735   0.11631
## 
## 
## 
##  PMS_prox_idx_educsec :
##  Cluster 1 Cluster 2
##    0.10384   0.10297
## 
## 
## 
##  PMS_prox_idx_lib :
##  Cluster 1 Cluster 2
##    0.11523    0.1109
## 
## 
## 
##  PMS_prox_idx_parks :
##  Cluster 1 Cluster 2
##    0.06747   0.06973
## 
## 
## 
##  PMS_prox_idx_transit :
##  Cluster 1 Cluster 2
##    0.01796   0.01807
```
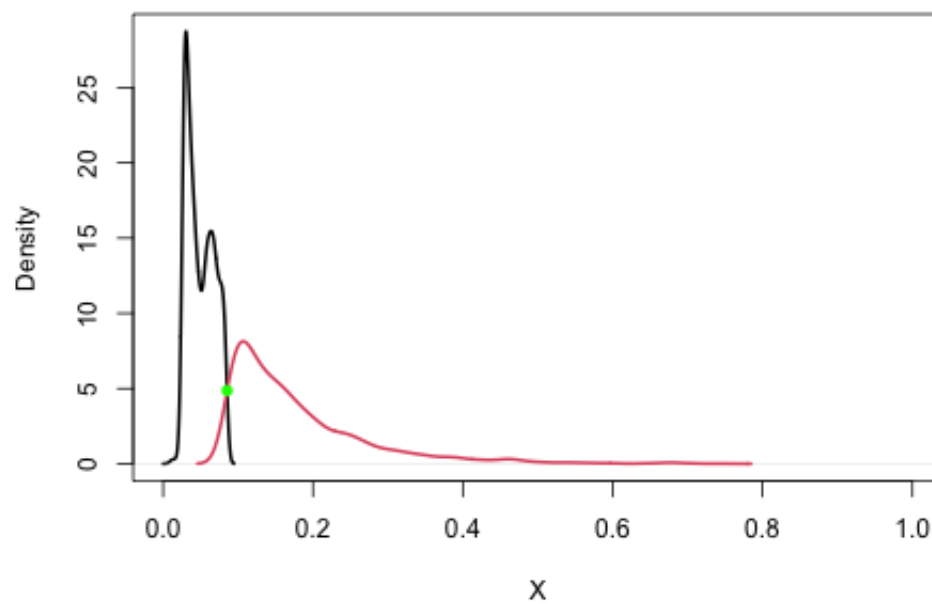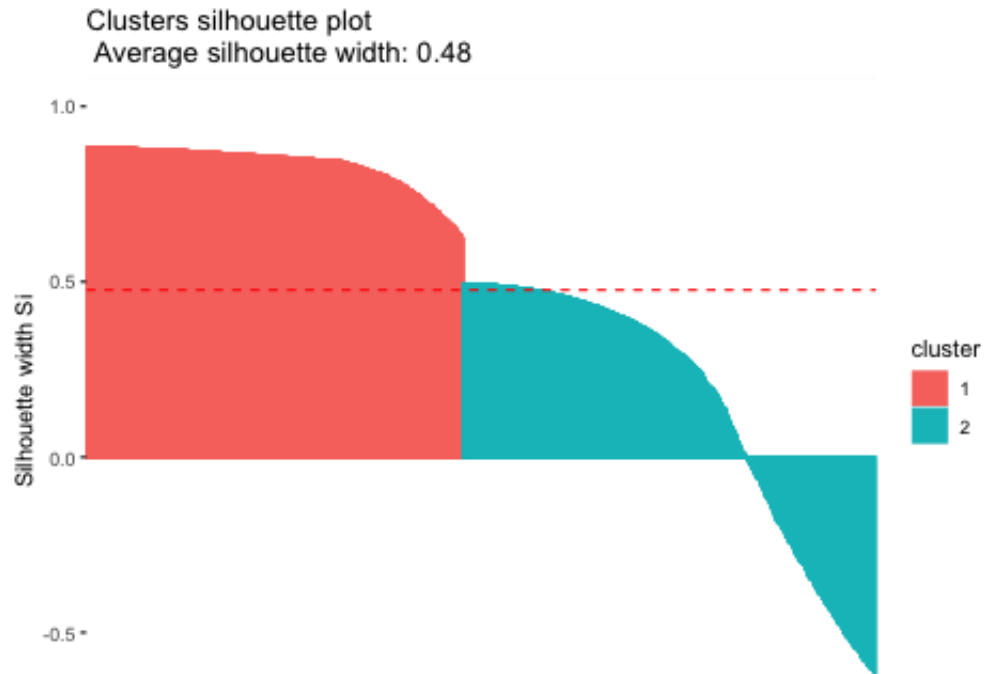
Primary Education

[1] "Maximum silhouete coefficient: 0.589022193745387 For 2 clusters."

[1] "Segment cutoff values:"

```
## [1] 0.08548012
##   cluster size ave.sil.width
## 1       1 3192          0.83
## 2       2 3499          0.15
```

Clusters silhouette plot
Average silhouette width: 0.48


```
## [1] "Cluster profiles:"
## [1] "Num of DBs:"
##  Cluster 1 Cluster 2
##       7022      7668
## 
## 
## 
##  DB Population:
##  Cluster 1 Cluster 2
##       71.4      73.6
## 
## 
## 
##  CSD Population:
##  Cluster 1 Cluster 2
##   232580.4  235894.3
## 
## 
## 
##  CMA Type:
##    Cluster 1 Cluster 2
##         3088      3350
## B       2912      3203
## D        770       848
```

```
## K          252       267
##
##
##
##   Index of Remoteness:
##   Cluster 1 Cluster 2
##       0.228     0.228
##
##
##
##   Provinces:
##                        Cluster 1 Cluster 2
## Alberta                     219       239
## BritishColumbia             355       368
## NewBrunswick                 62        60
## NorthwestTerritories          3         4
## NovaScotia                  209       241
## Ontario                    1034      1206
## Quebec                      408       450
## Saskatchewan                 39        32
## NA's                       4693      5068
##
##
##
##   Amenity dense:
##    Cluster 1 Cluster 2
## 0       6346      6948
## 1        532       552
## 2         74        73
## F         70        95
##
##
##
##   PMS_prox_idx_emp :
##   Cluster 1 Cluster 2
##     0.02546   0.02523
##
##
##
##   PMS_prox_idx_pharma :
##   Cluster 1 Cluster 2
##     0.04426   0.04555
##
##
##
##   PMS_prox_idx_childcare :
##   Cluster 1 Cluster 2
##     0.07585   0.07713
##
##
##
##   PMS_prox_idx_health :
##   Cluster 1 Cluster 2
##     0.01345   0.01409
```
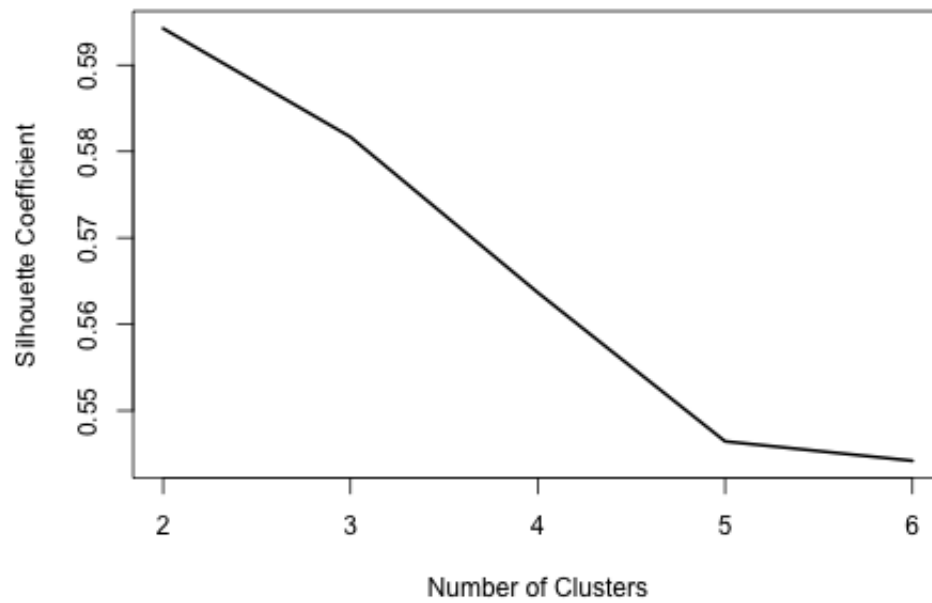
```
##
##
##
##  PMS_prox_idx_grocery :
##  Cluster 1 Cluster 2
##     0.0712     0.0706
##
##
##
##  PMS_prox_idx_educpri :
##  Cluster 1 Cluster 2
##    0.11689    0.11695
##
##
##
##  PMS_prox_idx_educsec :
##  Cluster 1 Cluster 2
##    0.10512    0.10188
##
##
##
##  PMS_prox_idx_lib :
##  Cluster 1 Cluster 2
##    0.11301    0.11379
##
##
##
##  PMS_prox_idx_parks :
##  Cluster 1 Cluster 2
##    0.06747     0.0693
##
##
##
##  PMS_prox_idx_transit :
##  Cluster 1 Cluster 2
##    0.01787    0.01813
```
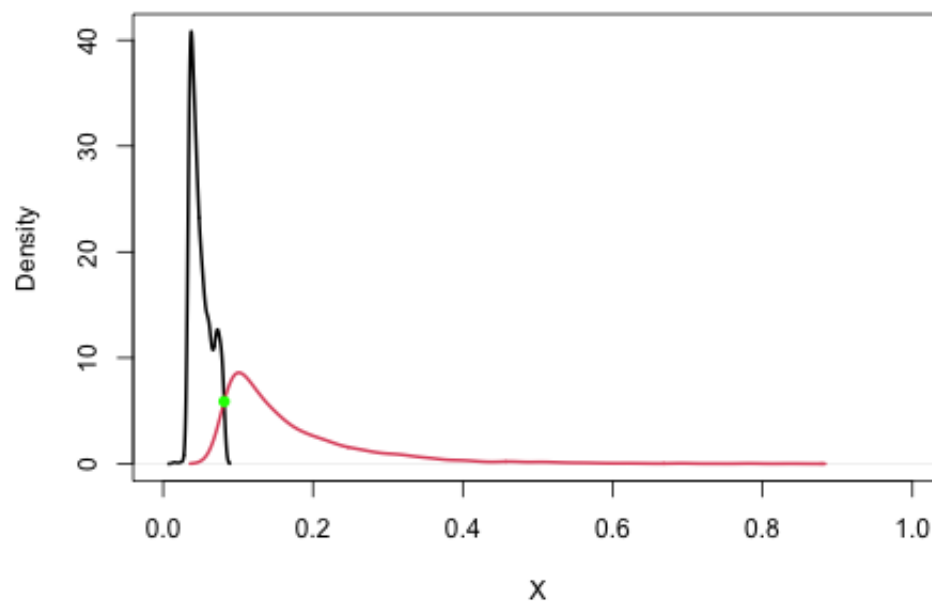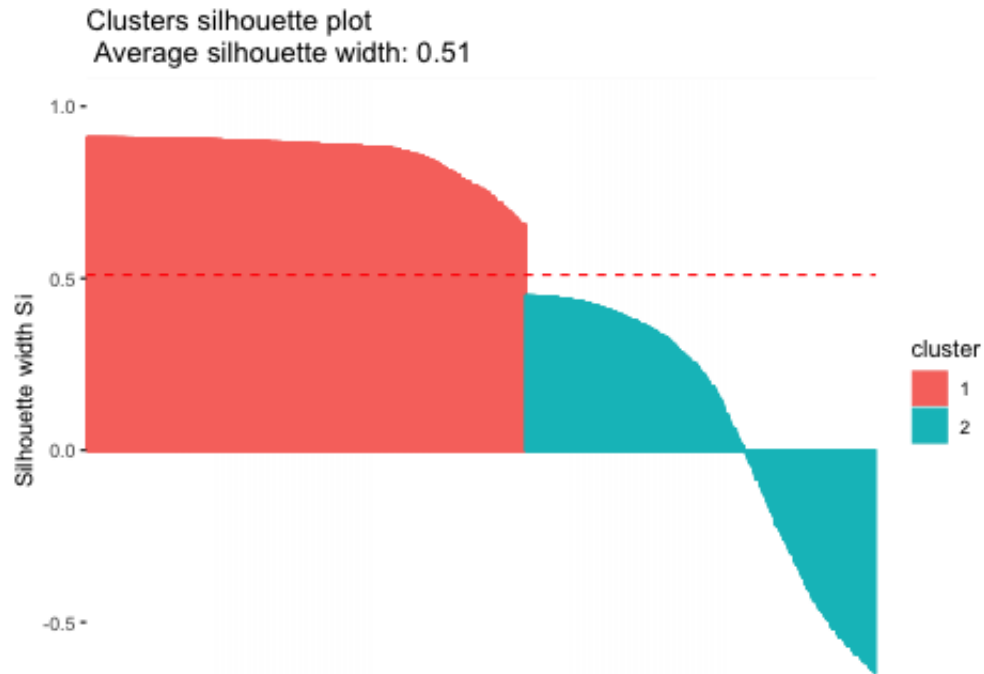
Secondary Education


```
## [1] "Maximum silhouete coefficient: 0.594242094440351 For 2 clusters."
```



```
## [1] "Segment cutoff values:"
```

```
## [1] 0.08149379
##   cluster size ave.sil.width
## 1       1 2330          0.86
## 2       2 1859          0.07
```

Clusters silhouette plot
Average silhouette width: 0.51


```
## [1] "Cluster profiles:"
## [1] "Num of DBs:"
##  Cluster 1 Cluster 2
##       8157      6533
##
##
##
##  DB Population:
##  Cluster 1 Cluster 2
##       72.3      72.7
##
##
##
##  CSD Population:
##  Cluster 1 Cluster 2
##   238244.9  229399.5
##
##
##
##  CMA Type:
##    Cluster 1 Cluster 2
##         3518      2920
## B       3411      2704
## D        908       710
```

```
## K          320          199
##
##
##
##   Index of Remoteness:
##   Cluster 1 Cluster 2
##      0.229     0.227
##
##
##
##   Provinces:
##                        Cluster 1 Cluster 2
## Alberta                     260       198
## BritishColumbia             417       306
## NewBrunswick                 69        53
## NorthwestTerritories          4         3
## NovaScotia                  231       219
## Ontario                    1227      1013
## Quebec                      480       378
## Saskatchewan                 43        28
## NA's                       5426      4335
##
##
##
##   Amenity dense:
##    Cluster 1 Cluster 2
## 0       7345      5949
## 1        619       465
## 2         84        63
## F        109        56
##
##
##
##   PMS_prox_idx_emp :
##   Cluster 1 Cluster 2
##     0.02609    0.0244
##
##
##
##   PMS_prox_idx_pharma :
##   Cluster 1 Cluster 2
##     0.04648   0.04294
##
##
##
##   PMS_prox_idx_childcare :
##   Cluster 1 Cluster 2
##     0.07596   0.07722
##
##
##
##   PMS_prox_idx_health :
##   Cluster 1 Cluster 2
##     0.01438   0.01301
```
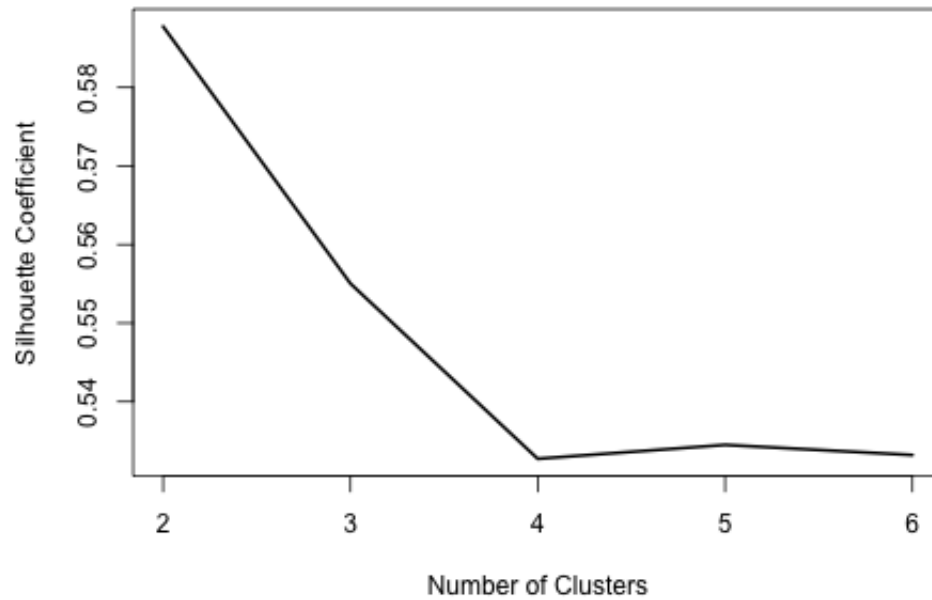
```
##
##
##
##  PMS_prox_idx_grocery :
##  Cluster 1 Cluster 2
##    0.07089   0.07089
##
##
##
##  PMS_prox_idx_educpri :
##  Cluster 1 Cluster 2
##    0.11649   0.11746
##
##
##
##  PMS_prox_idx_educsec :
##  Cluster 1 Cluster 2
##    0.10351   0.10343
##
##
##
##  PMS_prox_idx_lib :
##  Cluster 1 Cluster 2
##    0.11166   0.11564
##
##
##
##  PMS_prox_idx_parks :
##  Cluster 1 Cluster 2
##     0.0692   0.06742
##
##
##
##  PMS_prox_idx_transit :
##  Cluster 1 Cluster 2
##    0.01853   0.01732
```
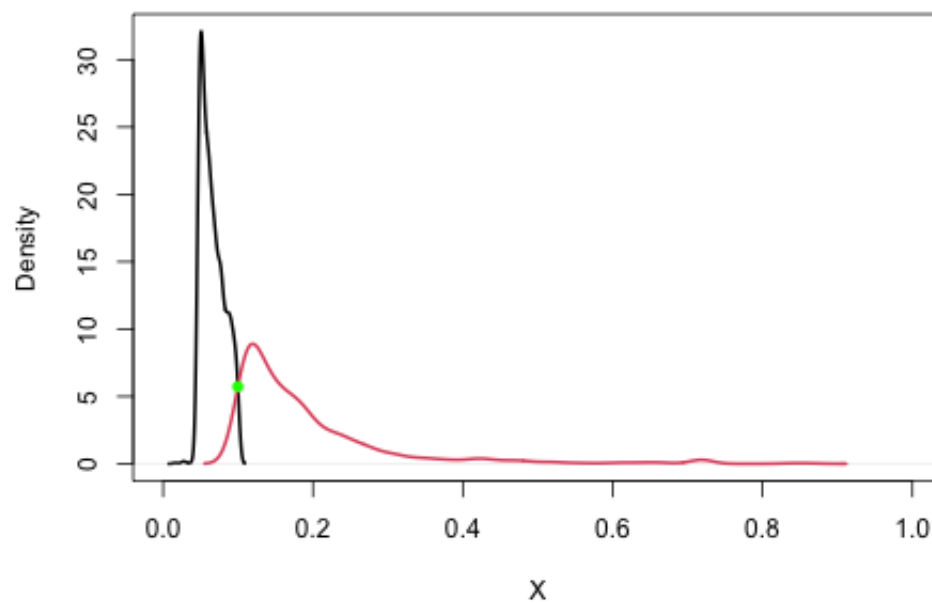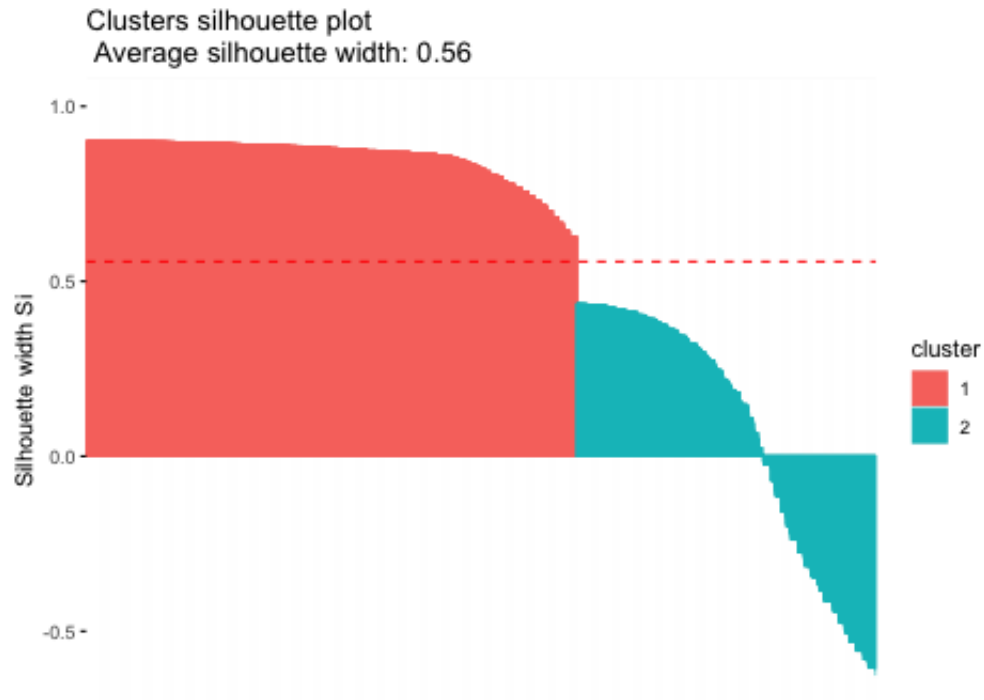
Libraries

[1] "Maximum silhouete coefficient: 0.587765890776524 For 2 clusters."

[1] "Segment cutoff values:"

```
## [1] 0.09979731
##   cluster size ave.sil.width
## 1       1 2043          0.85
## 2       2 1247          0.07
```

Clusters silhouette plot
Average silhouette width: 0.56


```
## [1] "Cluster profiles:"
## [1] "Num of DBs:"
##  Cluster 1 Cluster 2
##       9112      5578
##
##
##
##  DB Population:
##  Cluster 1 Cluster 2
##        75      68.4
##
##
##
##  CSD Population:
##  Cluster 1 Cluster 2
##   232010.9  238068.4
##
##
##
##  CMA Type:
##    Cluster 1 Cluster 2
##         3954      2484
## B       3807      2308
## D       1021       597
```

```
## K           330         189
##
##
##
##   Index of Remoteness:
##   Cluster 1 Cluster 2
##       0.227       0.23
##
##
##
##   Provinces:
##                         Cluster 1 Cluster 2
## Alberta                       279       179
## BritishColumbia               446       277
## NewBrunswick                   73        49
## NorthwestTerritories            5         2
## NovaScotia                    268       182
## Ontario                      1402       838
## Quebec                        541       317
## Saskatchewan                   46        25
## NA's                         6052      3709
##
##
##
##   Amenity dense:
##    Cluster 1 Cluster 2
## 0       8263      5031
## 1        671       413
## 2         79        68
## F         99        66
##
##
##
##   PMS_prox_idx_emp :
##   Cluster 1 Cluster 2
##     0.02521   0.02555
##
##
##
##   PMS_prox_idx_pharma :
##   Cluster 1 Cluster 2
##     0.04464   0.04541
##
##
##
##   PMS_prox_idx_childcare :
##   Cluster 1 Cluster 2
##     0.07573    0.0778
##
##
##
##   PMS_prox_idx_health :
##   Cluster 1 Cluster 2
##     0.01388   0.01362
```
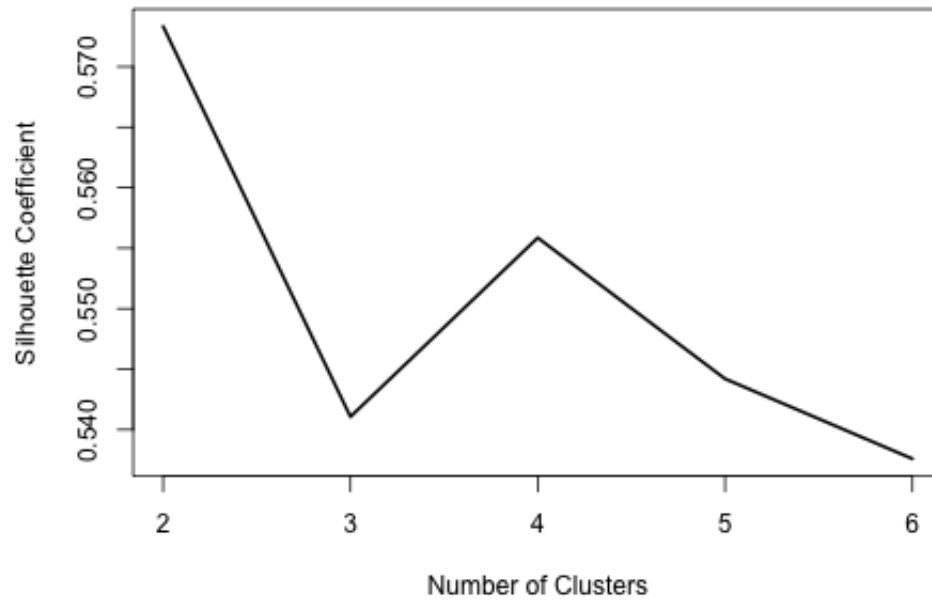
```
##
##
##
##  PMS_prox_idx_grocery :
##  Cluster 1 Cluster 2
##    0.07032   0.07183
##
##
##
##  PMS_prox_idx_educpri :
##  Cluster 1 Cluster 2
##    0.11664   0.11739
##
##
##
##  PMS_prox_idx_educsec :
##  Cluster 1 Cluster 2
##     0.1024    0.1052
##
##
##
##  PMS_prox_idx_lib :
##  Cluster 1 Cluster 2
##    0.11364     0.113
##
##
##
##  PMS_prox_idx_parks :
##  Cluster 1 Cluster 2
##    0.06863   0.06807
##
##
##
##  PMS_prox_idx_transit :
##  Cluster 1 Cluster 2
##    0.01752   0.01882
```
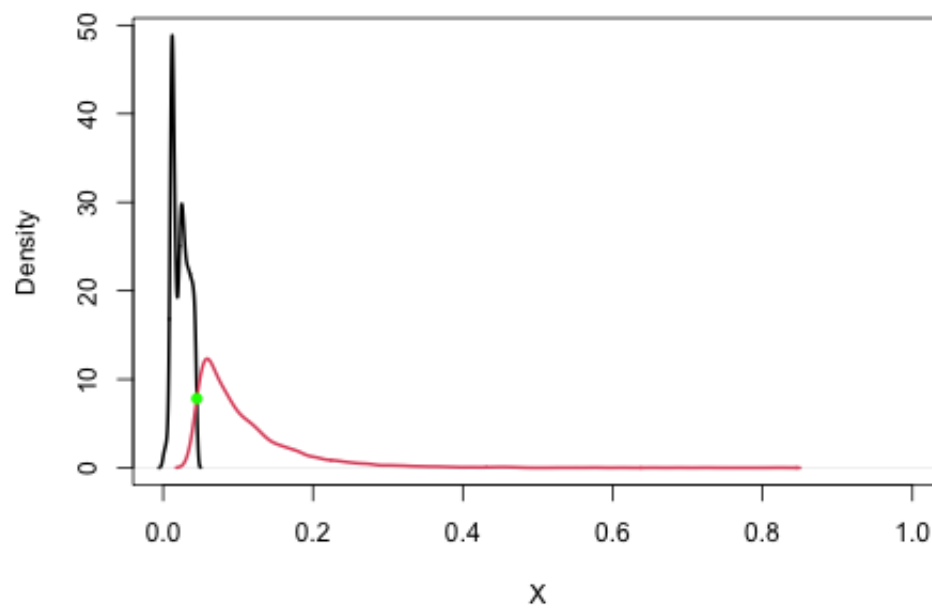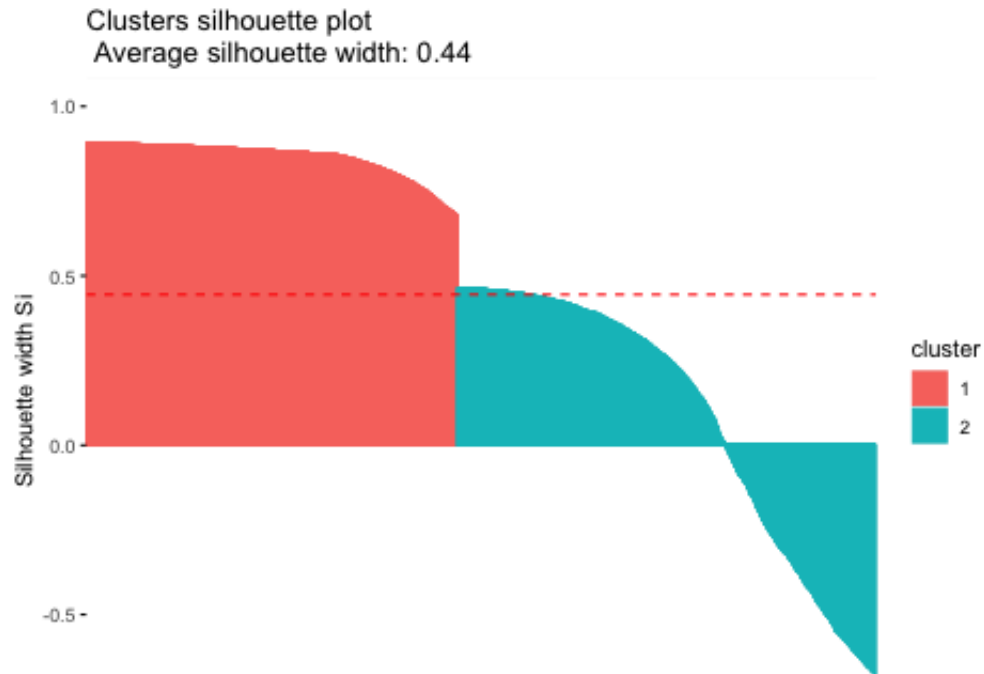
Parks

[1] "Maximum silhouete coefficient: 0.573329830620795 For 2 clusters."

[1] "Segment cutoff values:"

```
## [1] 0.04507102
##   cluster size ave.sil.width
## 1       1 3274          0.85
## 2       2 3695          0.09
```

Clusters silhouette plot
Average silhouette width: 0.44


```
## [1] "Cluster profiles:"
## [1] "Num of DBs:"
##  Cluster 1 Cluster 2
##       6881      7809
##
##
##
##  DB Population:
##  Cluster 1 Cluster 2
##       73.5      71.6
##
##
##
##  CSD Population:
##  Cluster 1 Cluster 2
##   239190.9  230010.7
##
##
##
##  CMA Type:
##    Cluster 1 Cluster 2
##         2980      3458
## B       2886      3229
## D        762       856
```

```
## K         253       266
##
##
##
##   Index of Remoteness:
##   Cluster 1 Cluster 2
##       0.227     0.229
##
##
##
##   Provinces:
##                       Cluster 1 Cluster 2
## Alberta                     231       227
## BritishColumbia             324       399
## NewBrunswick                 65        57
## NorthwestTerritories          5         2
## NovaScotia                  209       241
## Ontario                    1062      1178
## Quebec                      397       461
## Saskatchewan                 31        40
## NA's                       4557      5204
##
##
##
##   Amenity dense:
##    Cluster 1 Cluster 2
## 0      6229      7065
## 1       501       583
## 2        71        76
## F        80        85
##
##
##
##   PMS_prox_idx_emp :
##   Cluster 1 Cluster 2
##     0.02592   0.02482
##
##
##
##   PMS_prox_idx_pharma :
##   Cluster 1 Cluster 2
##     0.04529   0.04461
##
##
##
##   PMS_prox_idx_childcare :
##   Cluster 1 Cluster 2
##     0.07747   0.07564
##
##
##
##   PMS_prox_idx_health :
##   Cluster 1 Cluster 2
##     0.01397    0.0136
```
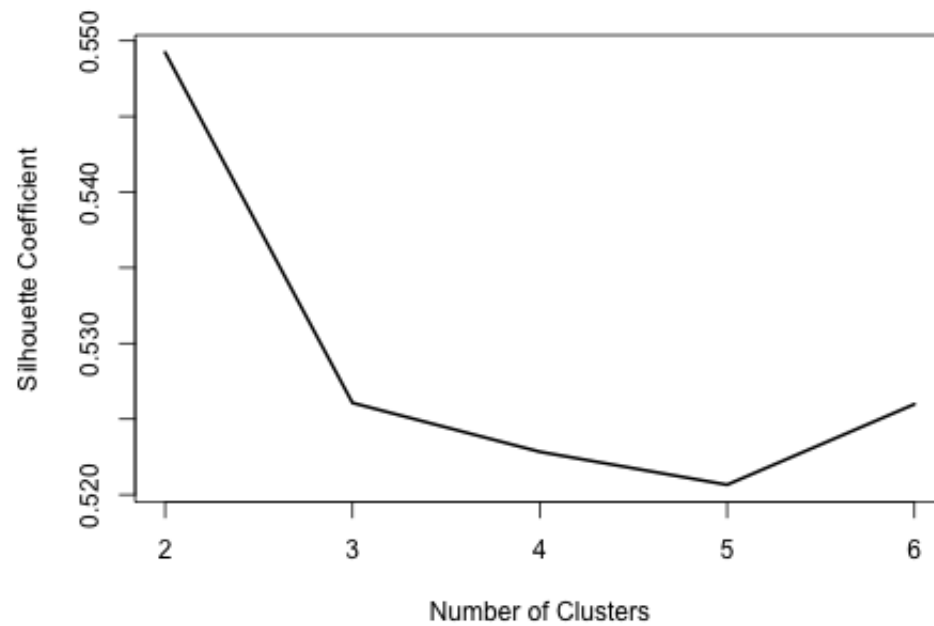
```
## 
## 
## 
## PMS_prox_idx_grocery :
## Cluster 1 Cluster 2
##    0.07114    0.07066
## 
## 
## 
## PMS_prox_idx_educpri :
## Cluster 1 Cluster 2
##      0.117    0.11685
## 
## 
## 
## PMS_prox_idx_educsec :
## Cluster 1 Cluster 2
##    0.10385    0.10315
## 
## 
## 
## PMS_prox_idx_lib :
## Cluster 1 Cluster 2
##    0.11443    0.11247
## 
## 
## 
## PMS_prox_idx_parks :
## Cluster 1 Cluster 2
##    0.06918    0.06774
## 
## 
## 
## PMS_prox_idx_transit :
## Cluster 1 Cluster 2
##    0.01853    0.01754
```
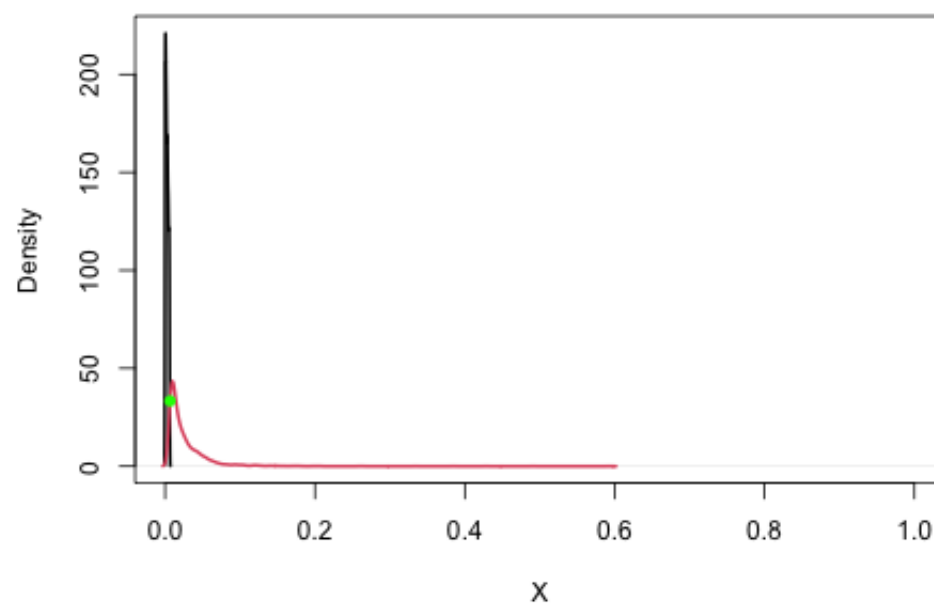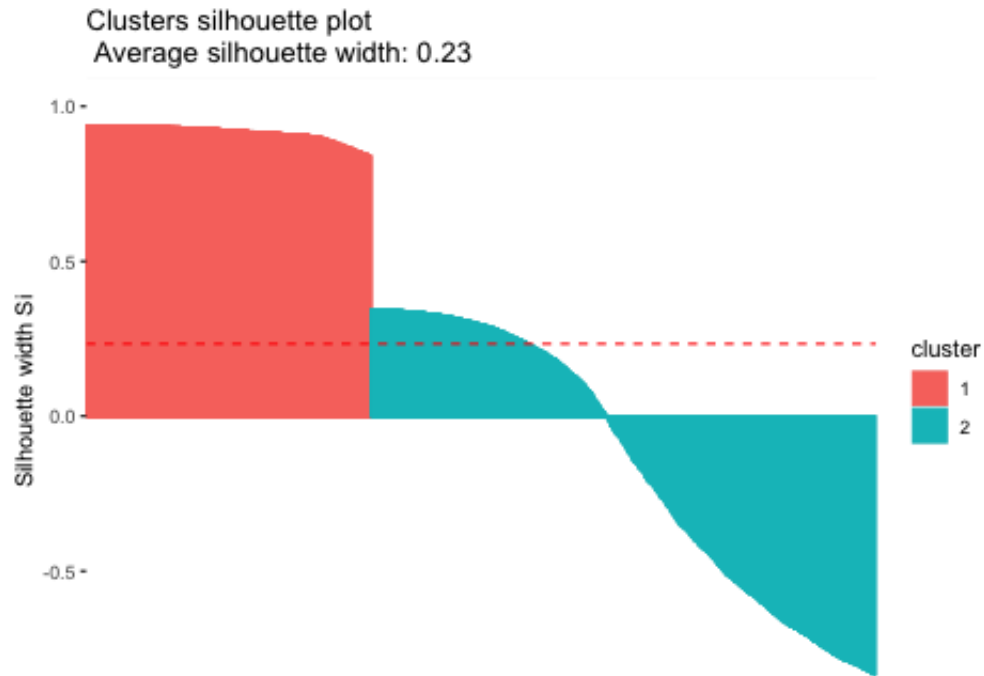
Transit

[1] "Maximum silhouete coefficient: 0.549231317427407 For 2 clusters."

[1] "Segment cutoff values:"

```
## [1] 0.006648229
##   cluster size ave.sil.width
## 1       1 1930         0.92
## 2       2 3422        -0.15
```

Clusters silhouette plot
Average silhouette width: 0.23


```
## [1] "Cluster profiles:"
## [1] "Num of DBs:"
##  Cluster 1 Cluster 2
##       5289      9401
##
##
##
##  DB Population:
##  Cluster 1 Cluster 2
##       75.3        71
##
##
##
##  CSD Population:
##  Cluster 1 Cluster 2
##   229902.9  236790.6
##
##
##
##  CMA Type:
##    Cluster 1 Cluster 2
##        2331      4107
## B      2171      3944
## D       593      1025
```

```
## K            194          325
##
##
##
##  Index of Remoteness:
##  Cluster 1 Cluster 2
##      0.229     0.228
##
##
##
##  Provinces:
##                       Cluster 1 Cluster 2
## Alberta                     168       290
## BritishColumbia             269       454
## NewBrunswick                 37        85
## NorthwestTerritories          3         4
## NovaScotia                  163       287
## Ontario                     801      1439
## Quebec                      316       542
## Saskatchewan                 25        46
## NA's                       3507      6254
##
##
##
##  Amenity dense:
##    Cluster 1 Cluster 2
## 0      4750      8544
## 1       418       666
## 2        56        91
## F        65       100
##
##
##
##  PMS_prox_idx_emp :
##  Cluster 1 Cluster 2
##    0.02622   0.02484
##
##
##
##  PMS_prox_idx_pharma :
##  Cluster 1 Cluster 2
##    0.04754   0.04345
##
##
##
##  PMS_prox_idx_childcare :
##  Cluster 1 Cluster 2
##     0.0791   0.07508
##
##
##
##  PMS_prox_idx_health :
##  Cluster 1 Cluster 2
##     0.0145   0.01338
```

```
##
##
##
##  PMS_prox_idx_grocery :
##  Cluster 1 Cluster 2
##    0.07334    0.06948
##
##
##
##  PMS_prox_idx_educpri :
##  Cluster 1 Cluster 2
##    0.11915    0.11567
##
##
##
##  PMS_prox_idx_educsec :
##  Cluster 1 Cluster 2
##    0.10651    0.10178
##
##
##
##  PMS_prox_idx_lib :
##  Cluster 1 Cluster 2
##    0.11047     0.1151
##
##
##
##  PMS_prox_idx_parks :
##  Cluster 1 Cluster 2
##    0.06975     0.0677
##
##
##
##  PMS_prox_idx_transit :
##  Cluster 1 Cluster 2
##    0.01839     0.0178
```

Conclusion

text