Manual cutoffs

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Introduction

The Proximity Measures Database contains continuous measures for 10 amenities for a number of DB within a specific threshold. The distribution of these proximity measures is heavily right skewed, and there are for the most part no discernible clusters. The density distribution, with a default bandwidth, of each amenity is shown in Figure 1.

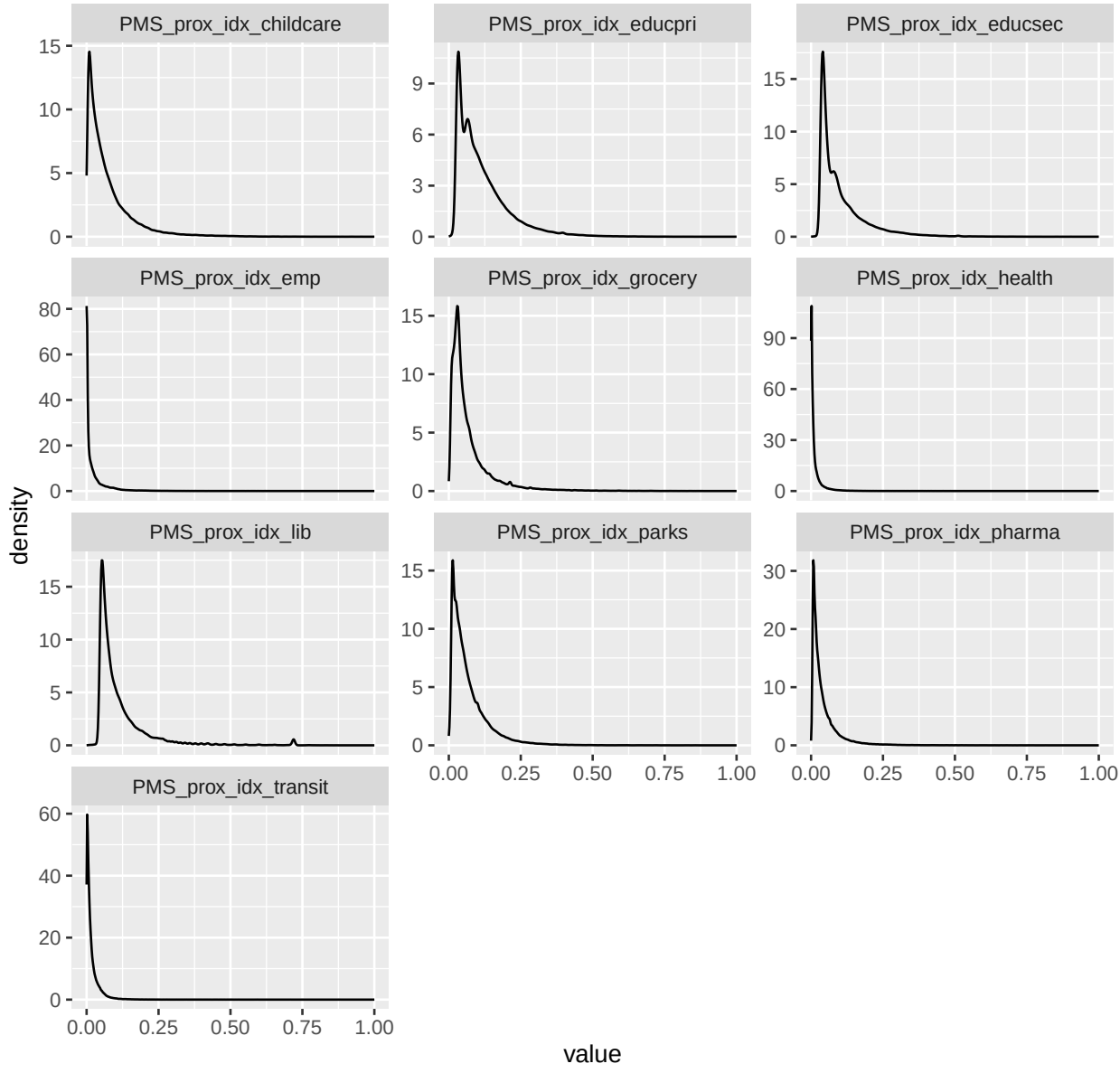


Figure 1: Distribution of proximity measures by amenity

When transforming the data, the inherent relationship between data points remain the same, but the new structure may reveal new insights. The most 'famous' transformation available is the log transform. It "can be used to make highly skewed distributions less skewed". It may help "make patterns more visible". A consideration to be aware of is that the log of 0 is -Inf. To account for proximity values of 0 in our dataset, we

shift the distribution by +0.0001. This avoids the problem of -Inf whilst maintaining the original distances between all values. The downsides of using a log transformation are [DOWNSIDES]. Figure 2 demonstrates the distribution of the log transformed proximity measures, where all the amenities' distributions were shifted by +0.0001. We can already visually identify more possible clusters.

We shifted the distribution by +0.0001 of the amenities that had a minimum value of 0. Grocery, educpri, educsec, and lib did not have values of 0 in their distribution and such were not shifted. The visual difference of the distributions between when +0.0001 is applied vs when it is not are imperceptible. For simplification in reproducibility, we will apply the distribution shift to all amenities.

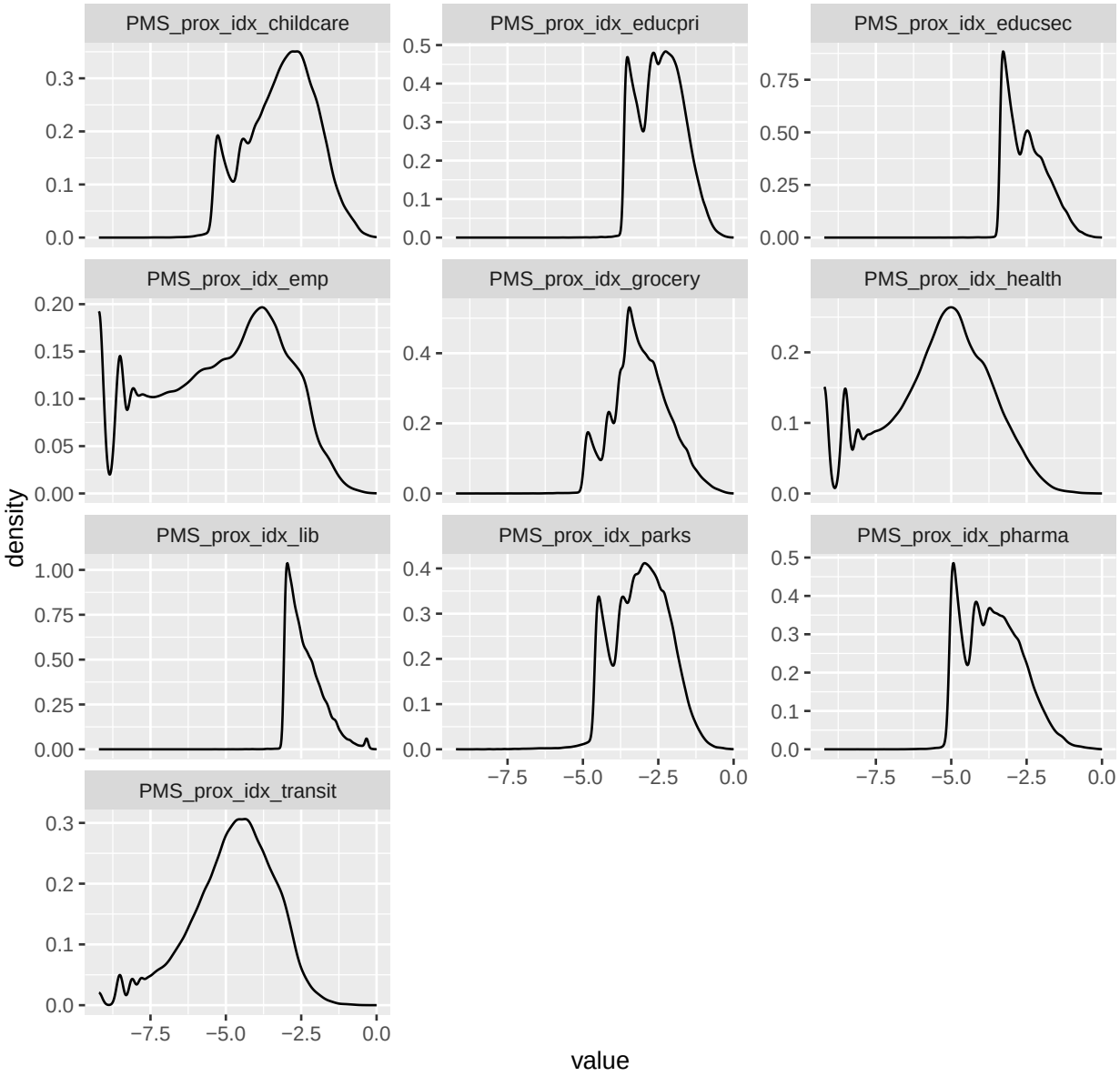
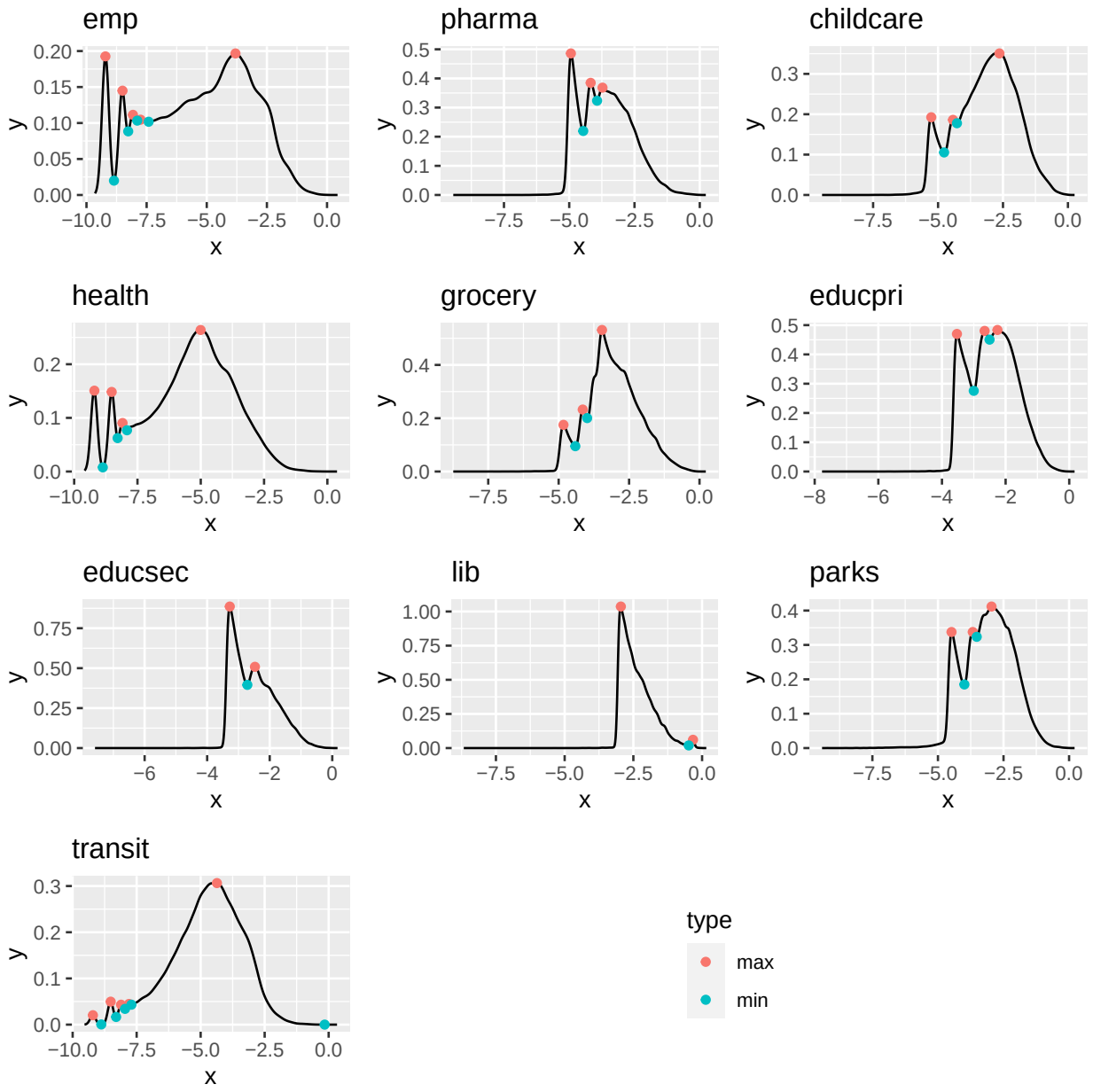


Figure 2: LOG TRANSFORMED(0.0001): Distribution of proximity measures by amenity

Segmenting via minima

A segmentation technique is to segment the distribution at select minima of the density distribution. Each minimum in the density curves represents a density sparse region, which may be a 'natural' break in the continuous measures. Figure 4 provides an overview of where maxima and minima are located in the density curves of every amenity. We see that there are a lot of points that are by definition local minima, but are not fully indicative of density sparse regions. We can limit which minima are representative of density sparse regions by only including those who have a threshold difference between themselves and surrounding maxima. The results of the indepth analysis of which minima should intuitively represent a cutoff value for each amenity are displayed in the following plot, and summarized in the table.

Summary



	num_groups
emp	5
pharma	3
childcare	3
health	4
grocery	3
educpri	3
educsec	2
lib	2
parks	3
transit	5

Cut off values:

```
## [1] "PMS_prox_idx_emp"
## [1] 0.0001423603 0.0002573125 0.0003743458 0.0006010775
## [1] "PMS_prox_idx_pharma"
## [1] 0.01152592 0.01958168
## [1] "PMS_prox_idx_childcare"
## [1] 0.008507409 0.013950871
## [1] "PMS_prox_idx_health"
## [1] 0.0001405736 0.0002524638 0.0003658077
## [1] "PMS_prox_idx_grocery"
## [1] 0.01218361 0.01856220
## [1] "PMS_prox_idx_educpri"
## [1] 0.04975835 0.08179011
## [1] "PMS_prox_idx_educsec"
## [1] 0.06619424
## [1] "PMS_prox_idx_lib"
## [1] 0.6150259
## [1] "PMS_prox_idx_parks"
## [1] 0.01844893 0.02954933
## [1] "PMS_prox_idx_transit"
## [1] 0.0001390986 0.0002481958 0.0003512994 0.0004514904 0.8553858919
```

Essentially, for every amenity, add a new column (so 10 new cols today) that outlines which group it belongs to, according to the cutoff points.

1	2	3	4	5	NA
29831	22179	14893	26887	329812	66074

How many DBs in each group

```
## [1] "emp"
##
##             1      2      3      4      5   <NA>
##   [1,]  29831  22179  14893  26887 329812  66074
## [1] "pharma"
##
##             1      2      3   <NA>
##   [1,]  41305  30505 106711 311155
```

```
## [1] "childcare"
##
##             1      2      3   <NA>
##   [1,]  26274  18663 199027 245712
## [1] "health"
##
##             1      2      3      4   <NA>
##   [1,]  14556  14259   8086 263564 189211
## [1] "grocery"
##
##             1      2      3   <NA>
##   [1,]  11600  10766 118697 348613
## [1] "educpri"
##
##             1      2      3   <NA>
##   [1,]  57009  45865 122485 264317
## [1] "educsec"
##
##             1      2   <NA>
##   [1,]  63449  77764 348463
## [1] "lib"
##
##             1      2   <NA>
##   [1,] 111546   1109 377021
## [1] "parks"
##
##             1      2      3   <NA>
##   [1,]  42995  31335 159738 255608
## [1] "transit"
##
##             1      2      3      4      5      6   <NA>
##   [1,]   1014   2474   2082   1923 173810      2 308371
```

Non-logged: adding to master df

```
## [1] "emp"
##
##             1      2      3      4      5   <NA>
##   [1,]  29831  22179  14893  26887 329812  66074
## [1] "pharma"
##
##             1      2      3   <NA>
##   [1,]  41305  30505 106711 311155
## [1] "childcare"
##
##             1      2      3   <NA>
##   [1,]  26274  18663 199027 245712
## [1] "health"
##
##             1      2      3      4   <NA>
##   [1,]  14556  14259   8086 263564 189211
## [1] "grocery"
##
```

```
##             1      2      3   <NA>
##   [1,]  11600  10766 118697 348613
## [1] "educpri"
##
##             1      2      3   <NA>
##   [1,]  57009  45865 122485 264317
## [1] "educsec"
##
##             1      2   <NA>
##   [1,]  63449  77764 348463
## [1] "lib"
##
##             1      2   <NA>
##   [1,] 111546   1109 377021
## [1] "parks"
##
##             1      2      3   <NA>
##   [1,]  42995  31335 159738 255608
## [1] "transit"
##
##             1      2      3      4      5      6   <NA>
##   [1,]   1014   2474   2082   1923 173810      2 308371
```

```
## [1] 0.9999000 0.9999391 1.0000482 1.0001513 1.0002516 2.3519467 2.7181818
```

```
## [1] 1
```

summary statistics of IoR

Next Steps

- ~~assign 'group' to each~~
- metrics for each clusters
- Investigate 'weight' of distribution for every suggested groups
- ~~number of DB for each clusters~~
- summary statistics of IoR for each cluster
- population summary statistics
- CMA type summary statistics