Lab2

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9 December 2018

Import Libs

```
library(fastICA)
library(ggplot2)
```
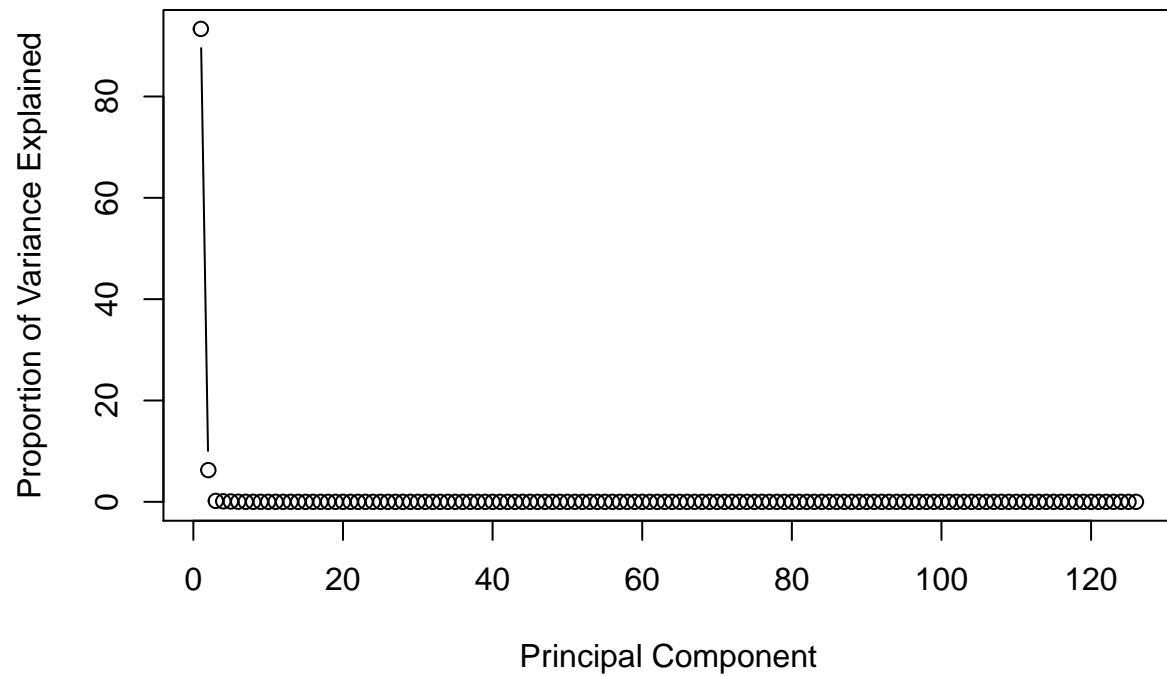
Assignment 2

Assignment 3
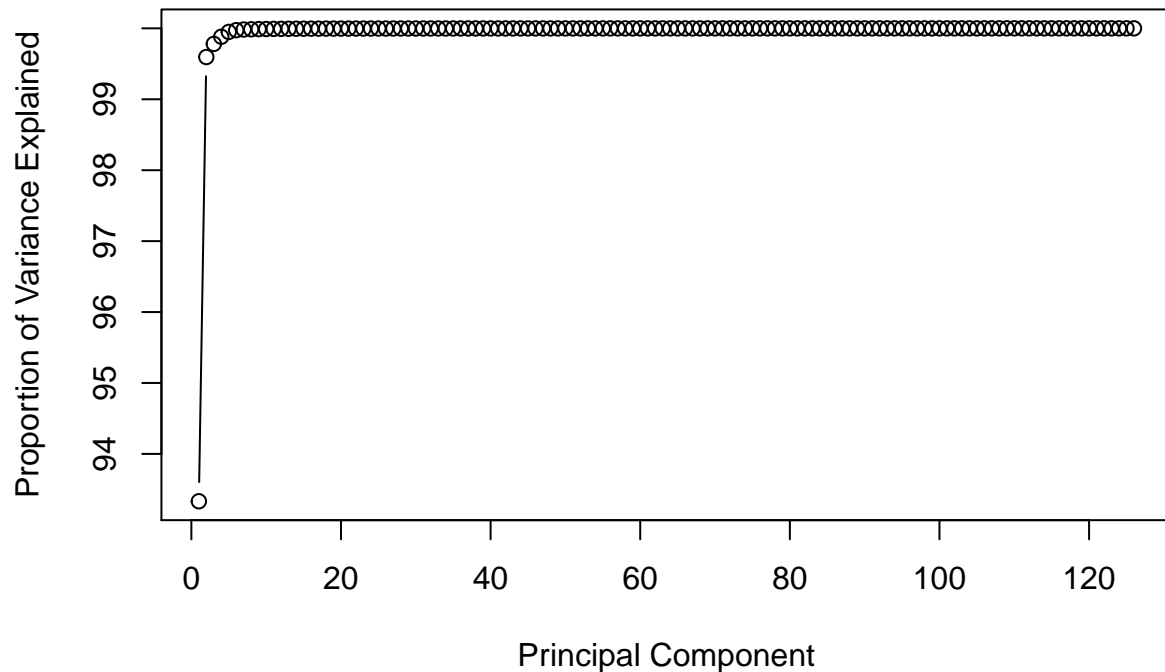
Assignment 4

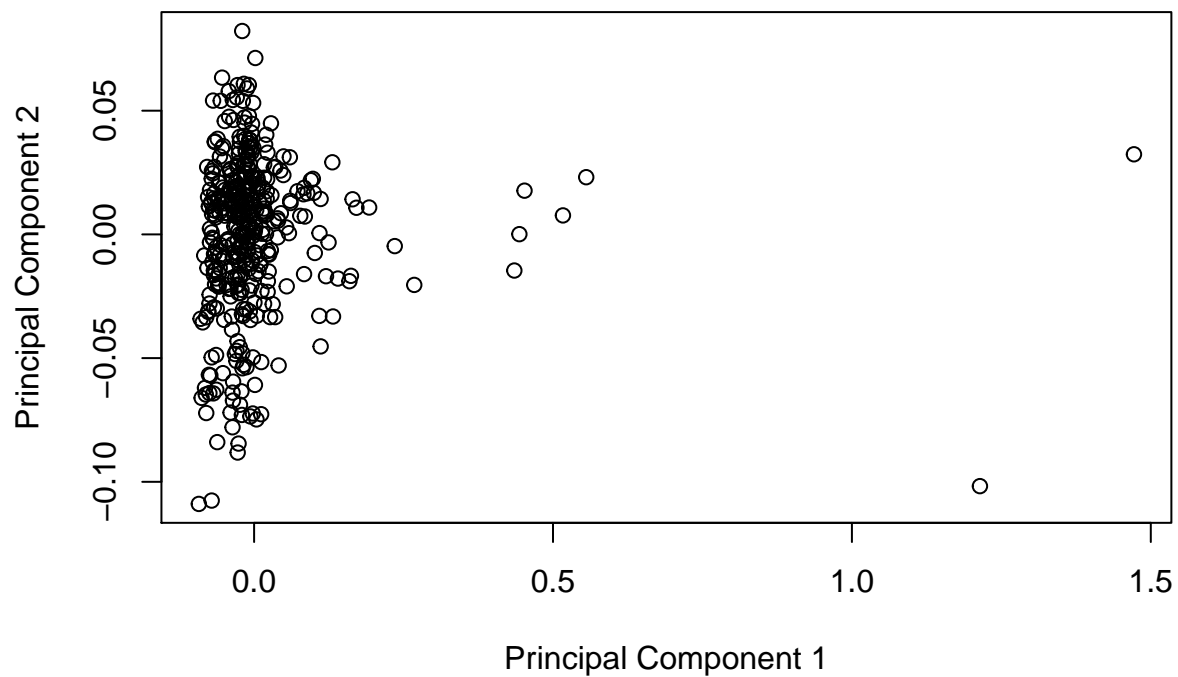### 1 Principal Component Analysis

Proportion of Variance Explained By each component

Cumalative Proportion of Variance Explained By each component


Plot of the Two Selected Principal Components

The first graph shows clearly that the first two principal components explain more than 99% of the total variance of the data, so we selected the first two principal components. We also made a cumalative percentage variance plot for the data and it showed the same thing, the first two components explain more than 99% of the total variance.

We than made a scatter plot of the two principal components. This plot had most of the components clustered

together near the left side of the plot. There are two outliers near the right side of the plot both far apart from each other. These are the unusual diesal fuels according to this plot.
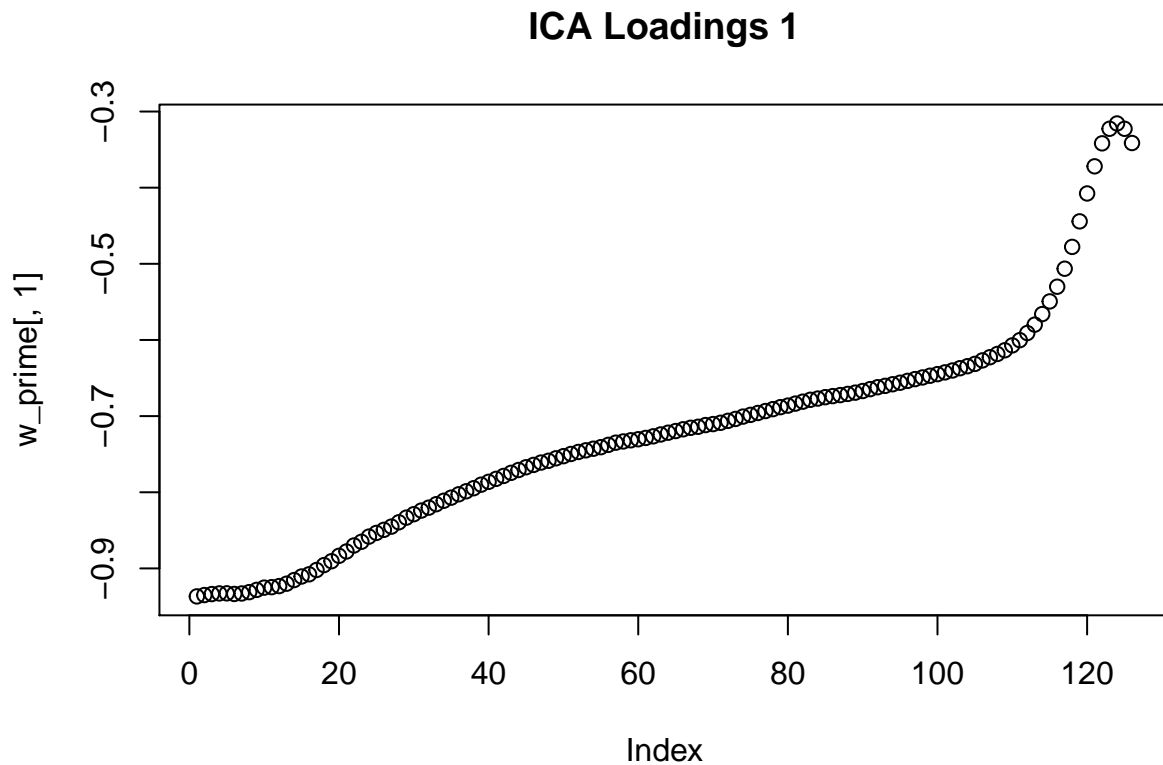
2 Principal Component Analysis Loadings

Principal Components 1
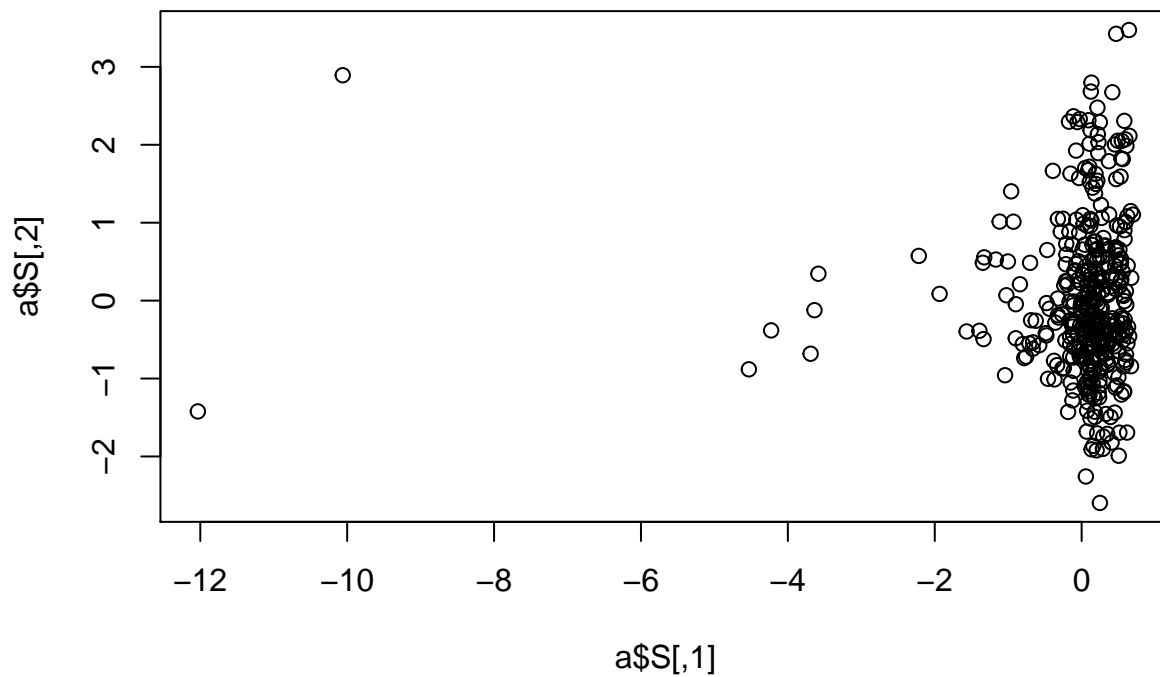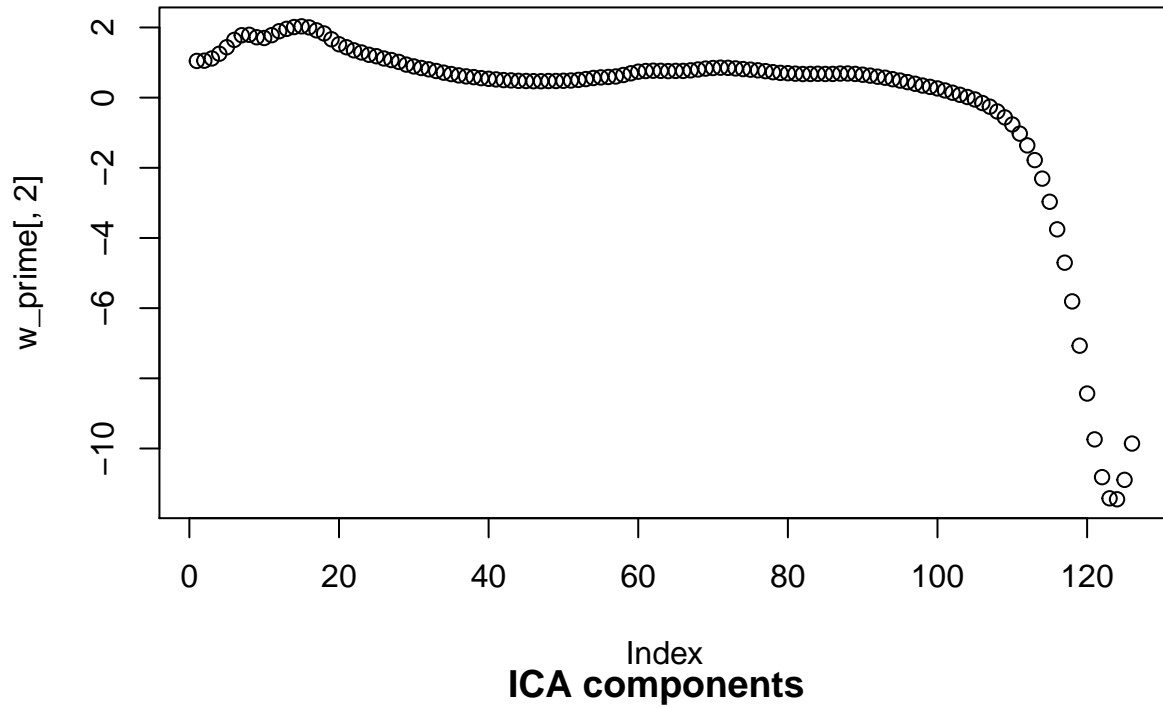

Principal Components 2
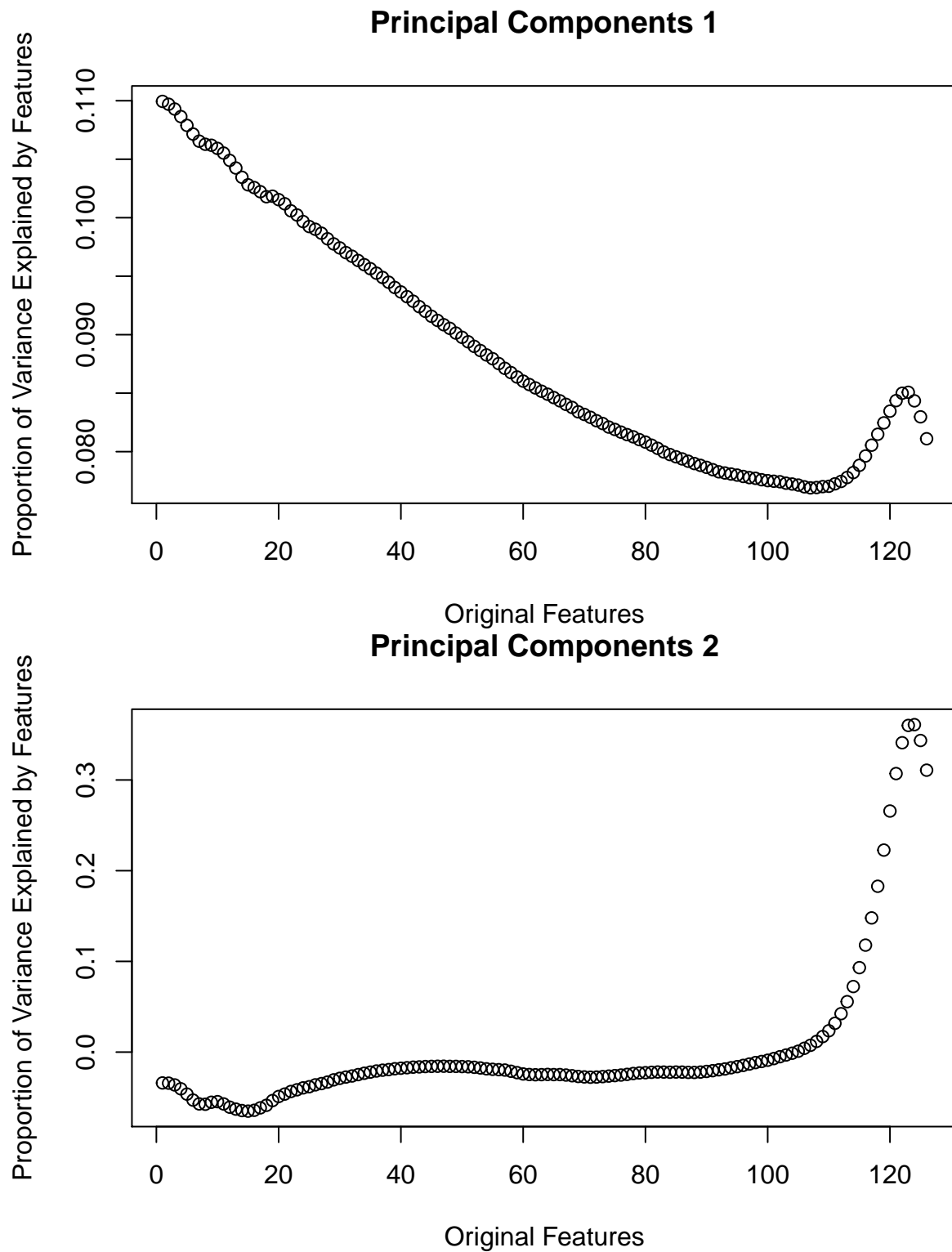
These are the trace plots showing how much contribution each of the original features make in the calculation of that principal component. The principal component 2(shown in the second plot) is explained by just a few of the original features. The features from 115 to 123 make majority of the contribution in explaining that feature.

3 Independent Component Analysis using fastICA

```
## Centering
## Whitening
## Symmetric FastICA using logcosh approx. to neg-entropy function
## Iteration 1 tol=0.019302
## Iteration 2 tol=0.013040
## Iteration 3 tol=0.002394
## Iteration 4 tol=0.000671
## Iteration 5 tol=0.000166
## Iteration 6 tol=0.000035
```

ICA Loadings 1

ICA Loadings 2

ICA components

Comparing the two trace plots with the ones in the previous step I think that each of the original features contribute more in calculation of the Independent components. The principal components are switched, like-

- PC1 (using PCA) is similar to PC2 (using ICA), and
- PC2 (unig PCA) is similar to PC1 (using ICA)

They have similar trace plots but the contribution of each of the original component is higher when using Independent Component Analysis.

The last plot is the plot of selected components using ICA. This looks like a mirror image to the one we had in the step 1, as the principal components are switched the plot is also mirrored along the Y-axis. The plot is exactly similar with the same outliers, just mirrored along the Y-axis.