K-Means Clustering

Customer Movie Rating

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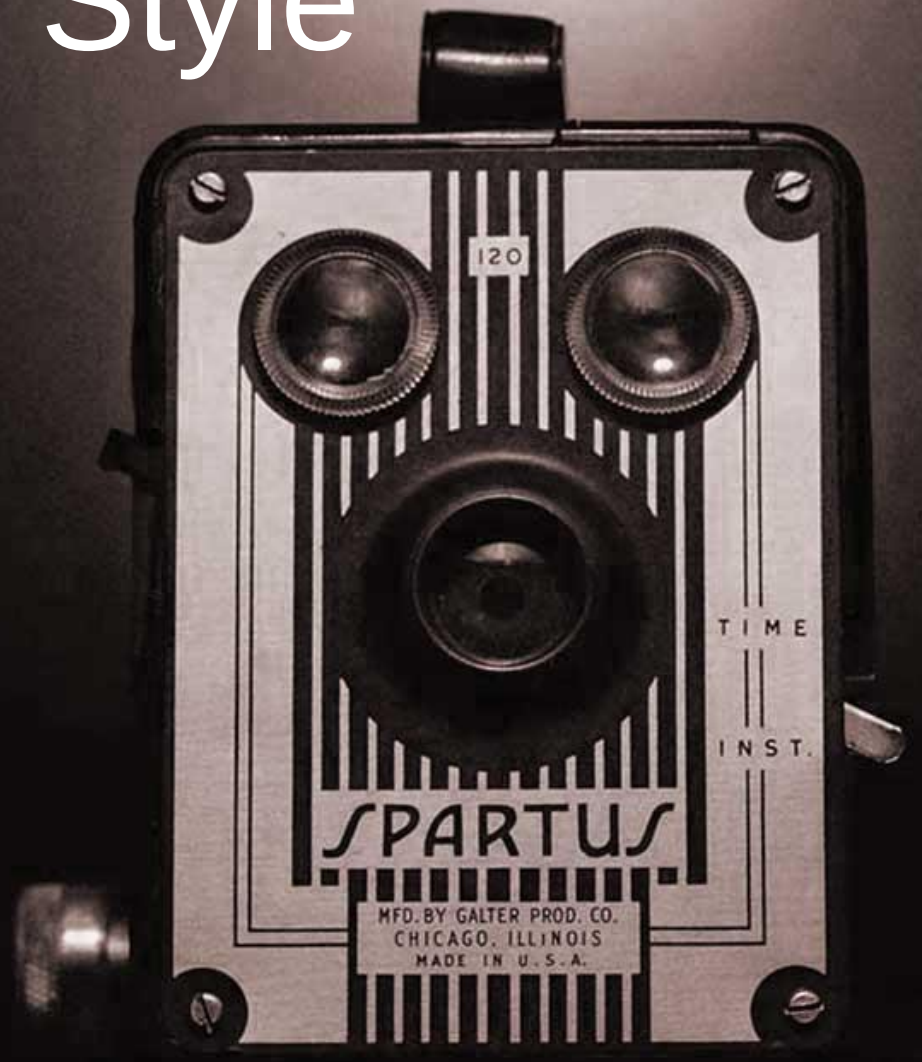
Agenda

Style



01 Read The Data

Read customer movie rating data.

02 Data Preparation

Check all entries each column, handling outliers, and scale the data

03 Determine The Optimal K Value

Determine the optimal k value to determine the best model.

04 K-Mean Execution

Create a model with the optimal k value that has been found.

01. Read The Data

Read customer movie rating data and display top 6 data

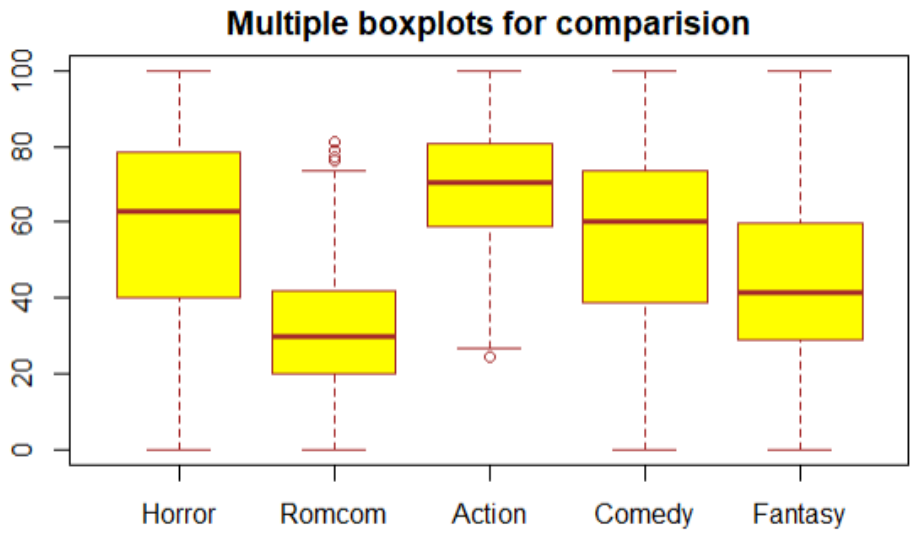
	Horror <dbl>	Romcom <dbl>	Action <dbl>	Comedy <dbl>	Fantasy <dbl>
1	72.5	29.9	68.6	40.7	57.9
2	82.2	45.3	76.5	17.4	67.7
3	70.0	44.0	65.1	53.7	37.8
4	99.1	21.0	77.9	25.4	40.3
5	84.0	0.0	68.1	49.8	40.0
6	70.2	55.0	97.2	48.1	40.5

02. Data Preparation

Summary data and check missing value

```
     Horror          Romcom          Action          Comedy     
 Min.   :  0.00   Min.   : 0.00   Min.   : 24.60   Min.   :  0.00  
 1st Qu.: 40.00   1st Qu.:19.90   1st Qu.: 58.75   1st Qu.: 38.50  
 Median : 62.80   Median :29.70   Median : 70.50   Median : 60.00  
 Mean   : 58.57   Mean   :31.25   Mean   : 68.84   Mean   : 56.52  
 3rd Qu.: 78.25   3rd Qu.:41.65   3rd Qu.: 80.55   3rd Qu.: 73.45  
 Max.   :100.00   Max.   :81.30   Max.   :100.00   Max.   :100.00  
    Fantasy      
 Min.   :  0.00  
 1st Qu.: 28.95  
 Median : 41.20  
 Mean   : 45.61  
 3rd Qu.: 59.85  
 Max.   :100.00  
```

Check outliers data with Multiple Boxplot



Handling outliers

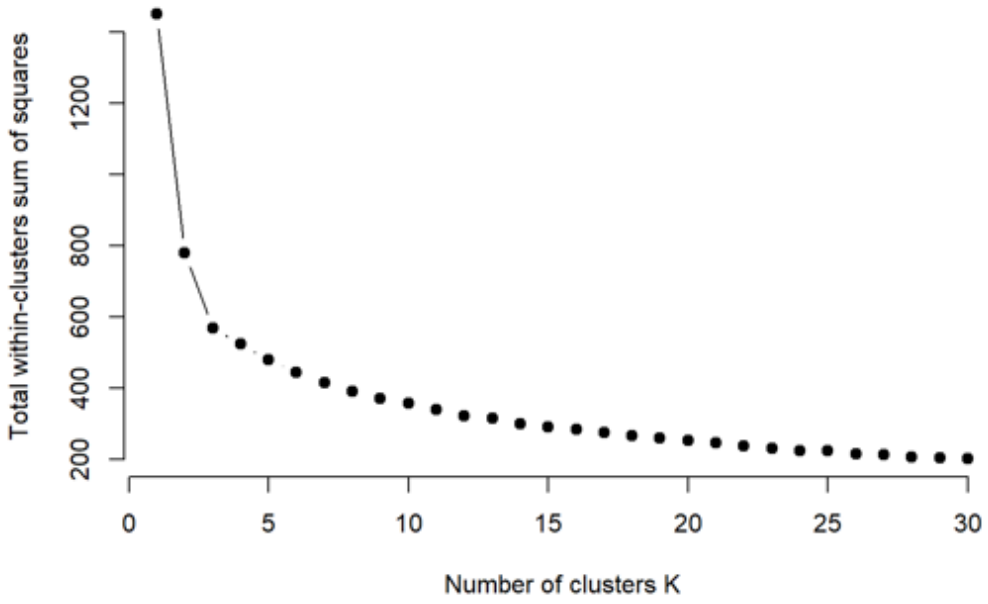
```
data$Romcom[is.na(data$Romcom)]<-mean(data$Romcom,na.rm=TRUE)
data$Action[is.na(data$Action)]<-mean(data$Action,na.rm=TRUE)

sum(is.na(data$Romcom))
sum(is.na(data$Action))
```

Scale the data

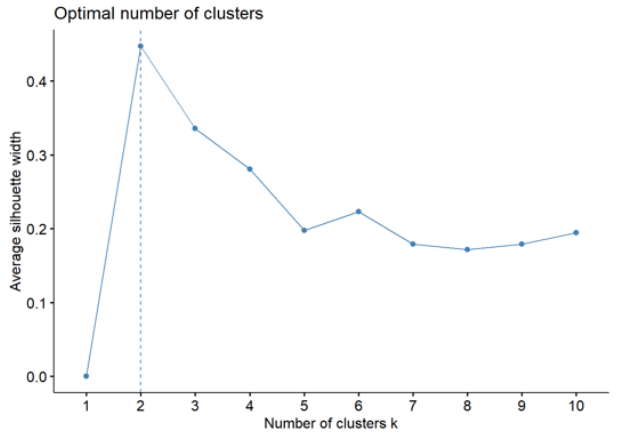
```
          Horror       Romcom       Action      Comedy     Fantasy
[1,] 0.5716500 -0.04299424 -0.02508091 -0.6986964  0.5587483
[2,] 0.9696365  0.91673283  0.47807457 -1.7277543  1.0042660
[3,] 0.4690762  0.83571691 -0.24799789 -0.1245439 -0.3550175
[4,] 1.6630357 -0.59764171  0.56724136 -1.3744297 -0.2413650
[5,] 1.0434897 -1.90636045 -0.05692619 -0.2967896 -0.2550033
[6,] 0.4772821  1.52123625  1.79646928 -0.3718711 -0.2322728
```

03. Determine The Optimum K Value

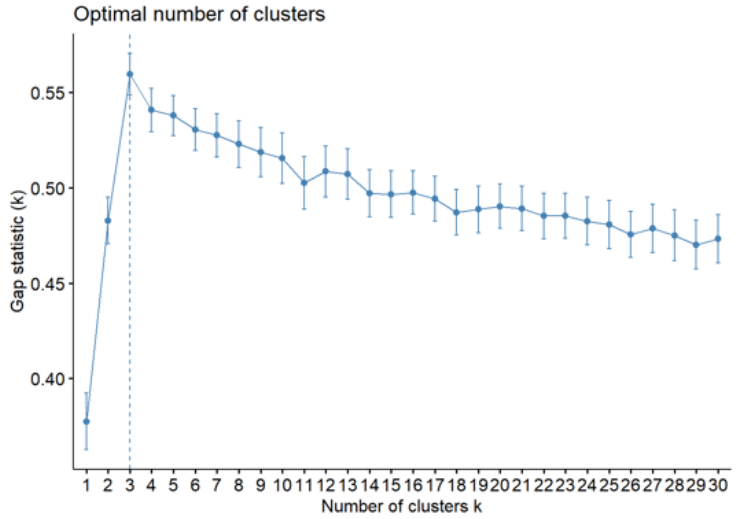
Total within-clusters sum of squares



Average silhouette method

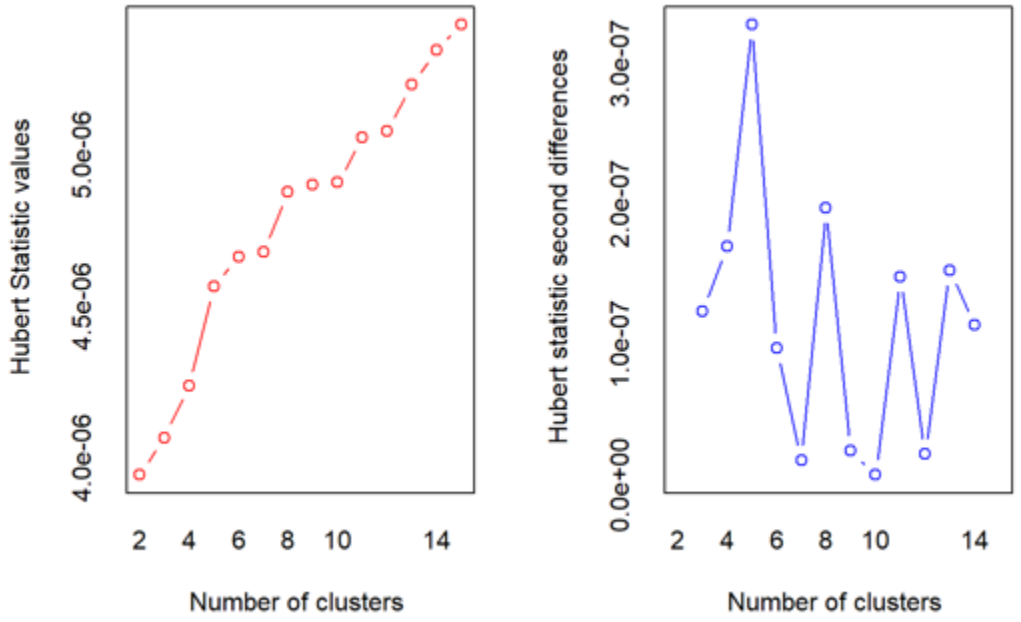


Gap statistic



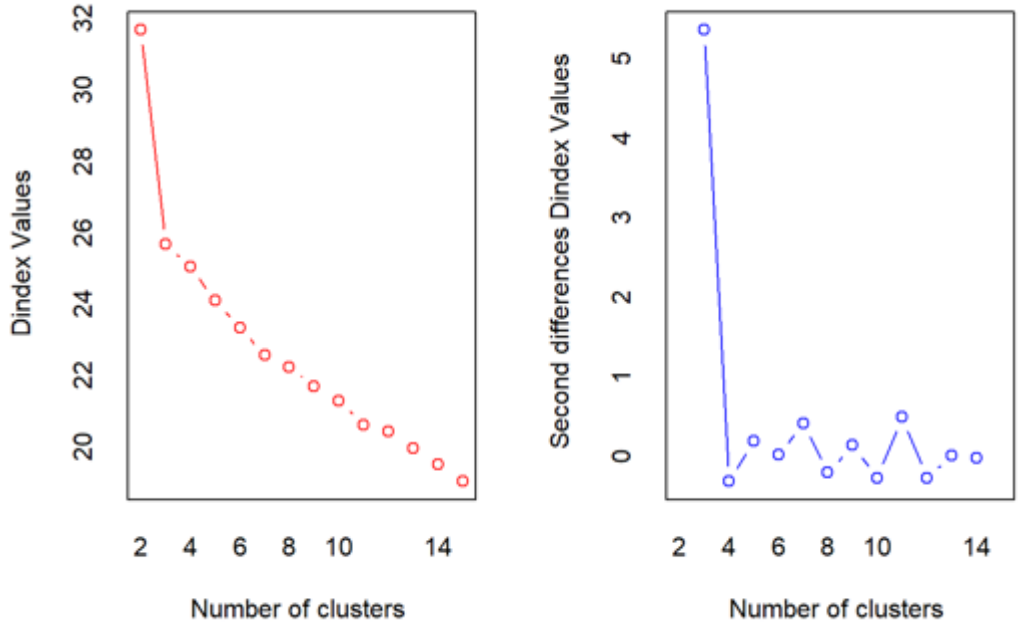
03. Determine The Optimum K Value

The optimal k value is based on several methods using NbClust



The Hubert index is a graphical method of determining the number of clusters. In the plot of Hubert index, we seek a significant knee that corresponds to a significant increase of the value of the measure i.e the significant peak in Hubert index second differences plot.

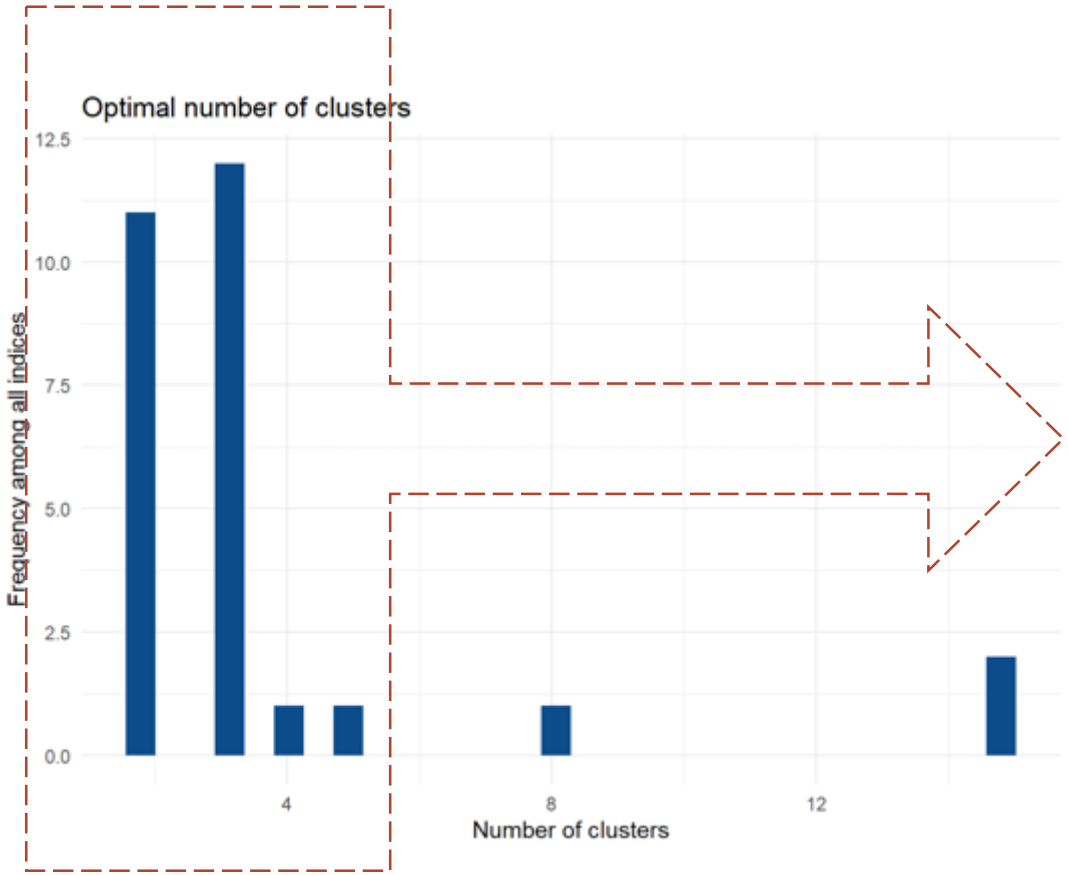
03. Determine The Optimum K Value

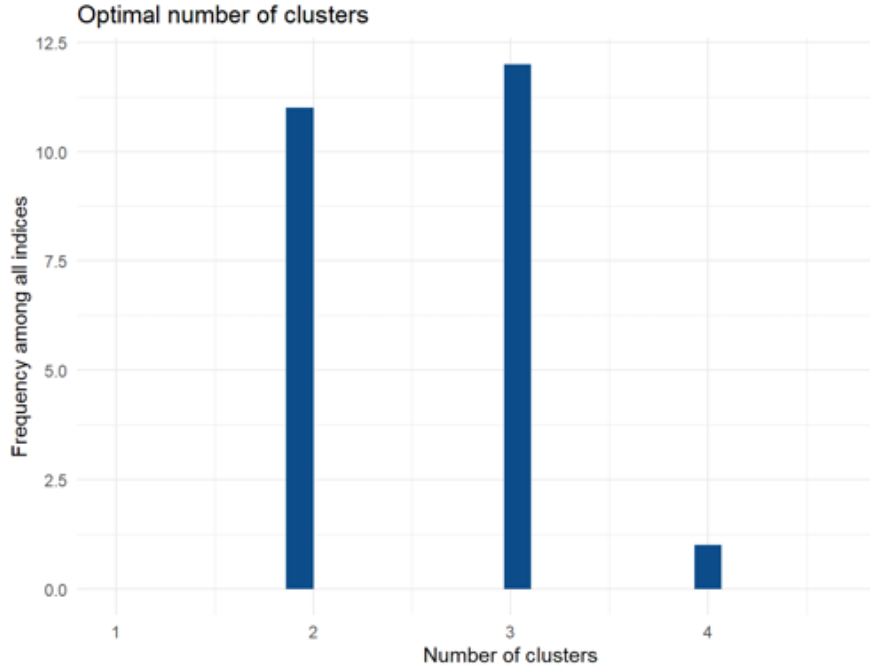


The D index is a graphical method of determining the number of clusters. In the plot of D index, we seek a significant knee (the significant peak in Dindex second differences plot) that corresponds to a significant increase of the value of the measure.

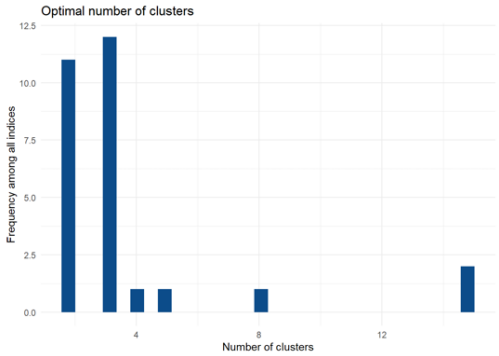
03. Determine The Optimum K Value

Make a plot of the optimal number of clusters from several test methods





03. Determine The Optimum K Value



Among all indices:

- 11 proposed 2 as the best number of clusters
- 12 proposed 3 as the best number of clusters
- 1 proposed 4 as the best number of clusters
- 1 proposed 5 as the best number of clusters
- 1 proposed 8 as the best number of clusters
- 2 proposed 15 as the best number of clusters

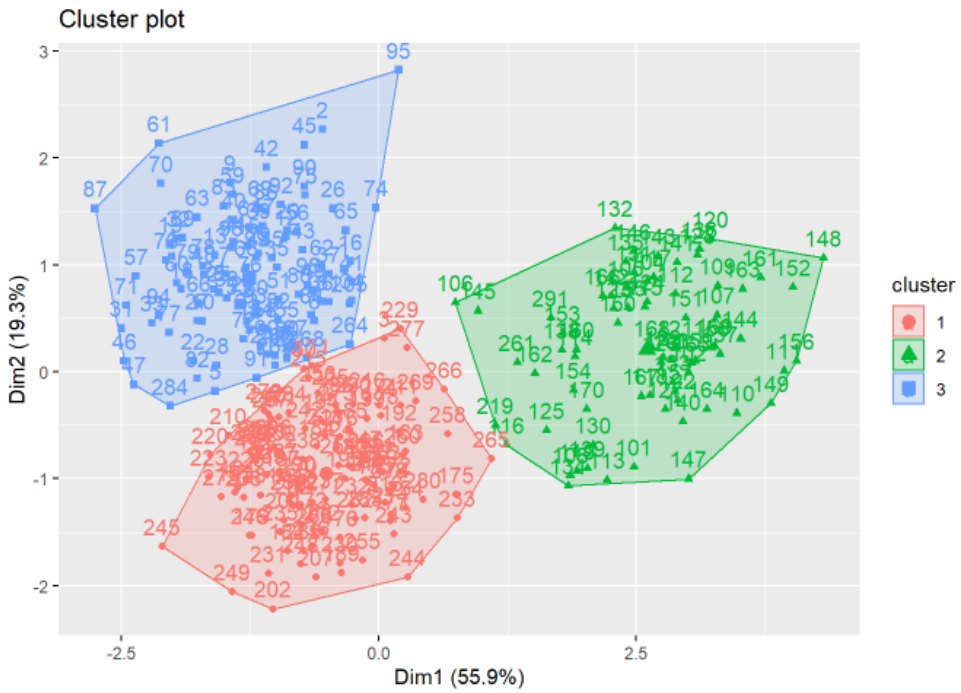
***** Conclusion *****

According to the majority rule, the best number of clusters is 3

04. K-Mean Execution

```
# Choose 123 as our random seed
set.seed(123)

# Cluster the players using kmeans with 3 clusters
cluster_solution <- kmeans(data_scale, centers = 3)
```

```
fviz_cluster(cluster_solution, data = data)
```



04. K-Mean Execution

Store the cluster assignments back into the clustering data frame object and display the top 6 data

Horror <dbl>	Romcom <dbl>	Action <dbl>	Comedy <dbl>	Fantasy <dbl>	cluster <fctr>
72.5	29.9	68.6	40.7	57.9	3
82.2	45.3	76.5	17.4	67.7	3
70.0	44.0	65.1	53.7	37.8	1
99.1	21.0	77.9	25.4	40.3	3
84.0	0.0	68.1	49.8	40.0	3
70.2	55.0	97.2	48.1	40.5	3

Look at the distribution of cluster assignments

```
  1   2   3
113  73 105
```


Thank You