



Telco Customer Churn



Problem Statement

Interesting patterns and information from Telcom customer data set.

Dataset

customerID	gender	Seniority	Partners	Dependents	tenure	PhoneService	MultipleLines	InternetService	OnlineSecurity	OnlineBackup	DeviceProtection	TechSupport	StreamingMovies	StreamingTV	Contract	PaperlessBilling	PaymentMethod	MonthlyCharges	TotalCharges	Churn
7590-YHVEG	Female	0	Yes	No	1	No	No phone service	DSL	No	Yes	No	No	No	No	Month-to-month	Yes	Electronic check	29.85	29.85	No
5575-GNVDE	Male	0	No	No	34	Yes	No	DSL	Yes	No	Yes	No	No	No	One year	No	Mailed check	56.95	1889.5	No
3668-QPYBK	Male	0	No	No	2	Yes	No	DSL	Yes	Yes	No	No	No	No	Month-to-month	Yes	Mailed check	53.85	108.15	Yes
7795-CFOCW	Male	0	No	No	45	No	No phone service	DSL	Yes	No	Yes	Yes	No	No	One year	No	Bank transfer (automatic)	42.3	1840.75	No
9237-HQITU	Female	0	No	No	2	Yes	No	Fiber optic	No	No	No	No	No	No	Month-to-month	Yes	Electronic check	70.7	151.65	Yes
9305-CDKSC	Female	0	No	No	8	Yes	Yes	Fiber optic	No	No	Yes	No	Yes	Yes	Month-to-month	Yes	Electronic check	99.65	820.5	Yes
1452-KIOVK	Male	0	No	Yes	22	Yes	Yes	Fiber optic	No	Yes	No	No	Yes	No	Month-to-month	Yes	Credit card (automatic)	89.1	1949.4	No
6713-OKOMC	Female	0	No	No	10	No	No phone service	DSL	Yes	No	No	No	No	No	Month-to-month	No	Mailed check	29.75	301.9	No
7892-POOKP	Female	0	Yes	No	28	Yes	Yes	Fiber optic	No	No	Yes	Yes	Yes	Yes	Month-to-month	Yes	Electronic check	104.8	3046.05	Yes
6388-TABGU	Male	0	No	Yes	62	Yes	No	DSL	Yes	Yes	No	No	No	No	One year	No	Bank transfer (automatic)	56.15	3487.95	No
9763-GRSKD	Male	0	Yes	Yes	13	Yes	No	DSL	Yes	No	No	No	No	No	Month-to-month	Yes	Mailed check	49.95	587.45	No
7469-LKBCI	Male	0	No	No	16	Yes	No	No	No inter	No inter	No inter	No inter	No inter	No inter	Two year	No	Credit card (automatic)	18.95	326.8	No
8091-TTVAX	Male	0	Yes	No	58	Yes	Yes	Fiber optic	No	No	Yes	No	Yes	Yes	One year	No	Credit card (automatic)	100.35	5681.1	No
0280-XUGEX	Male	0	No	No	49	Yes	Yes	Fiber optic	No	Yes	Yes	Yes	Yes	Yes	Month-to-month	Yes	Bank transfer (automatic)	103.7	5036.3	Yes
5129-JLPIS	Male	0	No	No	25	Yes	No	Fiber optic	Yes	No	Yes	Yes	Yes	Yes	Month-to-month	Yes	Electronic check	105.5	2686.05	No
3655-SNOVZ	Female	0	Yes	Yes	69	Yes	Yes	Fiber optic	Yes	Yes	Yes	Yes	Yes	Yes	Two year	No	Credit card (automatic)	113.25	7895.15	No
8191-XWSZG	Female	0	No	No	52	Yes	No	No	No inter	No inter	No inter	No inter	No inter	No inter	One year	No	Mailed check	20.65	1022.95	No
9959-WOPKF	Male	0	No	Yes	71	Yes	Yes	Fiber optic	Yes	No	Yes	No	Yes	Yes	Two year	No	Bank transfer (automatic)	106.7	7382.25	No

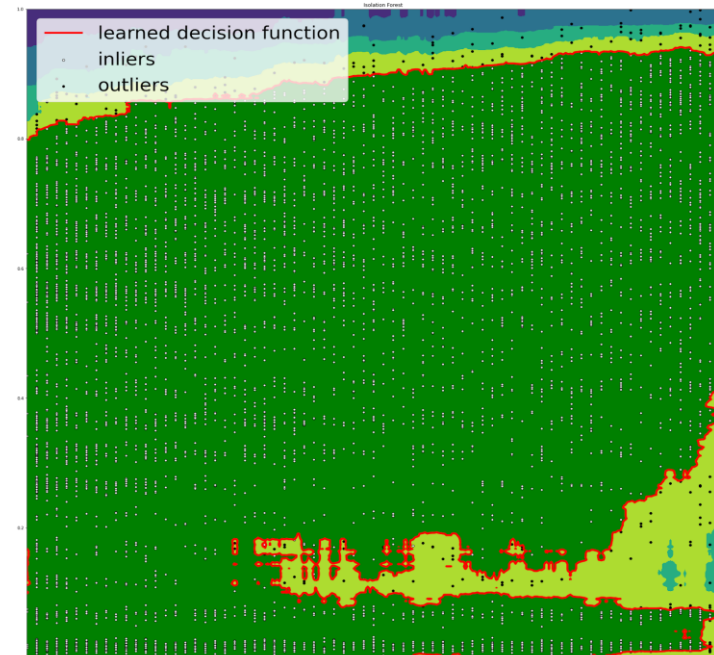


Ambika Chundru

Department of Data Analytics, Penn State University Great Valley

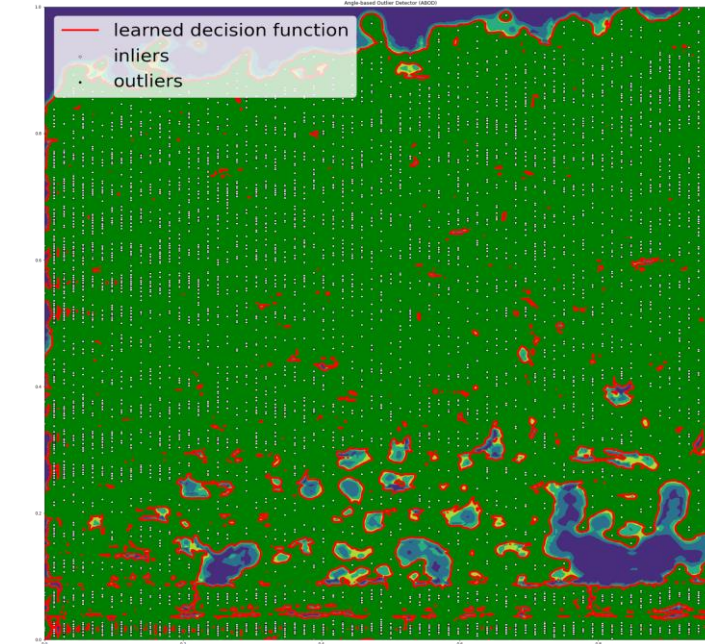
Outlier Detection

Isolation forest



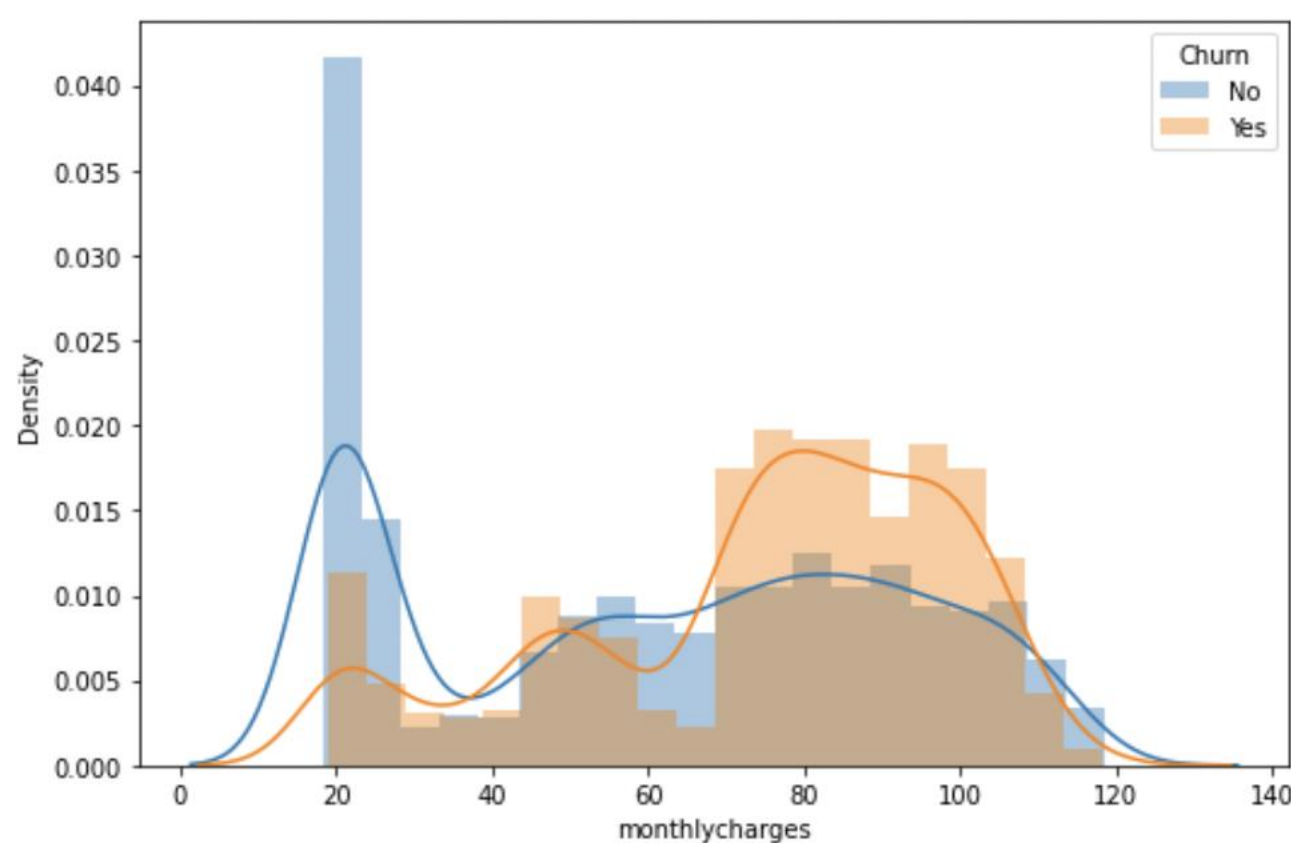
Outliers: 423

ABOD



Outliers: 0

Data Visualizations

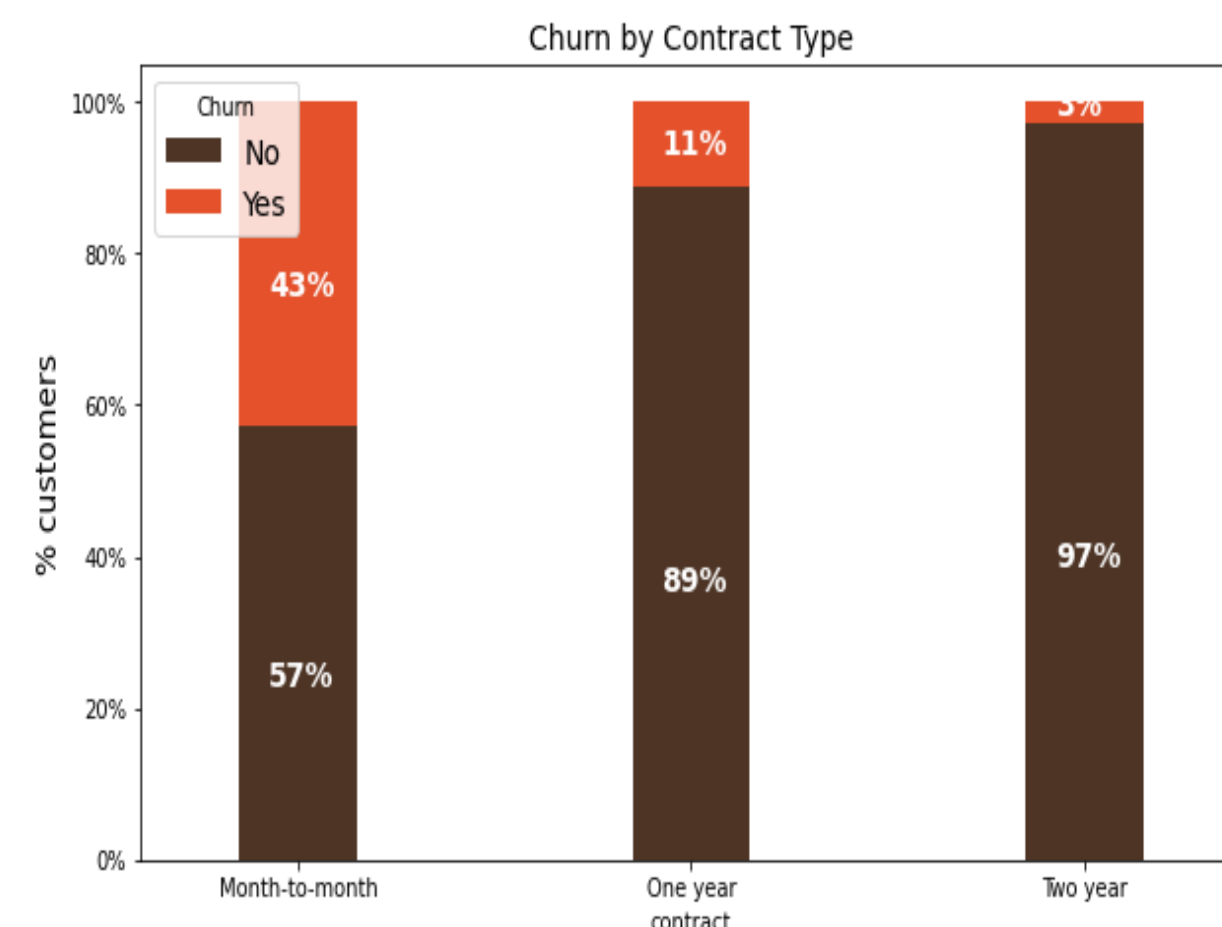


High monthly charges

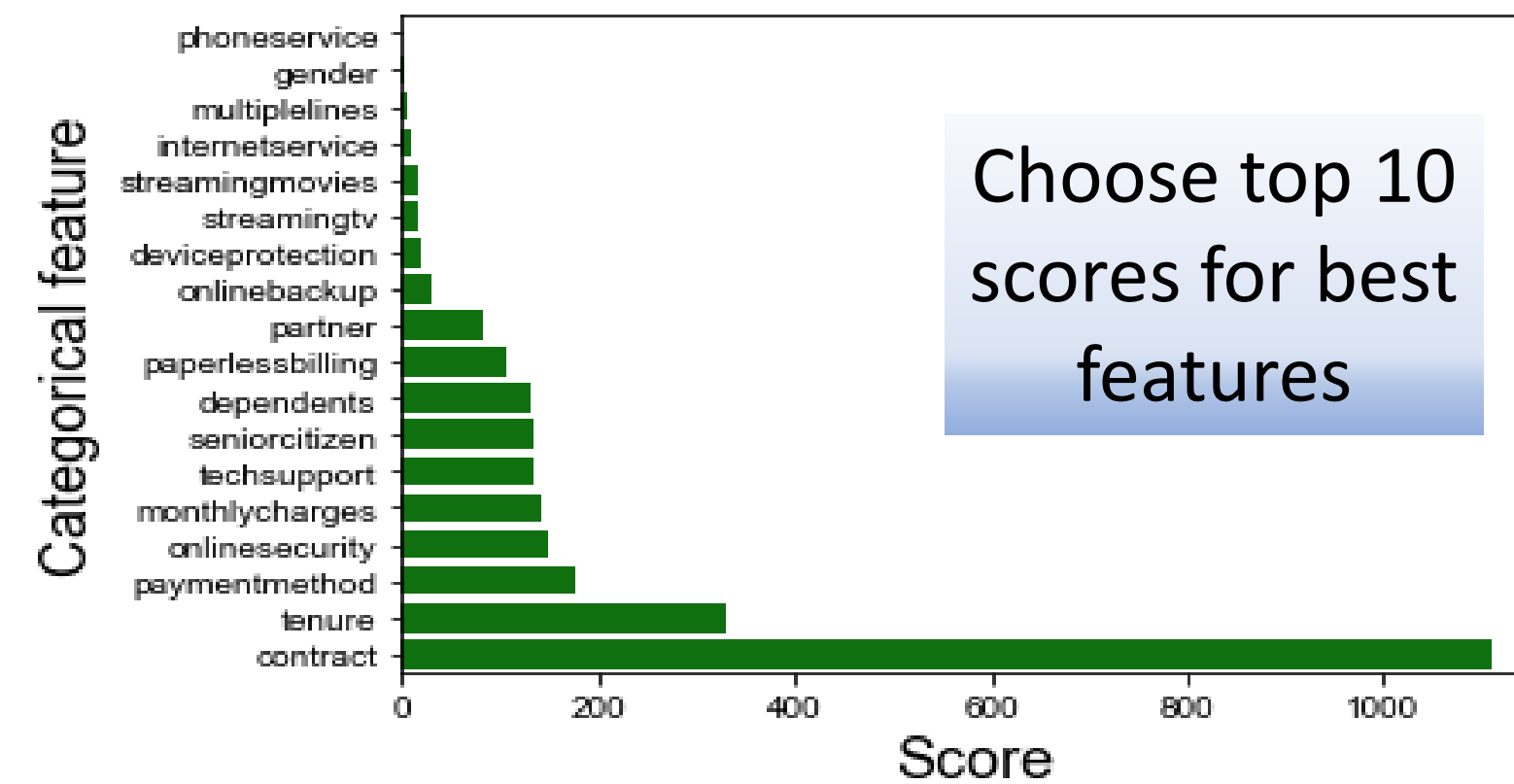
High probability of churning

Month-to-month contract

High probability of churning



Feature Selection (Chi2)

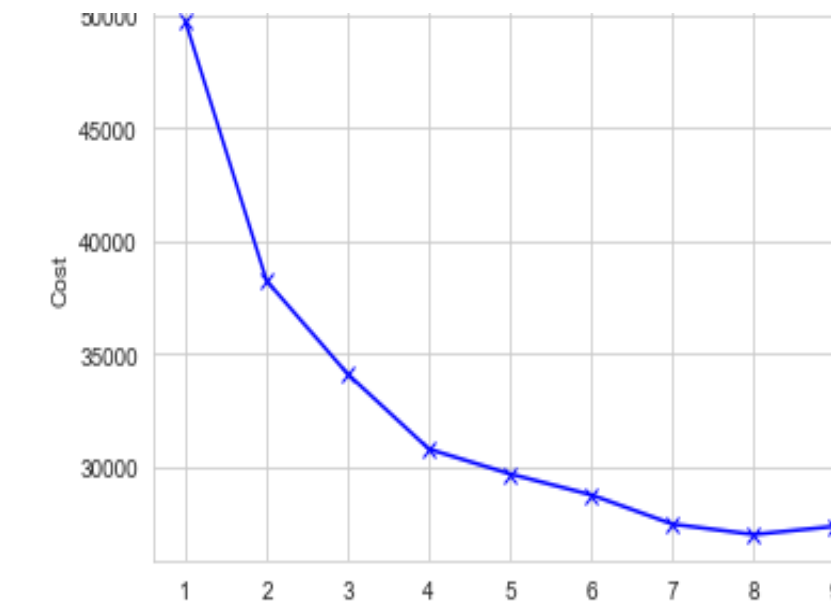


Choose top 10 scores for best features

Association Rule

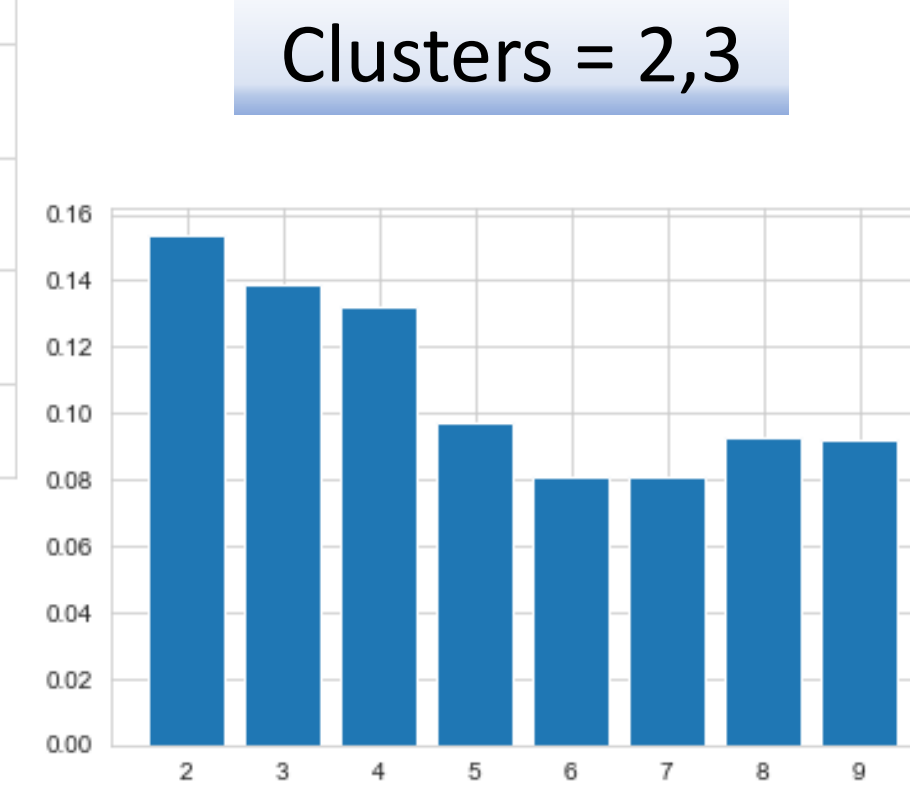
support	itemsets	
0 1.000000	(tenure)	1 0.909042 (phoneservice)
2 1.000000	(monthlycharges)	4 0.909042 (phoneservice, tenure)
3 1.000000	(churn)	7 0.909042 (monthlycharges, phoneservice)
5 1.000000	(monthlycharges, tenure)	8 0.909042 (phoneservice, churn)
6 1.000000	(tenure, churn)	10 0.909042 (monthlycharges, tenure, phoneservice)
9 1.000000	(monthlycharges, churn)	11 0.909042 (phoneservice, tenure, churn)
12 1.000000	(monthlycharges, tenure, churn)	13 0.909042 (monthlycharges, phoneservice, churn)
		14 0.909042 (monthlycharges, tenure, phoneservice, churn)

Optimal Clusters



Elbow Method

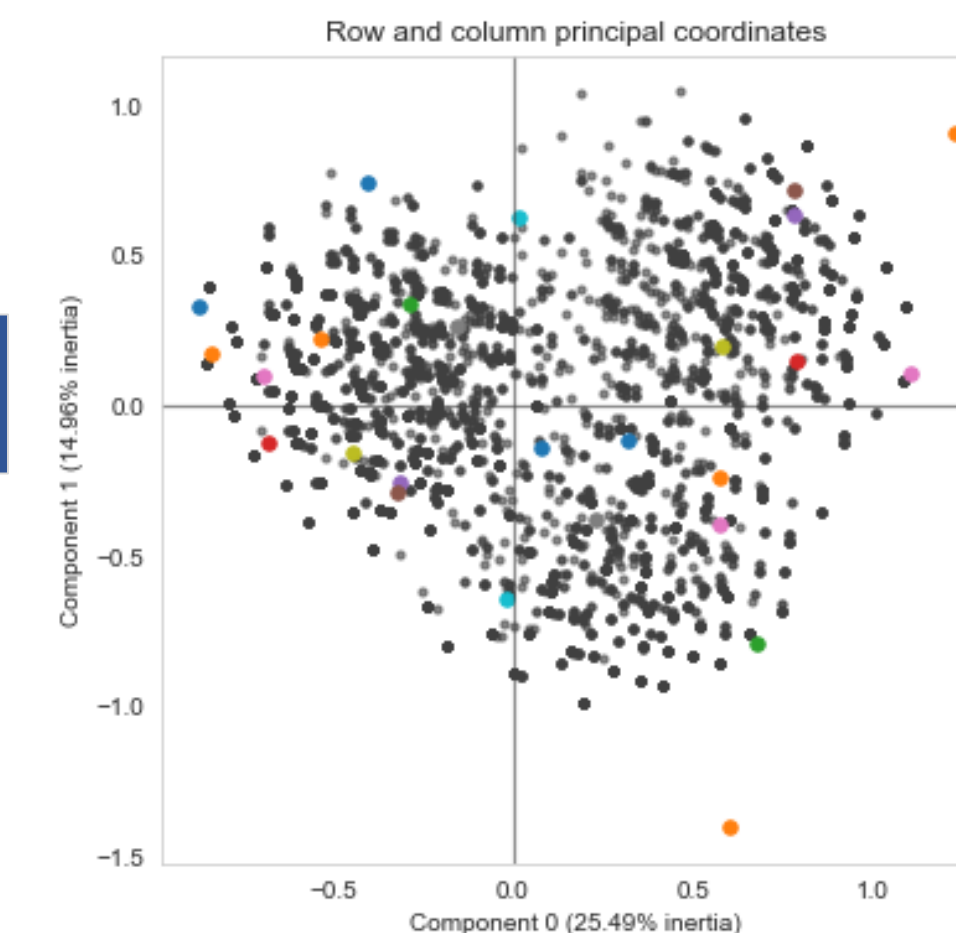
Clusters = 3,4



Clusters = 2,3

Silhouette Method

MCA



Constructing a low-dimensional visual representation of categorical variable associations.

K modes

