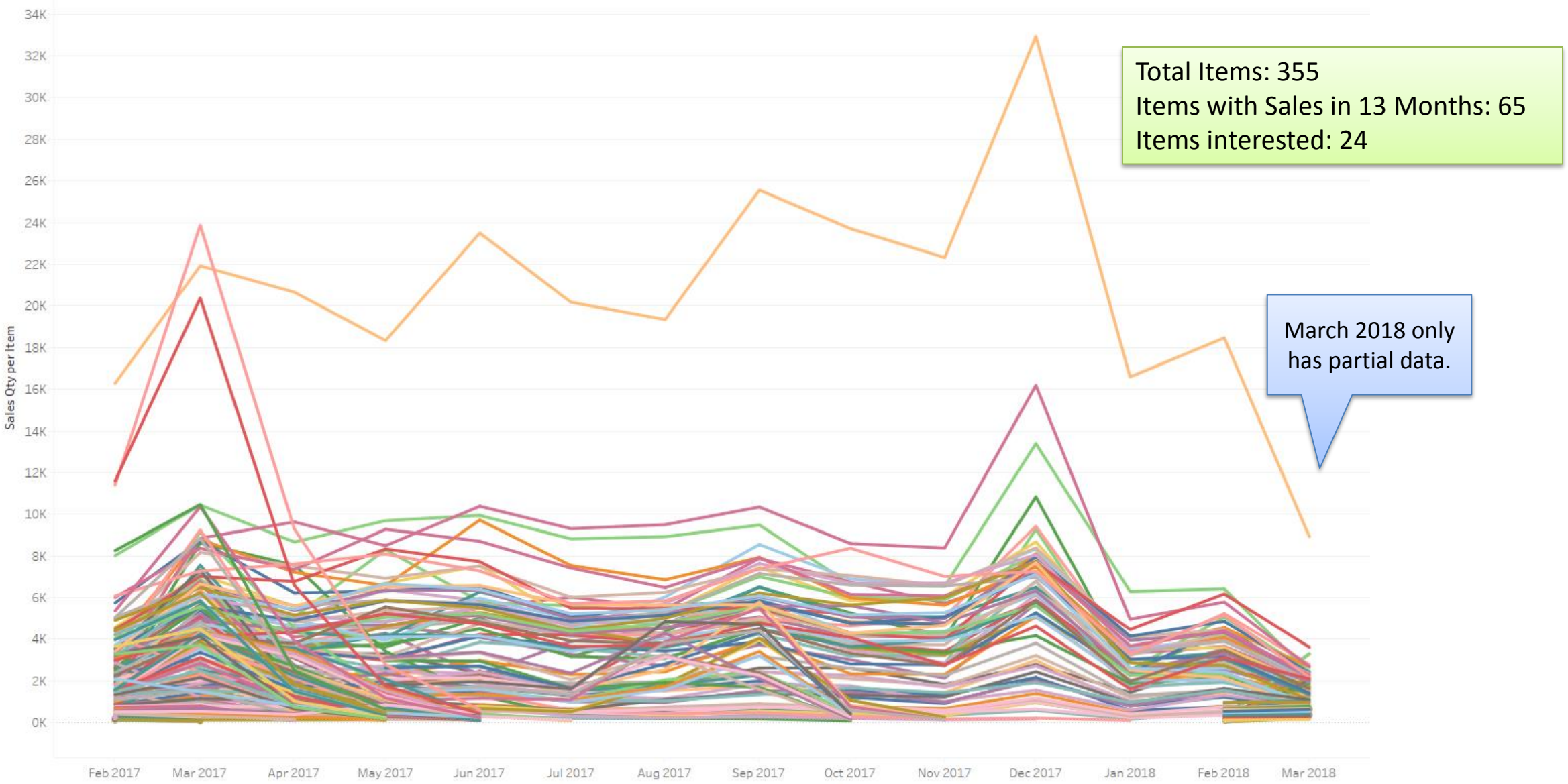
Jewelry Sales Data Analysis

Is it possible to predict the future sales?

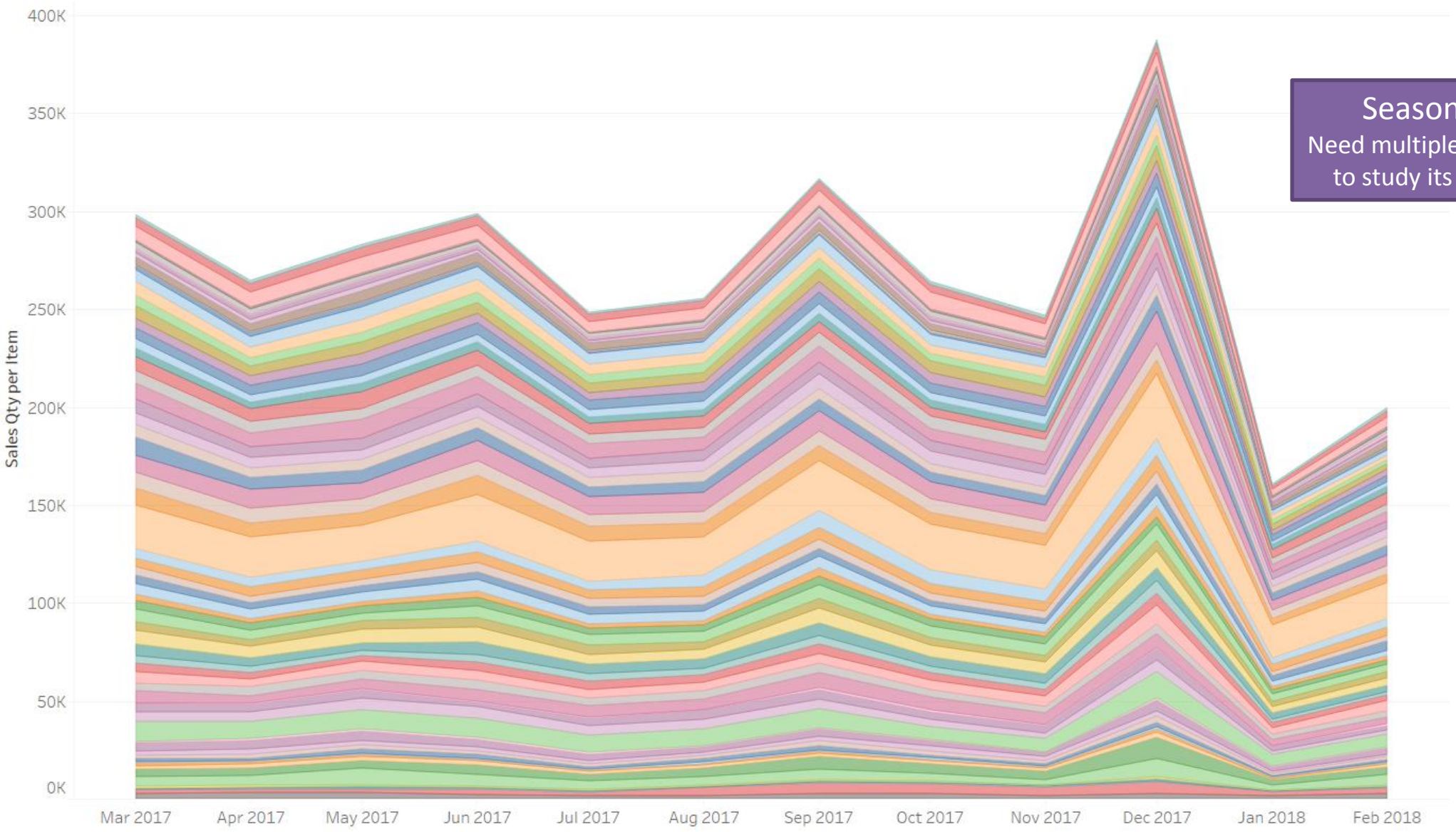
Ding Li 2018.03

online store: costumejewelry1.com

SALES TREADING OF ALL ITEMS – VISUALIZATION IN TABLEAU



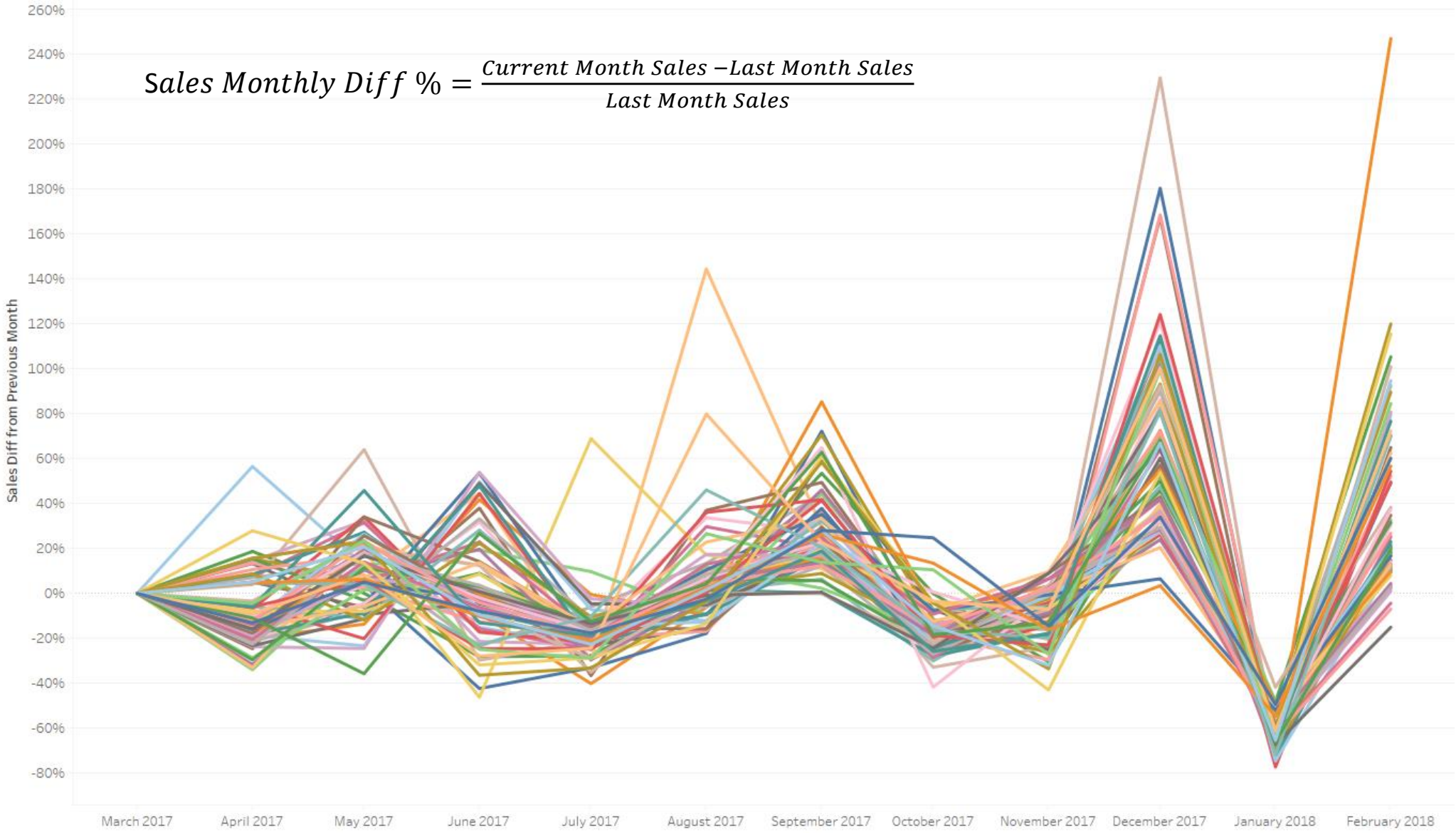
SALES TREADING OF 65 ITEMS WITH SALES BETWEEN MAR 2017 –FEB 2018



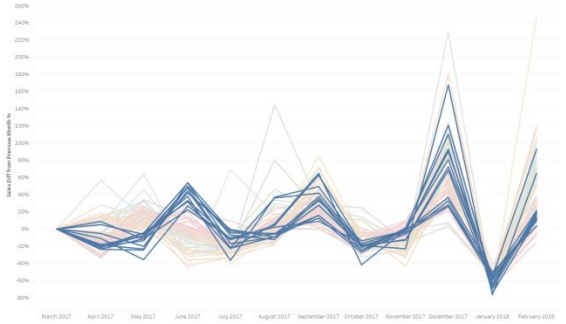
Seasonality?
Need multiple years' data to study its influence.

SALES CHANGE FROM PREVIOUS MONTH – ANY PATTERN?

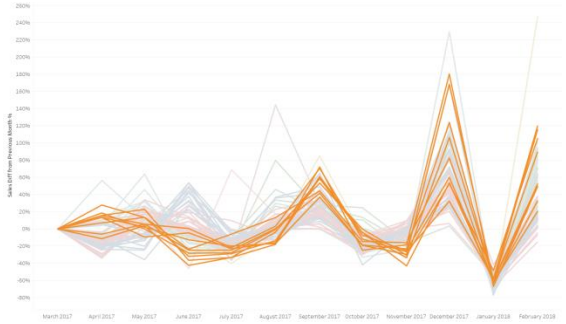
$$Sales\ Monthly\ Diff\ \% = \frac{Current\ Month\ Sales - Last\ Month\ Sales}{Last\ Month\ Sales}$$



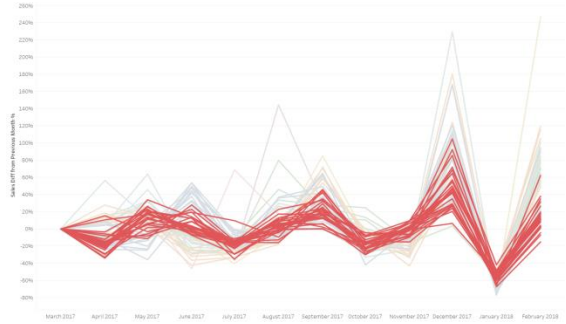
AGGLOMERATIVE CLUSTERING – ITEMS OF SIMILAR TRENDING IDENTIFIED BY PYTHON



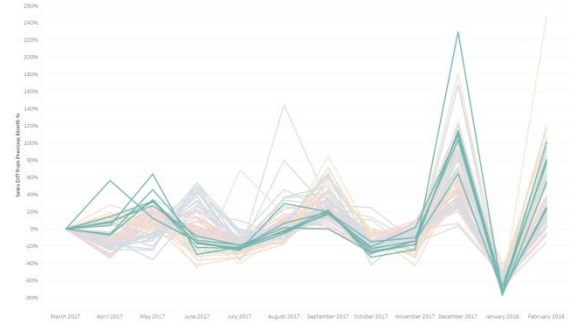
Cluster 0: 12 items



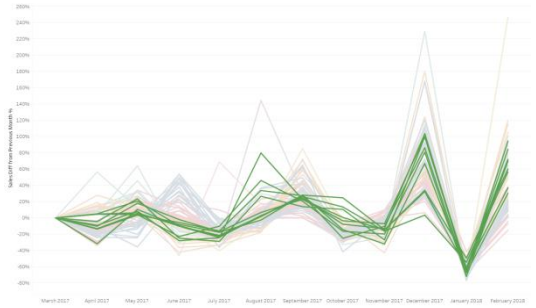
Cluster 1: 9 items



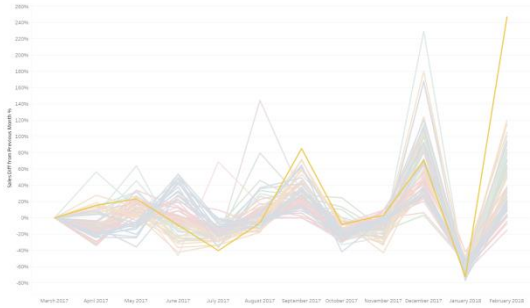
Cluster 2: 25 items



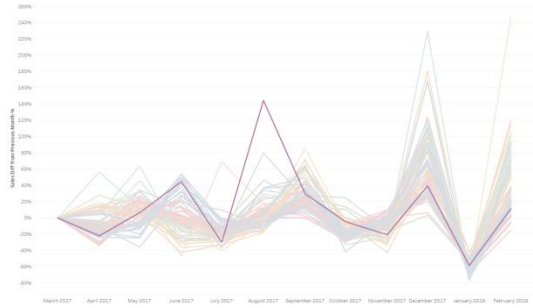
Cluster 3: 7 items



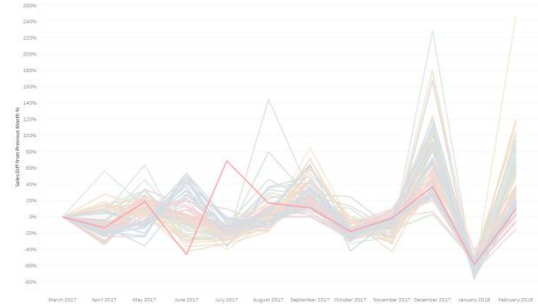
Cluster 4: 9 items



Cluster 5: 1 item



Cluster 6: 1 item

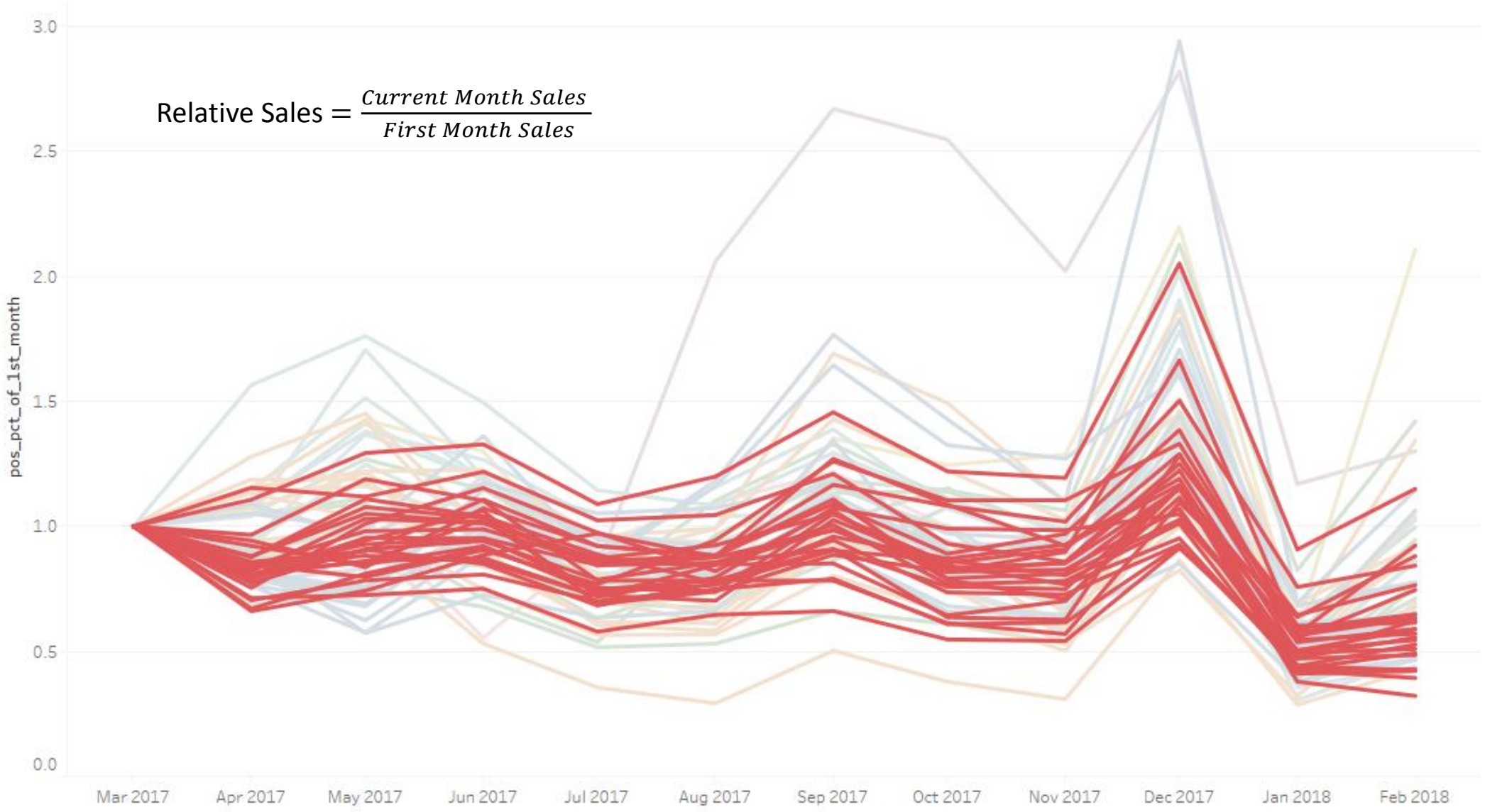


Cluster 7: 1 item

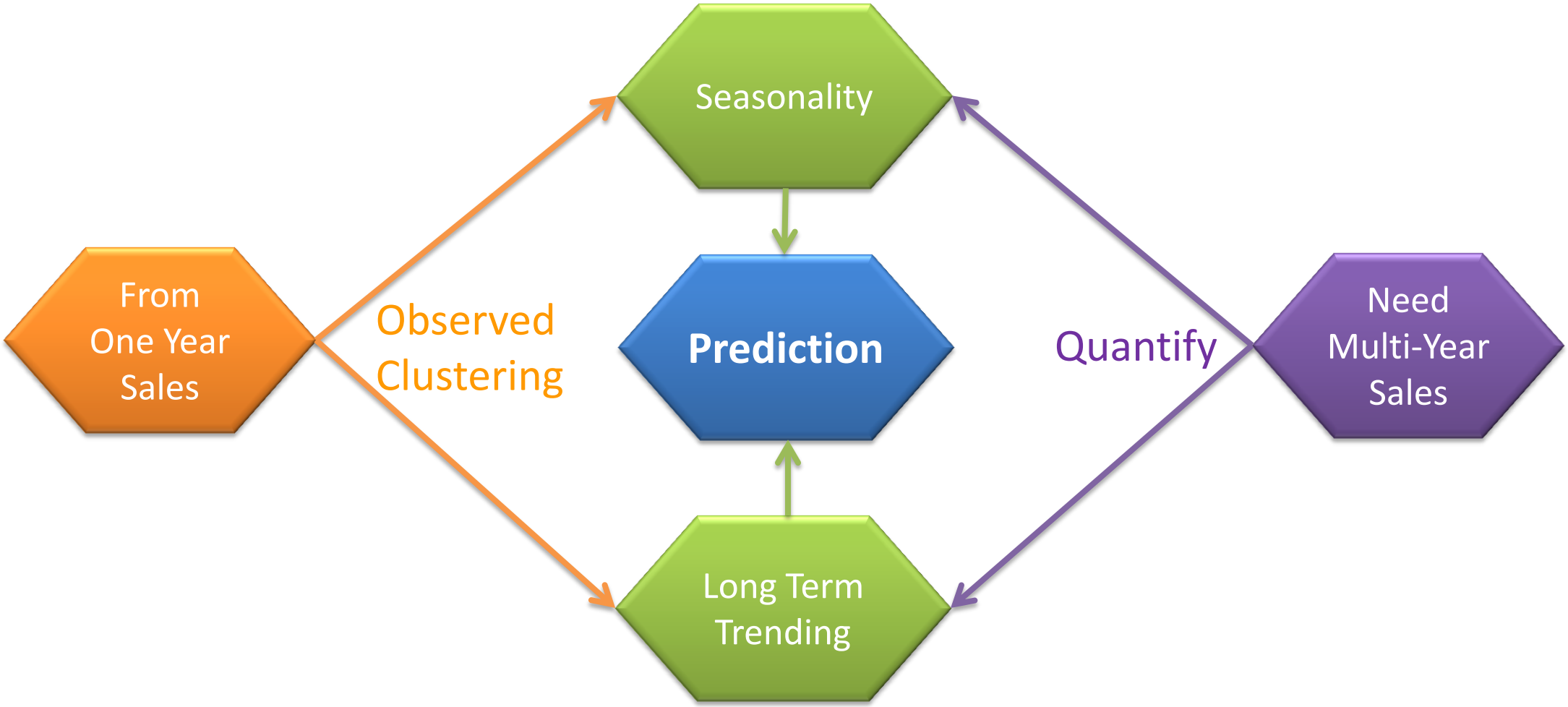
$$sales\ diff\ \% = \frac{Current\ Month\ Sales\ - Last\ Month\ Sales}{Last\ Month\ Sales}$$

SALES RELATIVE TO FIRST MOUTH – APPLYING THE SAME AGGLOMERATIVE CLUSTERING

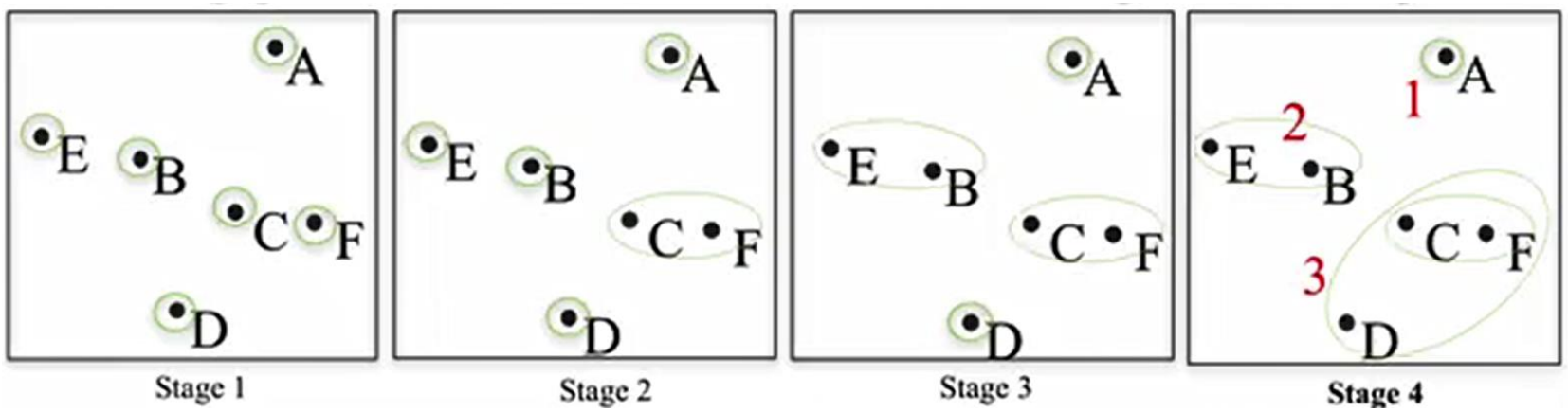
Relative Sales $= \frac{Current\ Month\ Sales}{First\ Month\ Sales}$

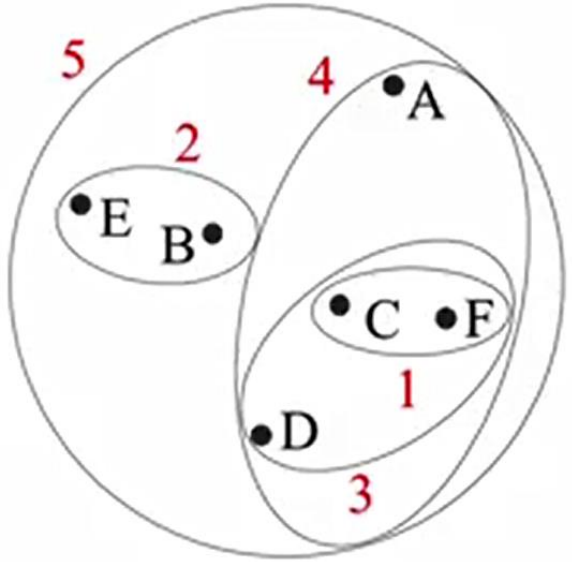


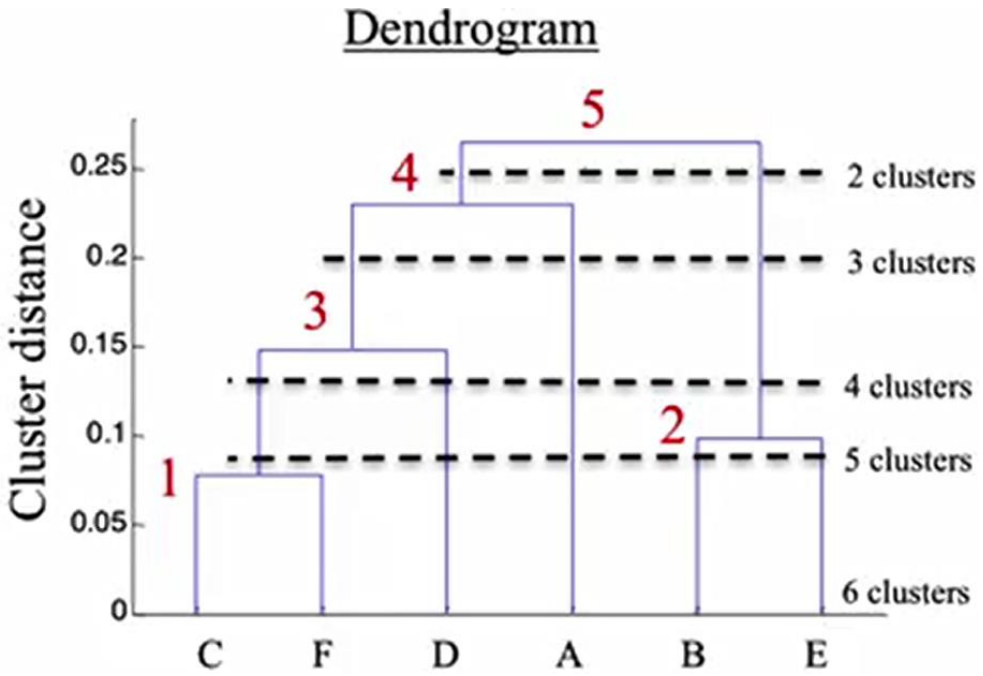
CONCLUSION


From
One Year
Sales
Observed
Clustering
Seasonality
Prediction
Long Term
Trending
Quantify
Need
Multi-Year
Sales

APPENDIX: HIERARCHICAL AGGLOMERATIVE CLUSTERING







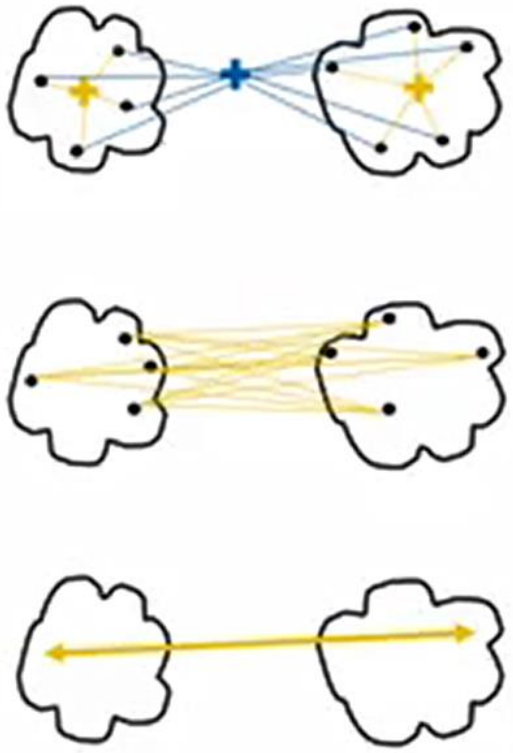
Coding in Python:

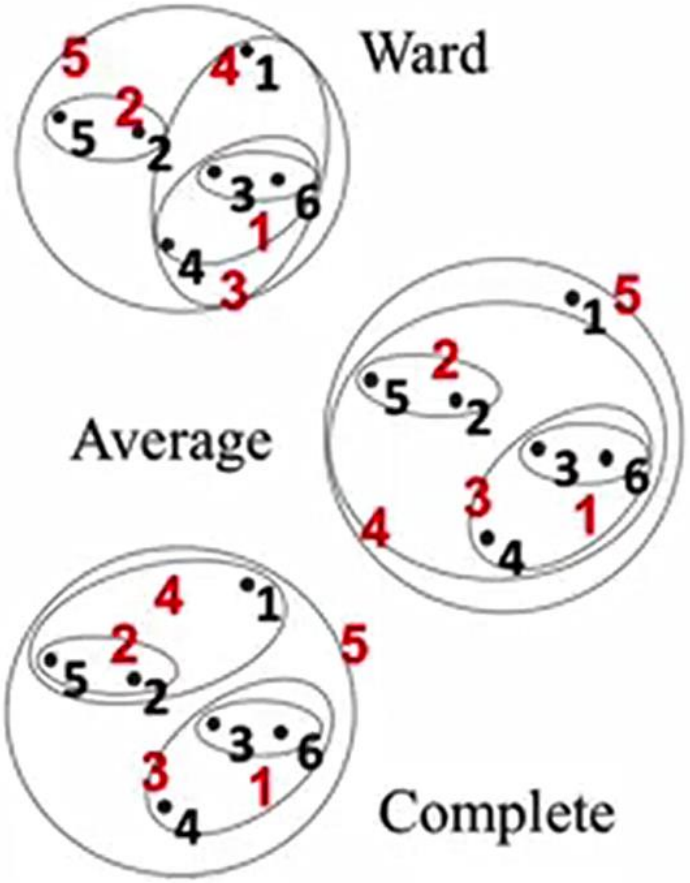
```
from sklearn.cluster import
                    AgglomerativeClustering
from sklearn.preprocessing import MinMaxScaler

#normalize the input
scaler = MinMaxScaler()
X_scaled = scaler.fit_transform(X)

#calculate clustering and get label
agglomerative =
AgglomerativeClustering(n_clusters=8)
                    .fit(X_scaled)
label=agglomerative.labels_.tolist()
```

http://scikit-learn.org/stable/modules/generated/sklearn.cluster.AgglomerativeClustering.html

APPENDIX: LINKAGE CRITERIA FOR AGGLOMERATIVE CLUSTERING

- **Ward's method**
  - *Least increase in total variance (around cluster centroids)*
- **Average linkage**
  - *Average distance between clusters*
- **Complete linkage**
  - *Max distance between clusters*





Kevyn Collins-Thompson, Coursera Class: Applied Machine Learning in Python, https://www.coursera.org/learn/python-machine-learning/lecture/Xs8IM/clustering, downloaded on 12/20/2017

APPENDIX: AGGLOMERATIVE CLUSTERING ITEMS

Cluster	Item	Item Desc	Color
0	ADX6407030	7 ROW CRY STRETCH	CRYSTA
	ADX6800249	GOLD ARROW	GOLD
	ADX6800311	F/B RG CRY FLWR/STAR	CRYST
	ADX6800381	F/B PRL RG FIREBALL	PEARL
	ADX6802090	9-ON ANCHOR/BOW	CRYST
	ADX6802091	6-ON CREAM FLOWER	SLCRPR
	ADX6802094	6PC GL CRY OPEN RING	GLCC
	ADX6802175	6-ON MLT FAUX STONE	MULTI
	ADX6802179	6-ON SLBK SET-F/B	MULTI
	ADX6802186	6PC MIX METAL RINGS	GLSLRG
	ADX6802187	6PC SL/TQ RING SET	TURQ
	ADX6812031	SL CRY NO OTHER LIKE	SLCC
1	ADX6407046	DECO V NECK&EAR SE	CRYSTA
	ADX6407051	"S" NECK & EAR SET	CRYST
	ADX6407688	CRYSTAL STONE STRETC	CRYSTA
	ADX6802213	6-ON SMALL HOOP	GL
	ADX6811004	STR SOC CASTED BRAC	SLCC
	ADX6812008	SOCIAL SWIRL Y NE SE	CRYST
	ADX6812010	SOCIAL 5 LOOP NE SET	SLCC
	ADX6812037	SL CRY 3LAYER SOCIAL	SLCC
	ADX6813002	SL CRYSTAL COMB	SLCC

Cluster	Item	Item Desc	Color
2	ADX6800007	LARGE FIREBALL STUD	SLCC
	ADX6800009	PAVE SQUARE EARS	SLCC
	ADX6800059	GL CRY RND STUD	GLCC
	ADX6800060	GL BLACK CRY RNDSTUD	GLJT
	ADX6800094	GL NAVETTE CRYSTAL	GLCC
	ADX6800095	GL PAVE BEZEL CRY	GLCC
	ADX6800108	GL NAVETTE NEUTRAL	GLNECC
	ADX6800115	GL OPAQ PEACH	GLPE
	ADX6800129	BLACK NAVETTE	BLACK
	ADX6800160	GL CRY CENTER STONE	CRYST
	ADX6800163	GL BLACK FLOWER	GLBK
	ADX6800164	GL BLK CENTER STONE	BLACK
	ADX6800175	SL LINEAR FEATHER	SL
	ADX6800176	GL VITRAL STUD	GLGR
	ADX6800308	F/B BK CRY FRINGE	BLACK
	ADX6800313	DUO WHITE PEARL	PEARL
	ADX6800384	F/B GOLD FRINGE	GLCC
	ADX6802093	6PC SIL CRY RING SET	CRYST
	ADX6802096	3PC GL CRY RING SET	CRYST
	ADX6802176	6-ON GLTQ SET -F/B	TURQ
	ADX6802178	6-ON GOLD SET -F/B	MULTI
	ADX6802188	BK CIRCLE W/TASSLE	BK
	ADX6802206	6-ON PEARL F/B FAN	PEARL
	ADX6802207	6-ON CRYSTUD PRL F/B	MULTI
	ADX6807039	SILVR SNAKE 18" NECK	SL

Cluster	Item	Item Desc	Color
3	ADX6407074	SILVR FIRBALL N/E	CRYSTA
	ADX6802267	SILVER TURQ BRACELET	TURQ
	ADX6811001	GL/CRY BRACE EAR SET	GLCC
	ADX6812012	GOLD PEARL NE SET	PEARL
	ADX6812028	HEM ROSE/CRY STONE	HMPCCC
	ADX6812032	SL YOU ARE SPECIAL	SLCC
	ADX6812049	GL CRY FLOWER V	GLCC
4	ADX6407003	42" PEARL NECK	NONE
	ADX6407004	3PC PEARL BRACELET	NONE
	ADX6407008	PEARL 8MM NECK	PEARL
	ADX6407009	PEARL TWIST NECK	NONE
	ADX6407035	3PC STONE STRETCH	CRYSTA
	ADX6407087	SILVER PEARL NE SET	CRYSTA
	ADX6800089	GOLD TXT DISK KITE	GL
	ADX6812013	JET PEARL NE SET	SLJT
	ADX6812014	SNGLE PEARL DROP SET	SLCR
5	ADX6812050	BKGL CROSS CHOKER	GLBK
6	ADX6812052	PEARL WEB CHOKER SET	PEARL
7	ADX6802231	4PC GL/PRL RING SET	MULTI