



conrad

School of Entrepreneurship and Business

Agenda

01

Recap

02

Hands-on
Analysis

03

Cluster
Analysis

Factor Analysis (Principal Component Analysis)

Factor Analysis Model

The common factors themselves can be expressed as linear combinations of the observed variables.

$$F_i = W_{i1}X_1 + W_{i2}X_2 + W_{i3}X_3 + \dots + W_{ik}X_k$$

Where:

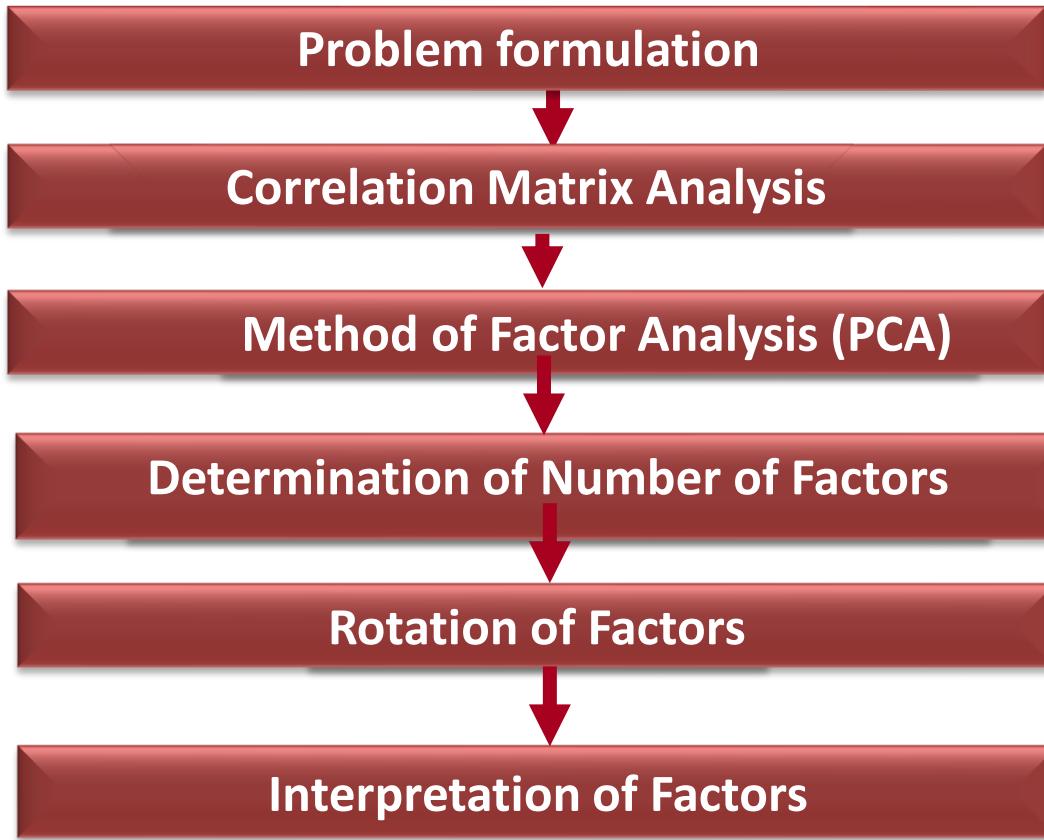
F_i = estimate of i th factor

W_i = weight or factor score coefficient

k = number of variables

- The first set of weights (factor score coefficients) are chosen so that the first factor explains the largest portion of the total variance.
- Then a second set of weights can be selected, so that the second factor explains most of the residual variance, subject to being uncorrelated with the first factor.
- This same principle applies for selecting additional weights for the additional factors.

Conducting Factor Analysis



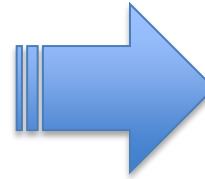
Hands-on Analysis

- All questions below refer to the brand tracking questionnaire and data made available on LEARN
 1. What is impact of Brand Commitment, Likelihood to Purchase and Brand Salience on being a promoter for TJ Maxx?
 2. What is the probability of someone being a promoter for TJ Maxx who is likely to make a purchase within the next 1 month, thinks that TJ Maxx as a brand is on its way up and considers TJ Maxx their favourite store?
 3. Is there a simpler set of factors that explains the data captured by brand imagery perception statements for Nordstrom ?
 4. Should Nordstrom be focusing on the brand imagery factors above or Brand Commitment and Likelihood to Purchase in order to increase the Likelihood of Recommendation?

Hands-on Analysis

1. What is impact of Brand Commitment, Likelihood to Purchase and Brand Salience on being a promoter for TJ Maxx?

Brand Commitment							
<p>Q11 Imagine you had to shop at a retail store, which of these statements best describes how much you would consider shopping at each of these stores? (Please select one answer for each brand)</p> <p>1 PROGRAMMER: ALLOW ONLY ONE ANSWER PER BRAND. ACCEPT ONLY ONE ANSWER IN FIRST ROW "ONLY STORE WOULD CONSIDER"</p>							
	Brand X	JC PenneyTarget	Kohl's	Nordstrom	Amazon	TJ Maxx	
Favorite store; only one I consider	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Store I pr	Likelihood to Purchase						
Store I con	<p>Q12 For the following retailers, when do you anticipate your next purchase at that store might be?</p> <p>PROGRAMMER: ALLOW ONLY ONE ANSWER PER BRAND.</p>						
Store I m		Brand X	JC PenneyTarget	Kohl's	Nordstrom	Amazon	TJ Maxx
Nc	Within the next month	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
St	Within next 1-3 months	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	With next 3-6 months						
	Within next 6-9 months	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Within 9 months – 1 year	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Longer than 1 year	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	I'm not sure when I will shop there again						
Brand Salience							
<p>Q9 When you think about retail stores, some seem to be on their way up and have a lot going for them, while others don't. Which of these statements best describes how you feel about each of these stores? (Please select one answer for each brand)</p> <p>PROGRAMMER: ALLOW ONLY ONE ANSWER PER BRAND.</p>							
	Brand X	JC PenneyTarget	Kohl's	Nordstrom	Amazon	TJ Maxx	
On its way up	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Holding its ground	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
On its way down	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	



Recode to Missing

Likelihood Recommend						
<p>Q13 How likely are you to recommend the following retailer to friends and family members, on a scale from 0-10, where 0=Not at all likely to recommend, and 10= Will definitely recommend.</p> <p>PROGRAMMER: ALLOW ONLY ONE ANSWER PER BRAND. SHOW EACH RETAILER ON SEPARATE SCREENS.</p>						
	Brand X	JC PenneyTarget	Kohl's	Nordstrom	Amazon	TJ Maxx
0	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

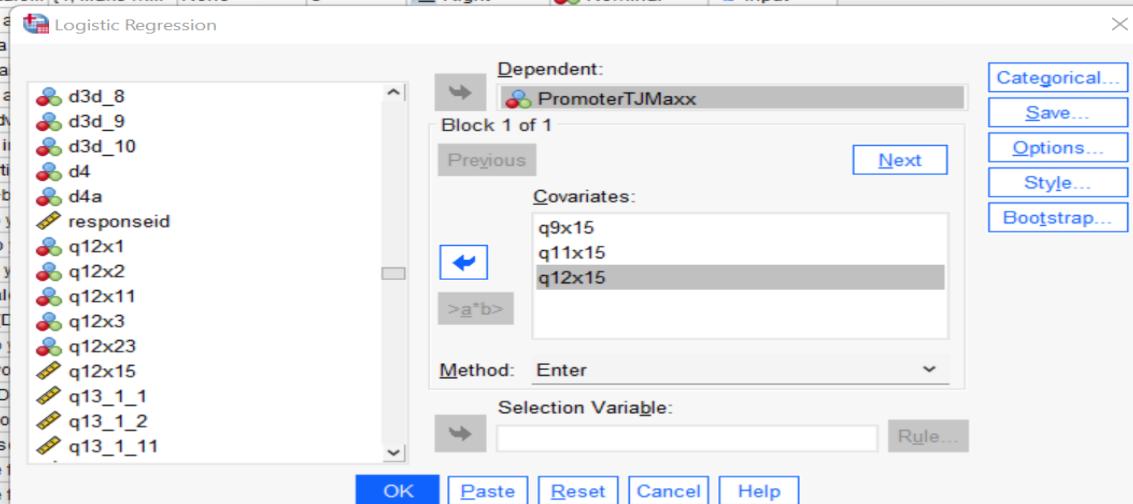
Recode to Promoter/Non-promoter

SPSS® Analyze | Regression | Binary Logistic

*357614 SPSS.sav [DataSet1] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
667	q22a_5	Numeric	1	0	Moved into a N...	{1, Purchas...	None	8	Right	Nominal	Input
668	q22a_6	Numeric	1	0	Started a new j...	{1, Purchas...	None	8	Right	Nominal	Input
669	q22a_7	Numeric	1	0	Made a commit...	{1, Purchas...	None	8	Right	Nominal	Input
670	q22a_8	Numeric	1	0	Planned/took a...	{1, Purchas...	None	8	Right	Nominal	Input
671	q23	Numeric	1	0	Which of the fol...	{1, Macy's i...	None	8	Right	Nominal	Input
672	q24_1	Numeric	1	0	TV commercial...	{1, Make m...	None	8	Right	Nominal	Input
673	q24_2	Numeric	1	0	Sales Catalog...	{1, Make m...	None	8	Right	Nominal	Input
674	q24_3	Numeric	1	0	Fashion Catalo...	{1, Make m...	None	8	Right	Nominal	Input
675	q24_4	Numeric	1	0	Newspaper a...						
676	q24_5	Numeric	1	0	Social Media						
677	q24_6	Numeric	1	0	Brand X emai...						
678	q24_7	Numeric	1	0	Brand X text a...						
679	q24_8	Numeric	1	0	Magazine adv...						
680	q24_9	Numeric	1	0	Events held in...						
681	q24_10	Numeric	1	0	Radio Adverti...						
682	d3	Numeric	1	0	How many ^b...						
683	d3d_1	Numeric	1	0	Brand X (Do y...						
684	d3d_2	Numeric	1	0	Dillard's (Do...						
685	d3d_3	Numeric	1	0	TJ Maxx (Do y...						
686	d3d_4	Numeric	1	0	Bloomingdale...						
687	d3d_5	Numeric	1	0	Nordstrom (D...						
688	d3d_6	Numeric	1	0	Amazon (Do y...						
689	d3d_7	Numeric	1	0	Target (Do yo...						
690	d3d_8	Numeric	1	0	JCPenney (D...						
691	d3d_9	Numeric	1	0	Kohl's (Do yo...						
692	d3d_10	Numeric	1	0	None of these						
693	d4	Numeric	1	0	Which of the t...						
694	d4a	Numeric	1	0	Which of the t...						
695	responseid	Numeric	8	0	responseid						
696	q12x1	Numeric	1	0	Brand X	None	8	Right	Scale	Input	
697	q12x2	Numeric	1	0	JC Penney	{1, Within th...	None	8	Right	Nominal	Input
698	q12x11	Numeric	1	0	Kohl's	{1, Within th...	None	8	Right	Nominal	Input
699	q12x3	Numeric	1	0	Nordstrom	{1, Within th...	None	8	Right	Nominal	Input
700	q12x23	Numeric	1	0	Amazon	{1, Within th...	None	8	Right	Nominal	Input
701	q12x15	Numeric	1	0	TJ Maxx	{1, Within th...	None	8	Right	Scale	Input
702	q13_1_1	Numeric	2	0	Q13_1 (How lik...	{0, Not at all...	None	8	Right	Scale	Input
703	q13_1_2	Numeric	2	0	Q13_1 (How lik...	{0, Not at all...	None	8	Right	Scale	Input
704	q13_1_11	Numeric	2	0	Q13_1 (How lik...	{0, Not at all...	None	8	Right	Scale	Input



Data View Variable View

SPSS output – Block 1

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	510.490	3	<.001
	Block	510.490	3	<.001
	Model	510.490	3	<.001

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1202.569 ^a	.322	.442

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Classification Table^a

Observed	Predicted			Percentage Correct
	Promoter	TJMaxx	Non Promoter	
Step 1	Promoter	718	130	84.7
	TJMaxx	135	333	71.2
	Overall Percentage			79.9

a. The cut value is .500

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	TJ Maxx Salience	-.735	.136	29.043	1	<.001
	TJ Maxx Commitment	-1.191	.105	128.826	1	<.001
	TJ Maxx LTP	-.375	.070	28.937	1	<.001
	Constant	4.770	.322	219.092	1	<.001

a. Variable(s) entered on step 1: TJ Maxx Salience, TJ Maxx Commitment, TJ Maxx LTP.

Hands-on Analysis

2. What is the probability of someone being a promoter for TJ Maxx who is likely to make a purchase within the next 1 month, thinks that TJ Maxx as a brand is on its way up and considers TJ Maxx their favourite store?

$$\ln\left(\frac{P(Y)}{1-P(Y)}\right) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \cdots + \beta_KX_K$$

⇓

$$P(Y) = \frac{\exp(\beta_0 + \beta_1X_1 + \beta_2X_2 + \cdots + \beta_KX_K)}{1 + \exp(\beta_0 + \beta_1X_1 + \beta_2X_2 + \cdots + \beta_KX_K)}$$

Variables in the Equation						
	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	TJ Maxx Salience	-.735	.136	29.043	1	<.001
	TJ Maxx Commitment	-1.191	.105	128.826	1	<.001
	TJ Maxx LTP	-.375	.070	28.937	1	<.001
	Constant	4.770	.322	219.092	1	<.001

a. Variable(s) entered on step 1: TJ Maxx Salience, TJ Maxx Commitment, TJ Maxx LTP.



$$P(\text{Promoter TJ Maxx}) = \frac{\exp(4.770 - 0.735 * \text{Salience} - 1.191 * \text{Commitment} - 0.375 * \text{LTP})}{1 + \exp(4.770 - 0.735 * \text{Salience} - 1.191 * \text{Commitment} - 0.375 * \text{LTP})}$$

$$P(\text{Promoter TJ Maxx}) = \frac{\exp(4.770 * 1 - 0.735 * 1 - 1.191 * 1 - 0.375 * 1)}{1 + \exp(4.770 - 0.735 * 1 - 1.191 * 1 - 0.375 * 1)}$$

$$P(\text{Promoter TJ Maxx}) = \frac{\exp(2.469)}{1 + \exp(2.469)}$$

$$P(\text{Promoter TJ Maxx}) = \frac{11.811}{12.811}$$

~ 0.92

Hands-on Analysis

3. Is there a simpler set of factors that explains the data captured by brand imagery perception statements for Nordstrom?

Code is _3

Brand Imagery – Competitive Brand #1						
Q15	Below is a list of different statements that people have made about retail stores. Please read each statement and rate (PIPE BRAND) on a scale of 1 to 5, where 5 means "Describes Extremely Well," and 1 means "Does Not Describe At All."					
	not at all 1	not very well 2	somewh at 3	very well 4	Extremely Well 5	
Value Attributes						
Good value for the money						
Great sales						
Good shopper rewards program						
Product Attributes						
Top quality merchandise						
Has the latest styles & fashions						
Carries the brands I want						
Has brands/products I want, but can't find anywhere else						
Good place to shop for gifts						
Best selection of brands and designers						
A store I trust for important occasions						
Store Experience Attributes						
Is a store for people like me						
Easy to find what I'm looking for						
Store I am proud to shop at						
Fun and exciting shopping experience						

Add this to missing data

Service Attributes						
Has warm and friendly salespeople						
Has available salespeople						
Makes it easy to return items						
Brand Attributes						
I often discover new things to buy						
Helps express my personal style						
Inspires me to try new things						
Has merchandise worth paying more for						
Omnichannel						
Offers a consistent experience online and in store						
Offers convenient ways to shop in stores and online						
Innovative in making shopping easier						

SPSS® Analyze | Dimension Reduction | Factor

*357614 SPSS.sav [DataSet1] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1123	oq14a_15	String	1	0	What brands or typ...	None	None	50	Left	Nominal	Input
1124	oq14b_15	String	1	0	You said that you th...	None	None	50	Left	Nominal	Input
1125	oq14c_15	String	1	0	Why do you not con...	None	None	50	Left	Nominal	Input
1126	oq14d_15	String	1	0	Specifically, which i...	None	None	50	Left	Nominal	Input
1127	q15_1_1	Numeric	1	0	Good value for the ...	{1, Not At All...}	None	8	Right	Nominal	Input
1128	q15_2_1	Numeric	1	0	Great sales (Below ...	{1, Not At All...}	None	8	Right	Nominal	Input
1129	q15_3_1	Numeric	1	0	Good shopper rew...	{1, Not At All...}	None	8	Right	Nominal	Input
1130	q15_4_1	Numeric	1	0	Top quality merch...	{1, Not At All...}	None	8	Right	Nominal	Input
1131	q15_5_1	Numeric	1	0	Has the latest style...	{1, Not At All...}	None	8	Right	Nominal	Input
1132	q15_6_1	Numeric	1	0	Carries the brands ...	{1, Not At All...}	None	8	Right	Nominal	Input
1133	q15_24_1	Numeric	1	0	Has brands/produc...						
1134	q15_7_1	Numeric	1	0	Good place to shop...						
1135	q15_8_1	Numeric	1	0	Best selection						
1136	q15_9_1	Numeric	1	0	A store I trust fo...						
1137	q15_10_1	Numeric	1	0	Is a store for peop...						
1138	q15_11_1	Numeric	1	0	Easy to find wh...						
1139	q15_12_1	Numeric	1	0	Store I am proud ...						
1140	q15_13_1	Numeric	1	0	Fun and excitin...						
1141	q15_14_1	Numeric	1	0	Has warm and coo...						
1142	q15_15_1	Numeric	1	0	Has available sel...						
1143	q15_16_1	Numeric	1	0	Makes it easy to ...						
1144	q15_17_1	Numeric	1	0	I often discover ...						
1145	q15_18_1	Numeric	1	0	Helps express my ...						
1146	q15_19_1	Numeric	1	0	Inspires me to ...						
1147	q15_20_1	Numeric	1	0	Has merchant ...						
1148	q15_21_1	Numeric	1	0	Offers a consis...						
1149	q15_22_1	Numeric	1	0	Offers convenient w...	{1, Not At All...}	None	8	Right	Nominal	Input
1150	q15_23_1	Numeric	1	0	Innovative in makin...	{1, Not At All...}	None	8	Right	Nominal	Input
1151	oq15a_1	String	1	0	What brands or typ...	None	None	50	Left	Nominal	Input
1152	oq15b_1	String	1	0	You said that you th...	None	None	50	Left	Nominal	Input
1153	q15_1_2	Numeric	1	0	Good value for the ...	{1, Not At All...}	None	8	Right	Nominal	Input
1154	q15_2_2	Numeric	1	0	Great sales (Below ...	{1, Not At All...}	None	8	Right	Nominal	Input
1155	q15_3_2	Numeric	1	0	Good shopper rew...	{1, Not At All...}	None	8	Right	Nominal	Input
1156	q15_4_2	Numeric	1	0	Top quality merch...	{1, Not At All...}	None	8	Right	Nominal	Input
1157	q15_5_2	Numeric	1	0	Has the latest style...	{1, Not At All...}	None	8	Right	Nominal	Input
1158	q15_6_2	Numeric	1	0	Carries the brands ...	{1, Not At All...}	None	8	Right	Nominal	Input
1159	q15_24_2	Numeric	1	0	Has brands/produc...	{1, Not At All...}	None	8	Right	Nominal	Input
1160	q15_7_2	Numeric	1	0	Good place to shop...	{1, Not At All...}	None	8	Right	Nominal	Input

Factor Analysis

Variables:

- q15_1_3
- q15_2_3
- q15_3_3
- q15_4_3
- q15_5_3
- q15_6_3
- q15_24_3

Selection Variable:

Value...

OK Paste Reset Cancel Help

SPSS Output

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			.972
Bartlett's Test of Sphericity	Approx. Chi-Square	12211.217	
	df	276	
	Sig.	.000	



Everything points to 2 factors – but worth exploring 3 factors as well

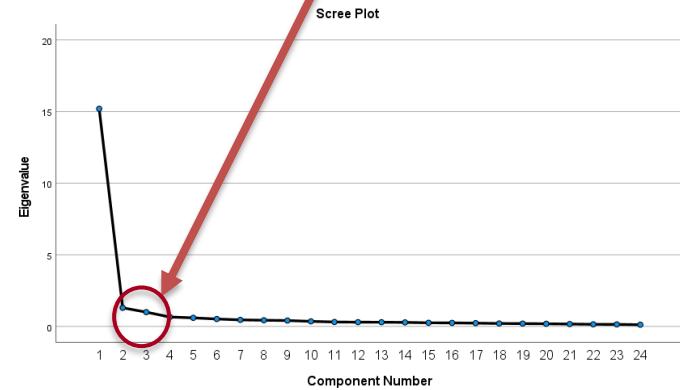
Eigenvalues > 1

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.194	63.309	63.309	15.194	63.309	63.309	8.524	35.518	35.518
2	1.299	5.412	68.721	1.299	5.412	68.721	7.969	33.202	68.721
3	.998	4.160	72.881						
4	.658	2.743	75.624						
5	.599	2.496	78.120						
6	.518	2.158	80.277						
7	.457	1.905	82.182						
8	.431	1.795	83.977						
9	.411	1.713	85.690						
10	.354	1.475	87.165						
11	.310	1.293	88.458						
12	.297	1.237	89.695						
13	.295	1.228	90.923						
14	.282	1.176	92.100						
15	.254	1.058	93.158						
16	.247	1.030	94.188						
17	.230	.957	95.145						
18	.206	.859	96.003						
19	.197	.822	96.825						
20	.186	.773	97.599						
21	.167	.696	98.295						
22	.148	.616	98.911						
23	.143	.594	99.505						
24	.119	.495	100.000						

Extraction Method: Principal Component Analysis.

Percentage of Variance Explained

Based on Scree Plot



SPSS Output

Rotated Component Matrix^a

	Component	
	1	2
Top quality merchandise	.848	
Has the latest styles & fashions	.831	
A store I trust for important occasions	.774	
Best selection of brands and designers	.769	
Carries the brands I want	.705	
Store I am proud to shop at	.691	.506
Makes it easy to return items	.643	
Offers convenient ways to shop in stores and online	.627	.527
Has brands/products I want, but can't find anywhere else	.608	
Offers a consistent experience online and in store	.606	.523
Has merchandise worth paying more for	.577	.552
Great sales		.843
Good shopper rewards program		.813
Good value for the money		.800
Innovative in making shopping easier	.505	.681
Inspires me to try new things	.530	.672
Is a store for people like me	.526	.665
Fun and exciting shopping experience	.544	.659
I often discover new things to buy	.539	.652
Helps express my personal style	.583	.640
Easy to find what I'm looking for	.571	.576
Good place to shop for gifts	.548	.559
Has warm and friendly salespeople	.530	.542
Has available salespeople	.531	.542

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

The screenshot shows the IBM SPSS Statistics Data Editor window. A 'Factor Analysis' dialog box is open over the data view. The 'Extraction' tab is selected. In the 'Variables' list, several variables are listed: q15_16_11, q15_17_11, q15_18_11, q15_19_11, q15_20_11, q15_21_11, q15_22_11, q15_23_11, oq15a_11, oq15b_11, q15_1_3, q15_2_3, q15_3_3, q15_4_3, q15_5_3, q15_6_3, q15_24_3, s1, os2, dregion, and dregion1. The 'Method' dropdown is set to 'Principal components'. Other tabs in the dialog include Descriptives, Rotation, Scores, and Options. The main data grid below shows the correlation matrix between these variables. The status bar at the bottom indicates 'IBM SPSS Statistics Processor is ready' and the date/time '11/25/2020 8:21 PM'.

That's a lot of overlap 14/24 ~ 59%

SPSS Output

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.194	63.309	63.309	15.194	63.309	63.309	6.884	28.684	28.684
2	1.299	5.412	68.721	1.299	5.412	68.721	6.453	26.889	55.573
3	.998	4.160	72.881	.998	4.160	72.881	4.154	17.307	72.881
4	.658	2.743	75.624						
5	.599	2.496	78.120						
6	.518	2.158	80.277						
7	.457	1.905	82.182						
8	.431	1.795	83.977						
9	.411	1.713	85.690						
10	.354	1.475	87.165						
11	.310	1.293	88.458						
12	.297	1.237	89.695						
13	.295	1.228	90.923						
14	.282	1.176	92.100						
15	.254	1.058	93.158						
16	.247	1.030	94.188						
17	.230	.957	95.145						
18	.206	.859	96.003						
19	.197	.822	96.825						
20	.186	.773	97.599						
21	.167	.696	98.295						
22	.148	.616	98.911						
23	.143	.594	99.505						
24	.119	.495	100.000						

Extraction Method: Principal Component

Reduced the overlap 8/24 ~ 33%

Rotated Component Matrix^a

	Component		
	1	2	3
Has the latest styles & fashions	.784		
Top quality merchandise	.771		
Best selection of brands and designers	.746		
A store I trust for important occasions	.734		
Carries the brands I want	.702		
Store I am proud to shop at	.628		
Has brands/products I want, but can't find anywhere else	.576		
Good place to shop for gifts	.534	.531	
Has merchandise worth paying more for	.533	.503	
Great sales	.794		
Good shopper rewards program	.763		
Good value for the money	.739		
Inspires me to try new things	.554	.671	
I often discover new things to buy	.560	.650	
Helps express my personal style	.609	.640	
Is a store for people like me	.501	.630	
Fun and exciting shopping experience	.511	.617	
Innovative in making shopping easier		.596	
Easy to find what I'm looking for	.518	.520	
Has available salespeople			.782
Has warm and friendly salespeople			.750
Makes it easy to return items			.732
Offers a consistent experience online and in store			.578
Offers convenient ways to shop in stores and online			.569

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 9 iterations.



Hands-on Analysis

4. Should Nordstrom be focusing on the factors above or Brand Commitment and Likelihood to Purchase in order to increase the Likelihood of Recommendation?



Brand Commitment						
Q11 Imagine you had to shop at a retail store, which of these statements best describes how much you would consider shopping at each of these stores? (Please select one answer for each brand)						
1 PROGRAMMER: ALLOW ONLY ONE ANSWER PER BRAND. ACCEPT ONLY ONE ANSWER IN FIRST ROW "ONLY STORE WOULD CONSIDER"						
	Brand X	JC PenneyTarget	Kohl's	Nordstrom	Amazon	TJ Maxx
Favorite store; only one I consider	<input type="radio"/>					
Store I prefer and consider highly	<input type="radio"/>					
Store I consider equally with others	<input type="radio"/>					
Store I might consider, less so than others	<input type="radio"/>					
Not a store I usually consider	<input type="radio"/>					
Store I would never consider	<input type="radio"/>					

Likelihood to Purchase						
Q12 For the following retailers, when do you anticipate your next purchase at that store might be?						
PROGRAMMER: ALLOW ONLY ONE ANSWER PER BRAND.						
	Brand X	JC PenneyTarget	Kohl's	Nordstrom	Amazon	TJ Maxx
Within the next month	<input type="radio"/>					
Within next 1-3 months	<input type="radio"/>					
With next 3-6 months						
Within next 6-9 months	<input type="radio"/>					
Within 9 months – 1 year	<input type="radio"/>					
Longer than 1 year	<input type="radio"/>					
I'm not sure when I will shop there again						



Likelihood Recommend						
Q13 How likely are you to recommend the following retailer to friends and family members, on a scale from 0-10, where 0=Not at all likely to recommend, and 10= Will definitely recommend.						
PROGRAMMER: ALLOW ONLY ONE ANSWER PER BRAND. SHOW EACH RETAILER ON SEPARATE SCREENS.						
	Brand X	JC PenneyTarget	Kohl's	Nordstrom	Amazon	TJ Maxx
0	<input type="radio"/>					
1	<input type="radio"/>					
2	<input type="radio"/>					
3	<input type="radio"/>					
4	<input type="radio"/>					
5	<input type="radio"/>					
6	<input type="radio"/>					
7	<input type="radio"/>					
8	<input type="radio"/>					
9	<input type="radio"/>					
10	<input type="radio"/>					

Recode to Missing

SPSS® Analyze | Regression | Linear

*357614 SPSS.sav [DataSet1] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help



Name

Type

Width

Decimals

Label

Values

Missing

Columns

Align

Measure

Role

1370 q5b_14 Numeric 1 0 Last Act Clearance Section (for any dept) (...

1371 q19f_13 Numeric 1 0 Kelly Ripa Home (Which are your ^begin(1)...)

1372 q19f_14 Numeric 1 0 Joy Mangano (Which are your ^begin(1)'fav...

1373 q19f_15 Numeric 1 0 Kate Spade Home (Which are your ^begin(1)'...

1374 q19f_16 Numeric 1 0

1375 q19f_17 Numeric 1

1376 q22_10 Numeric 1

1377 dtrack_1 Numeric 1

1378 dtrack_2 Numeric 1

1379 dtrack_3 Numeric 1

1380 dtrack_4 Numeric 1

1381 dtrack_5 Numeric 1

1382 dtrack_6 Numeric 1

1383 dtrack_7 Numeric 1

1384 dtrack_8 Numeric 1

1385 dtrack_9 Numeric 1

1386 dtrack_10 Numeric 1

1387 PromoterTJ... Numeric 8

1388 FAC1_1 Numeric 11

1389 FAC2_1 Numeric 11

1390 FAC3_1 Numeric 11

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1399

1400

1401

1402

1403

1404

1405

1406

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< Data View Variable View >

Linear Regression

Dependent: q13_1_3

Block 1 of 1

Independent(s): q11x3, q12x3, FAC1_1, FAC2_1, FAC3_1

Method: Enter

Selection Variable: Rule...

Case Labels:

WLS Weight:

OK Paste Reset Cancel Help

SPSS Output

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.708 ^a	.501	.495	1.263

a. Predictors: (Constant), Service, Experience, Product, Nordstrom, Nordstrom

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	665.707	5	133.141	83.505	<.001 ^b
	Residual	663.278	416	1.594		
	Total	1328.986	421			

a. Dependent Variable: Q13_1 (How likely are you to recommend the following retailer to friends and family members, on a scale from 0-10, where 0=Not at all likely to recommend, and 10= Will definitely recommend. Nordstrom)

b. Predictors: (Constant), Service, Experience, Product, Nordstrom, Nordstrom

Should Nordstrom be focusing on the factors above or Brand Commitment and Likelihood to Purchase in order to increase the Likelihood of Recommendation?

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	8.883	.224		39.617	<.001
	Nordstrom Commitment	-.354	.078	-.203	-4.533	<.001
	Nordstrom LTP	-.071	.060	-.055	-1.193	.233
	Product	.706	.071	.382	9.939	<.001
	Experience	.588	.078	.319	7.528	<.001
	Service	.585	.068	.316	8.637	<.001

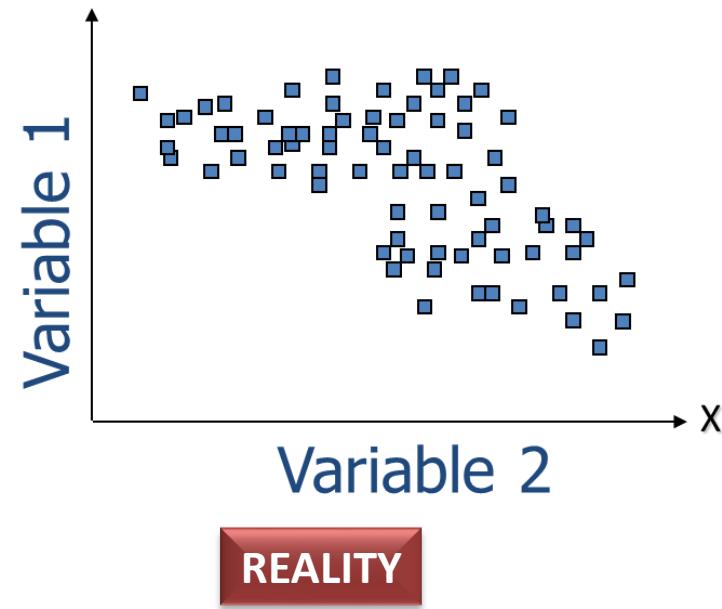
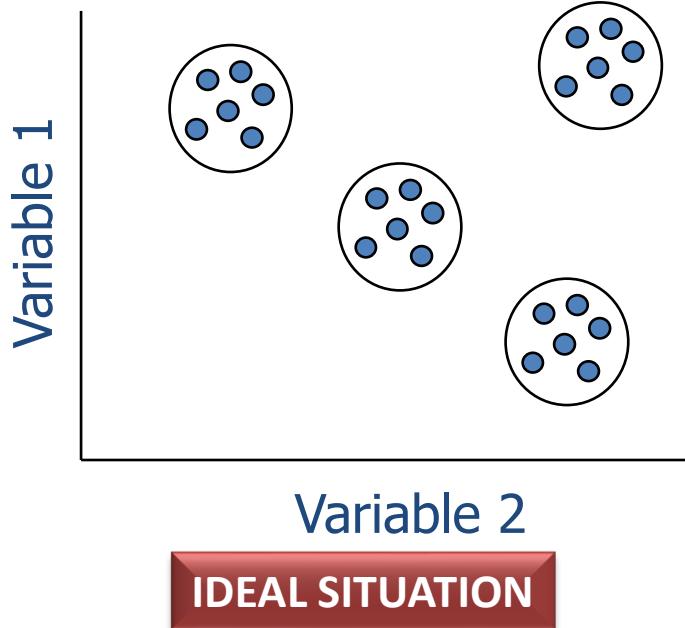
a. Dependent Variable: Q13_1 (How likely are you to recommend the following retailer to friends and family members, on a scale from 0-10, where 0=Not at all likely to recommend, and 10= Will definitely recommend. Nordstrom)



Cluster Analysis (Classification Analysis)

Cluster Analysis

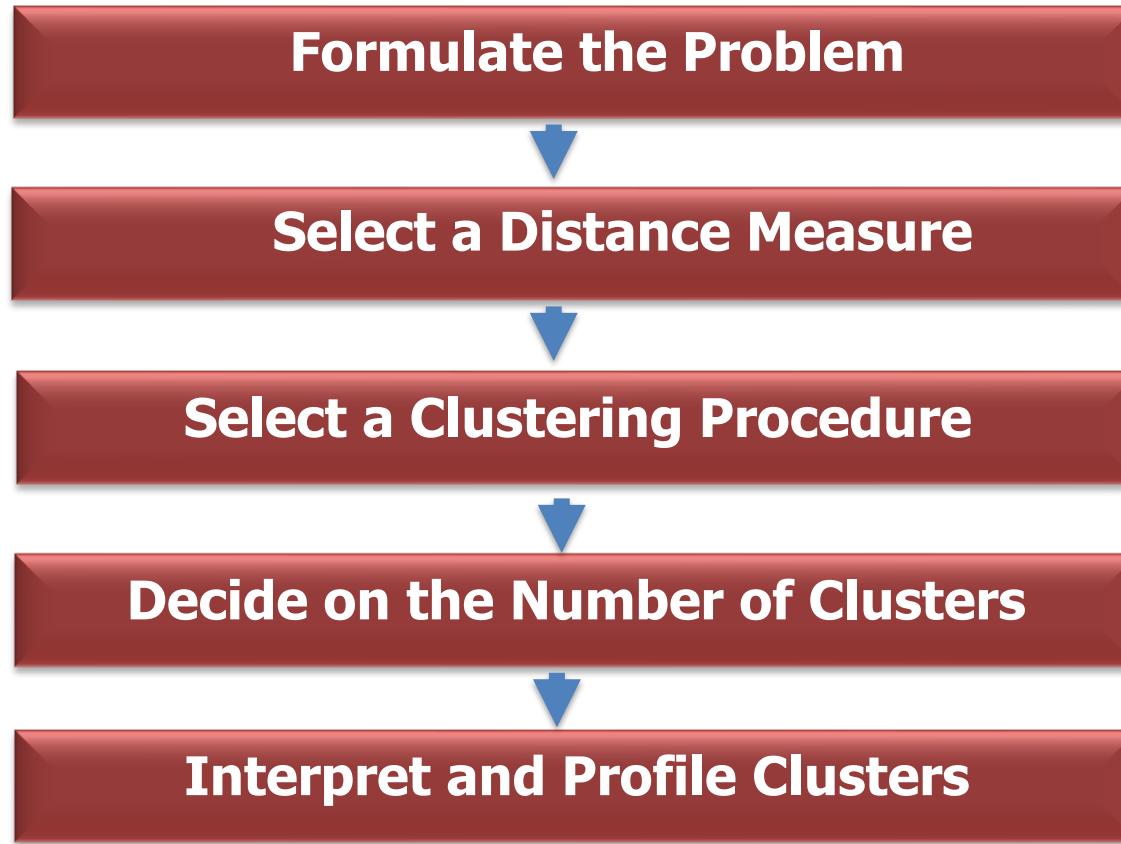
- Cluster analysis is a class of techniques used to classify objects or cases into relatively homogeneous groups called *clusters*. Objects in each cluster tend to be similar to each other and dissimilar to objects in the other clusters. Cluster analysis is also known as *classification analysis*.



Statistics Associated with Cluster Analysis

- **Agglomeration schedule.** An agglomeration schedule gives information on the objects or cases being combined at each stage of a clustering process.
- **Cluster centroid.** The cluster centroid is the mean values of the variables for all the cases or objects in a particular cluster.
- **Cluster centers.** The cluster centers are the initial starting points in I clustering. Clusters are built around these centers, or *seeds*.
- **Cluster membership.** Cluster membership indicates the cluster to which each object or case belongs.

Conducting Cluster Analysis



Conducting Cluster Analysis

Formulate the Problem

- Perhaps the most important part of formulating the clustering problem is selecting the variables on which the clustering is based.
- Inclusion of even one or two irrelevant variables may distort an otherwise useful clustering solution.
- Basically, the set of variables selected should describe the similarity between objects in terms that are relevant to the research problem.
- The variables should be selected based on past research, theory, or a consideration of the hypotheses being tested. In exploratory research, the researcher should exercise judgment and intuition.

Conducting Cluster Analysis

Select a Distance or Similarity Measure

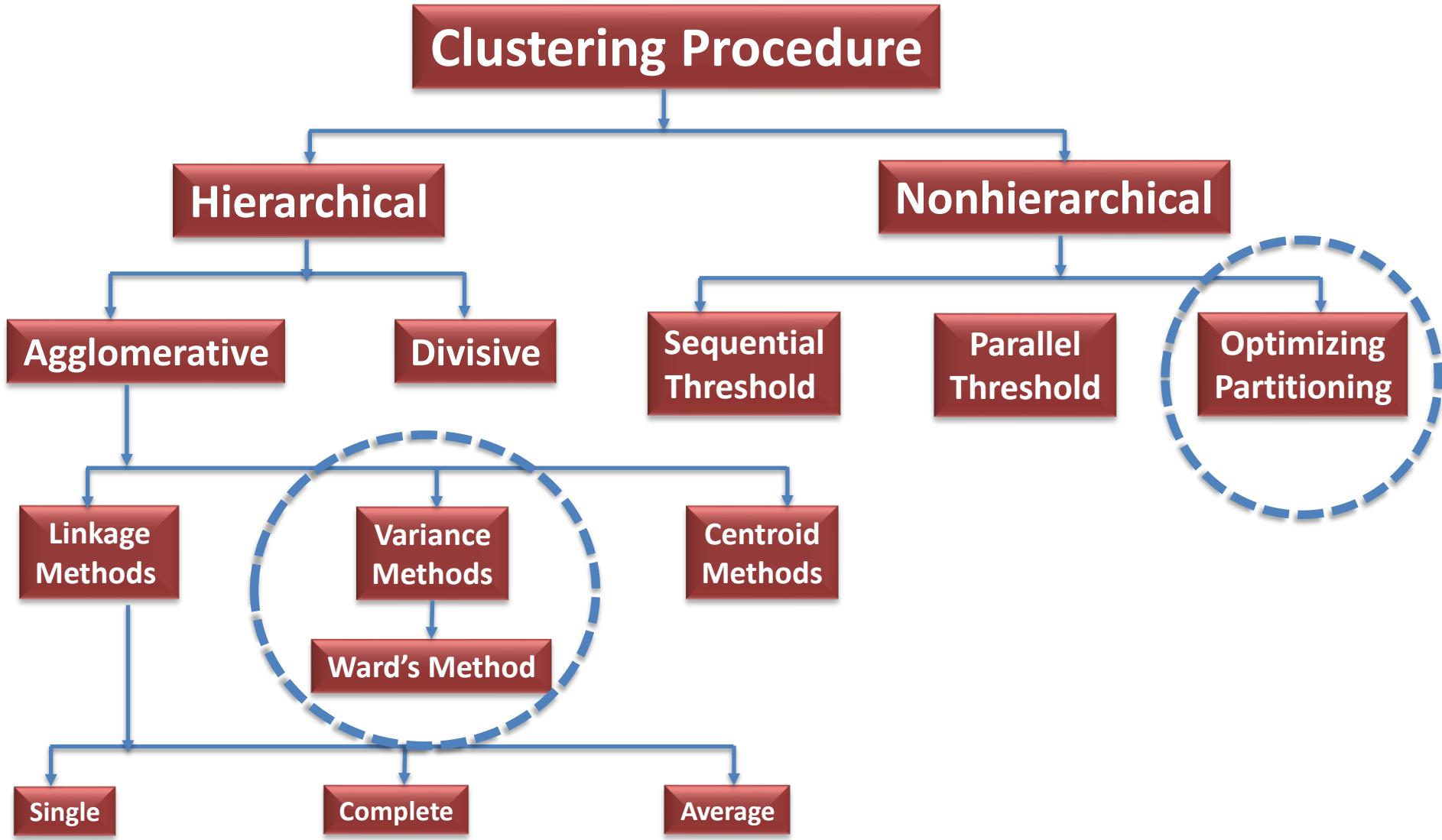
- The most used measure of similarity is the Euclidean distance or its square. The **Euclidean distance** is the square root of the sum of the squared differences in values for each variable.
- If the variables are measured in vastly different units, the clustering solution will be influenced by the units of measurement. In these cases, before clustering respondents, we must **standardize the data** by rescaling each variable to have a mean of zero and a standard deviation of unity. It is also desirable to **eliminate outliers** (cases with atypical value).

2D Distance Calculator

(X_1, Y_1) =

(X_2, Y_2) =

Classification of Clustering Procedures



Conducting Cluster Analysis

Select a Clustering Procedure – Hierarchical

- **Hierarchical clustering** is characterized by the development of a hierarchy or tree-like structure. Hierarchical methods can be agglomerative or divisive.
 - **Agglomerative clustering** starts with each object in a separate cluster. Clusters are formed by grouping objects into bigger and bigger clusters. This process is continued until all objects are members of a single cluster.
 - **Divisive clustering** starts with all the objects grouped in a single cluster. Clusters are divided or split until each object is in a separate cluster.
- **Agglomerative methods are commonly used** in marketing research. They consist of linkage methods, **error sums of squares** or variance methods, and centroid methods.

Conducting Cluster Analysis

Hierarchical Clustering – Variance Method

- The **variance methods** attempt to generate clusters to minimize the within-cluster variance.
- A commonly used variance method is the **Ward's procedure**. For each cluster, the means for all the variables are computed. Then, for each object, the squared Euclidean distance to the cluster mean is calculated. These distances are summed for all the objects. At each stage, the two clusters with the smallest increase in the overall sum of squares within cluster distances are combined.

Conducting Cluster Analysis

Select a Clustering Procedure – Nonhierarchical

- K means cluster analysis
- Partitional clustering approach
- Each cluster is associated with a **centroid** (center point)
- Each point is assigned to the cluster with the closest centroid
- **Number of clusters, K , must be specified**
- The basic algorithm is very simple

-
- 1: Select K points as the initial centroids.
 - 2: **repeat**
 - 3: Form K clusters by assigning all points to the closest centroid.
 - 4: Recompute the centroid of each cluster.
 - 5: **until** The centroids don't change
-

Conducting Cluster Analysis

Select a Clustering Procedure

- It has been suggested that the **hierarchical and nonhierarchical methods be used in tandem**. First, an initial clustering solution is obtained using a hierarchical procedure, such as average linkage or Ward's. The number of clusters and cluster centroids so obtained are used as inputs to the optimizing partitioning method.
- So we'll be using in a sequential fashion
 - Hierarchical Clustering with Ward's Method
 - K-Means Clustering

Conducting Cluster Analysis

Decide on the Number of Clusters

- Theoretical, conceptual, or practical considerations may suggest a certain number of clusters.
- In hierarchical clustering, the distances at which clusters are combined can be used as criteria. This information can be obtained from the agglomeration schedule
- These are then used as inputs for the number of clusters in the K-means cluster analysis.

Challenge: A small lawn and Garden (L&G) firm is interested in understanding the landscape of consumers in the L&G market based on a host of demographic, behavioral and psychographic variables. The task is to provide them with the “best” segmentation schema guided by data and create segment personas so that they can effectively market their services!



Set of variables to be used for the clustering process are below:

- Q20 - Respondent L&G knowledge level
- Q21 - Respondent L&G participation interest level
- Q22 - Statement agreement about L&G care
- Q23 - Respondent desired status of lawn and garden
- Q24 - Main reason grow/have plants
- Q26 - Main reason maintain lawn

Set of additional variables to be used for profiling are below:

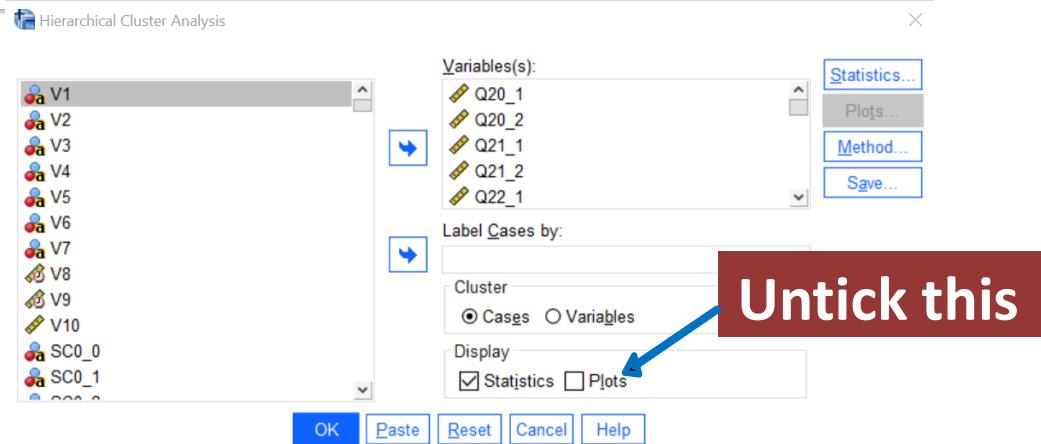
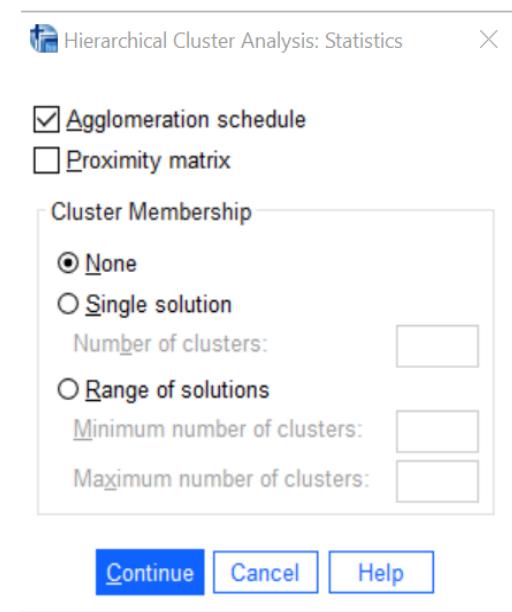
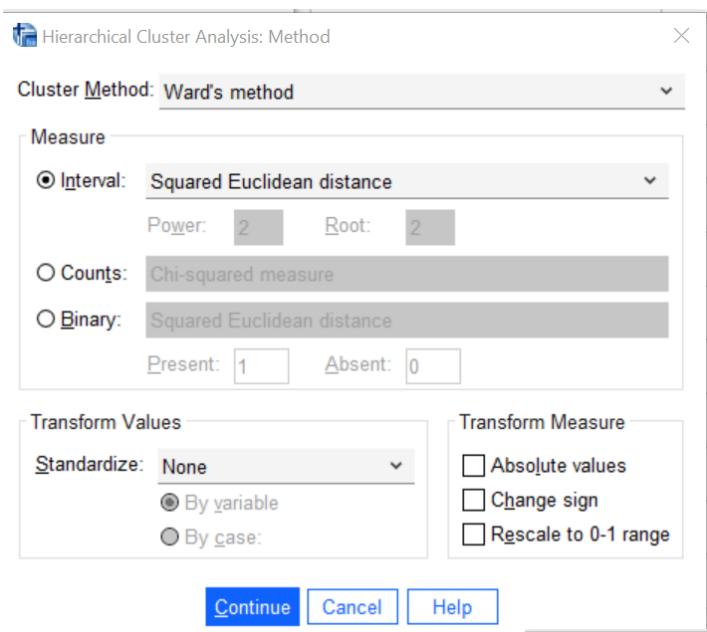
- Q3 - Age
- Q4 – Gender
- Q40 – Marital Status
- Q41 - Education



SPSS® Analyze | Classify| Hierarchical Cluster

The screenshot shows the IBM SPSS Statistics Data Editor interface. The title bar indicates the file is named "16AM063_Small_Scale_Segmentation.sav [DataSet1] - IBM SPSS Statistics Data Editor". The menu bar includes File, Edit, View, Data, Transform, Analyze, Graphs, Utilities, Extensions, Window, and Help. The Analyze menu is currently open, displaying various statistical analysis options. A sub-menu under "Classify" is open, showing "TwoStep Cluster...", "K-Means Cluster...", "Hierarchical Cluster...", "Cluster Silhouettes", "Tree...", "Discriminant...", "Nearest Neighbor...", "ROC Curve...", and "ROC Analysis...". The main data view shows a dataset with variables Q24_6, Q25, Q26_1 through Q26_5, Q27, Q27_TEXT, Q28_80, Q28_81, and Q28_82. The data consists of 19 rows of numerical values. The status bar at the bottom right shows "IBM SPSS Statistics Processor is ready" and "Unicode:ON".

Selections



SPSS Output

Case Processing Summary^{a,b}

Cases					
Valid		Missing		Total	
N	Percent	N	Percent	N	Percent
393	67.9	186	32.1	579	100.0

a. Squared Euclidean Distance used

b. Ward Linkage

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	Next Stage
1	532	548	.000	0	0	3
2	305	540	.000	0	0	8
3	377	532	.000	0	1	4
4	352	377	.000	0	3	5
5	337	352	.000	0	4	6
6	319	337	.000	0	5	7
7	264	319	.000	0	6	9
8	88	305	.000	0	2	33
9	224	264	.000	0	7	10
10	133	224	.000	0	9	11
11	123	133	.000	0	10	12
12	67	123	.000	0	11	13
13	10	67	.000	0	12	22
14	12	544	.500	0	0	20
15	100	140	1.000	0	0	25
16	378	518	2.000	0	0	49
17	166	478	3.000	0	0	21
18	231	407	4.000	0	0	26
19	9	195	5.000	0	0	41
20	12	146	6.500	14	0	35

SPSS Output

382	1	46	6941.645	357	371	385
383	3	33	7095.338	377	370	388
384	9	21	7252.618	356	348	391
385	1	32	7425.238	382	369	388
386	18	74	7610.328	379	375	390
387	7	63	7830.292	380	373	389
388	1	3	8187.701	385	383	390
389	7	29	8564.904	387	381	392
390	1	18	8966.855	388	386	391
391	1	9	10163.154	390	384	392
392	1	7	12783.511	391	389	0

Number of Cases	393
Step of the “bigger” jump	389
Number of Clusters remaining after and including 389	4

Identify the step where the “distance coefficients” makes a bigger jump

Now repeat the analysis

- Choose the k -means technique
- Set **4** as the number of clusters
- Save cluster number for each case
- Run the analysis

SPSS® Analyze | Classify| K-Means Cluster

*16AMC documentation 500 cases.sav [DataSet1] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help

Name Type Width Decimals Label Values Missing Columns Align

430 Q45 Numeric 8 0 How many peo... {1, 1}... None 5 Right

431 Q46 Numeric 8 0 What is the app... {1, Less tha... None 5 Right

432 Q47 Numeric 8 0 What is the app... {1, Less tha... None 5 Right

433 Q48_1 Numeric 8 e 5 Right

434 Q48_2 Numeric 8 e 5 Right

435 Q48_3 Numeric 8 e 5 Right

436 Q48_4 Numeric 8 e 5 Right

437 Q48_5 Numeric 8 e 5 Right

438 LocationLat... String 2000 e Left

439 LocationLon... String 2000 e Left

440 LocationAcc... String 2000 e Left

441 QCL_1 Numeric 8 e Right

442 QCL_2 Numeric 8 e Right

443 QCL_3 Numeric 8 e Right

444 QCL_4 Numeric 8 e Right

445

446

447 Specify Number of Clusters - 4

448

449

450 Set Max Iterations to 999

K-Means Cluster Analysis

Variables: V1, V2, V3, V4, V5, V6, V7, V8

Label Cases by:

Number of Clusters: 4

Method: Iterate and classify Classify only

Cluster Centers

Read initial: Open dataset External data file File...

Write final: New dataset Data file File...

Iterate... Save... Options...

K-Means Cluster: Save New V... Cluster membership Distance from cluster center Continue Cancel Help

K-Means Cluster Analysis: Iter... Maximum Iterations: 999 Convergence Criterion: 0 Use running means Continue Cancel Help

Type here to search

2:16 PM 11/26/2020

SPSS Output

Final Cluster Centers				
	Cluster			
	1	2	3	4
How would you describe your KNOWLEDGE LEVEL for each of the following? (Select one response per ac...-Plant care or gardening)	4	2	3	2
How would you describe your KNOWLEDGE LEVEL for each of the following? (Select one response per ac...-Lawn care)	4	2	3	3
How would you describe your desire to participate in each of the following, regardless of your cu...- Plant care or gardening	4	1	3	2
How would you describe your desire to participate in each of the following, regardless of your cu...- Lawn care	4	1	3	2
Please read the following statements about lawns and garden care, and indicate how much you agree...-Working on my lawn and garden/plants is relaxing/a pleasant escape for me	4	1	3	2
Please read the following statements about lawns and garden care, and indicate how much you agree...-It's important that my lawn and plants/garden (s) look nice because we use it frequently to play/entertain outdoors	4	1	3	2
Please read the following statements about lawns and garden care, and indicate how much you agree...-I enjoy using herbs/fruits/vegetables from my garden for cooking/baking	4	1	3	2

Please read the following statements about lawns and garden care, and indicate how much you agree...-I want a lawn and garden/plants that are admired by others	4	1	3	2
Please read the following statements about lawns and garden care, and indicate how much you agree...-Taking good care of your lawn and garden/plants is part of being a good neighbor	3	1	2	2
Please read the following statements about lawns and garden care, and indicate how much you agree...-My lawn and garden/plants enhance my family's quality of life (mental health)	4	1	3	2
Please read the following statements about lawns and garden care, and indicate how much you agree...-I am concerned about my personal health/safety when using lawn and garden/plant products	3	1	3	3
Please read the following statements about lawns and garden care, and indicate how much you agree...-I am concerned about the safety of children/pets in a yard where lawn and garden/plant products have been used	3	1	3	2
Please read the following statements about lawns and garden care, and indicate how much you agree...-I think lawns and gardens/plants are wasteful because they require too many resources (e.g., water, fertilizer, fuel for mowing, etc.)	3	2	4	4
Please read the following statements about lawns and garden care, and indicate how much you agree...-I prefer to buy organic or natural lawn and garden/plant products where possible	4	1	3	2
Please read the following statements about lawns and garden care, and indicate how much you agree...-I'd pay more for environmentally-friendly lawn and garden products	4	2	3	2
Which one of the following statements best describes how you would like your lawn and garden or p...-I'd like my LAWN to be...	4	1	3	2
Which one of the following statements best describes how you would like your lawn and garden or p...-I'd like my GARDEN/PLANTS to be...	4	1	3	2
Below is a list of statements that may explain why you have or grow plants at your home. Please t...-For what they yield/the crop	4	1	3	2
Below is a list of statements that may explain why you have or grow plants at your home. Please t...-For how they look/the aesthetics	4	1	2	2
Below is a list of statements that may explain why you have or grow plants at your home. Please t...-To keep the yard looking neat and tidy/because it's part of being a responsible homeowner	3	1	2	2

Which is the most engaged segment?



Who are the people in Cluster 2

Set of variables to be used for the clustering process are below:

- Q20 - Respondent L&G knowledge level
- Q21 - Respondent L&G participation interest level
- Q22 - Statement agreement about L&G care
- Q23 - Respondent desired status of lawn and garden
- Q24 - Main reason grow/have plants
- Q26 - Main reason maintain lawn

Set of additional variables to be used for profiling are below:

- Q3 - Age
- Q4 – Gender
- Q40 – Marital Status
- Q41 - Education



Statistics

Please indicate your age.

N	Valid	58
	Missing	0
	Mean	19.10



Are you...?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	36	62.1	62.1
	Female	22	37.9	100.0
	Total	58	100.0	100.0



Which of the following best describes you?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never Married	19	32.8	32.8	32.8
	Now Married	27	46.6	46.6	79.3
	Divorced	4	6.9	6.9	86.2
	Separated (legally)	2	3.4	3.4	89.7
	Living with a partner/significant other	6	10.3	10.3	100.0
	Total	58	100.0	100.0	

What is the highest level of education you have completed or the highest degree you have received?



		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than high school graduate	2	3.4	3.4	3.4
	High School Graduate – High School Diploma, or the equivalent (e.g., GED)	12	20.7	20.7	24.1
	Some college but no degree	12	20.7	20.7	44.8
	Associate Degree in College (Occupational/Vocational or Academic program)	4	6.9	6.9	51.7
	Bachelor's Degree (e.g., BA, AB, BS)	19	32.8	32.8	84.5
	Master's Degree (e.g., MA, MS, MEng, MEd, MSW, MBA)	4	6.9	6.9	91.4
	Professional School Degree (e.g., MD, DDS, DVM, LLB, JD)	1	1.7	1.7	93.1
	Doctorate Degree (e.g., PhD, EdD)	4	6.9	6.9	100.0
	Total	58	100.0	100.0	

Who are the people in Cluster 2

The breakdown by age looks like this:

- **Baby Boomers:** Baby boomers were born between 1946 and 1964. They're currently between 56-74 years old (71.6 million in U.S.)
- **Gen X:** Gen X was born between 1965 and 1979/80 and are currently between 40-55 years old (65.2 million people in U.S.)
- **Gen Y:** Gen Y, or Millennials, were born between 1981 and 1994/6. They are currently between 24-39 years old (72.1 million in the U.S.)
 - Gen Y.1 = 25-29 years old (around 31 million people in U.S.)
 - Gen Y.2 = 29-39 (around 42 million people in U.S.)
- **Gen Z:** Gen Z is the newest generation to be named and were born between 1997 and 2012/15. They are currently between 8-23 years old (nearly 68 million in U.S.)



These Are The TV Shows Millenials Like The Most, According To New Research

Oct 24, 2022



American Crime, Empire, How To Get Away With Murder, Scandal, People Vs. O.J. Simpson, You're The Worst and Jessica Jones

Last Week Tonight With John Oliver, Full Frontal With Samantha Bee, and Vice.

30 for 30, Going Clear, The Jinx, Making A Murder

The Fosters, Switched At Birth and Degrassi: Next Class

TILL
NEXT
TIME

