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!

Clustering Variables: L&G knowledge (Q20), interest in L&G activities (Q21), attitudes towards L&G care (Q22), reasons for growing plants (Q24), and maintaining a lawn (Q26).

Profiling Variables: Age (Q3), Gender (Q4), Marital Status (Q40), Education (Q41).

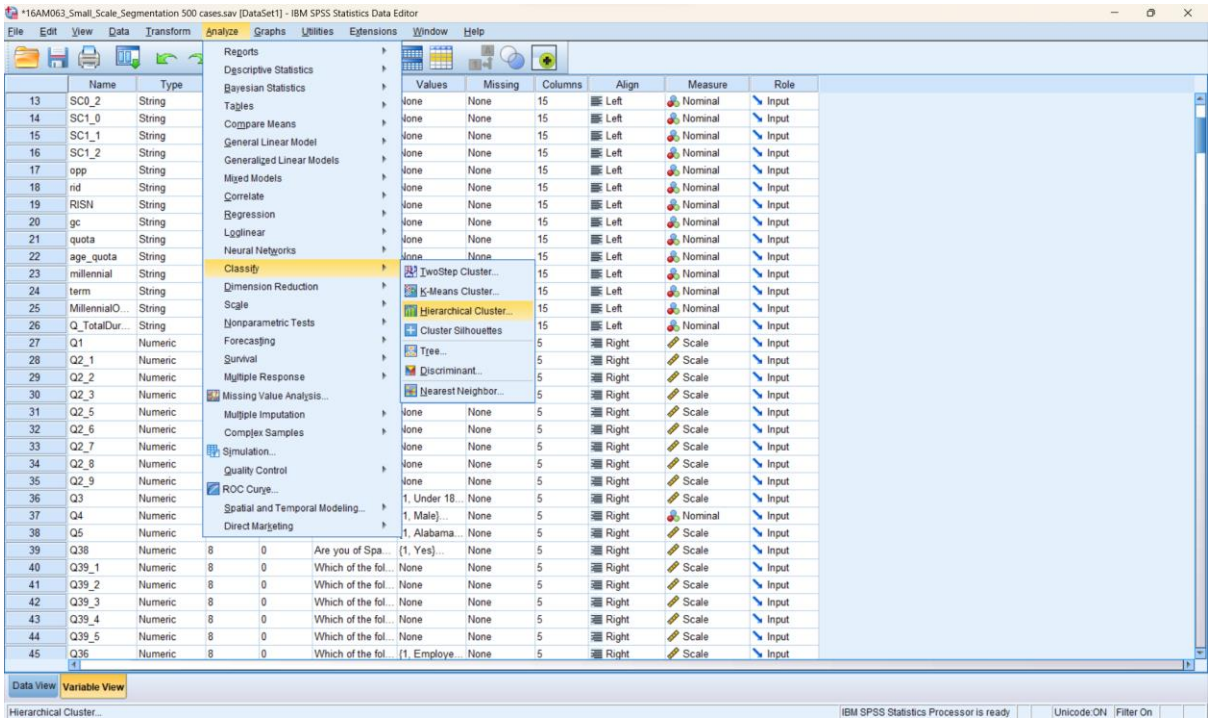
Here this problem is a clustering problem as the client wants the most relevant groups/segments to effectively market their services hence, we will perform the clustering analysis.

For the clustering all the variables should be scaler, so we converted all the variables to Scale (continuous variables)

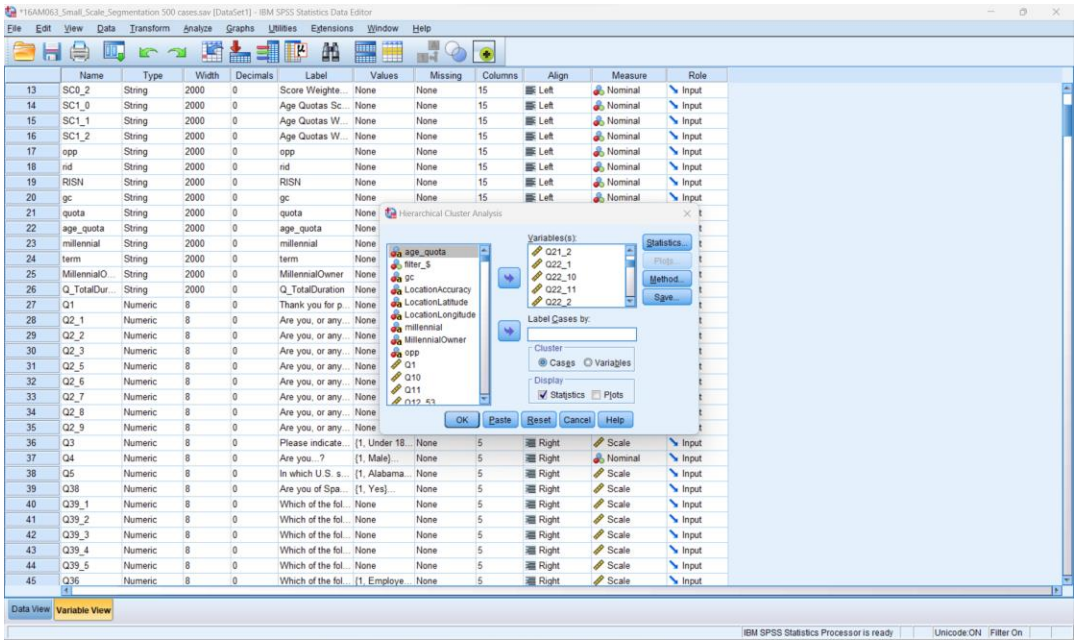
Since, we don't know the number of clusters/groups for analysis, we will use hierarchical clustering with Ward's method (to find number of clusters) and non-hierarchical (K-means clustering) methods (for optimizing partitioning) in tandem.

Perform Hierarchical Analysis as shown below using following steps:

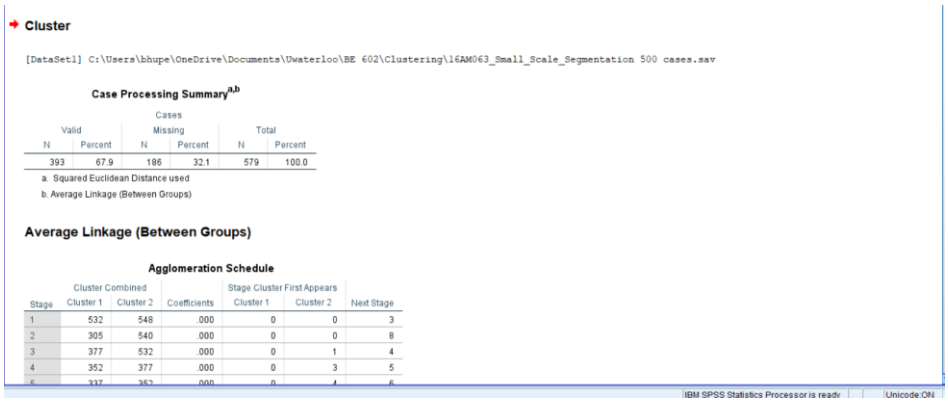
Analyze -> Classify -> Hierarchical Clustering



Load all the variables here, and ran the analysis



From the Hierarchical clustering table that the highest jump in coefficient is observed from 388 stage, So we concluded that the optimal number of clusters is 5.



Cluster

[DataSet1] C:\Users\bhupe\OneDrive\Documents\Uwaterloo\BE 602\Clustering\16AM063_Small_Scale_Segmentation 500 cases.sav

Case Processing Summary[a,b]

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

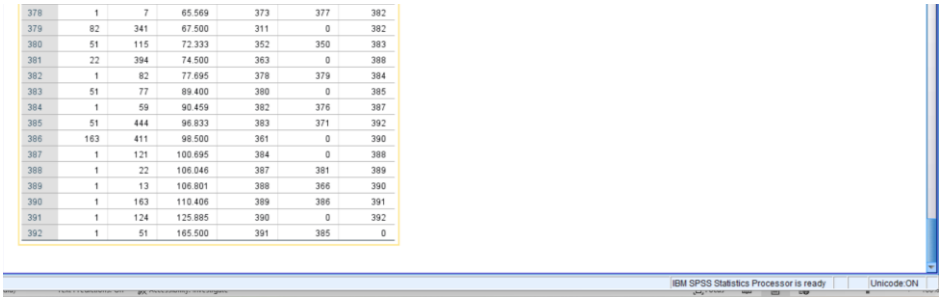
a. Squared Euclidean Distance used

b. Average Linkage (Between Groups)

Average Linkage (Between Groups)

Agglomeration Schedule

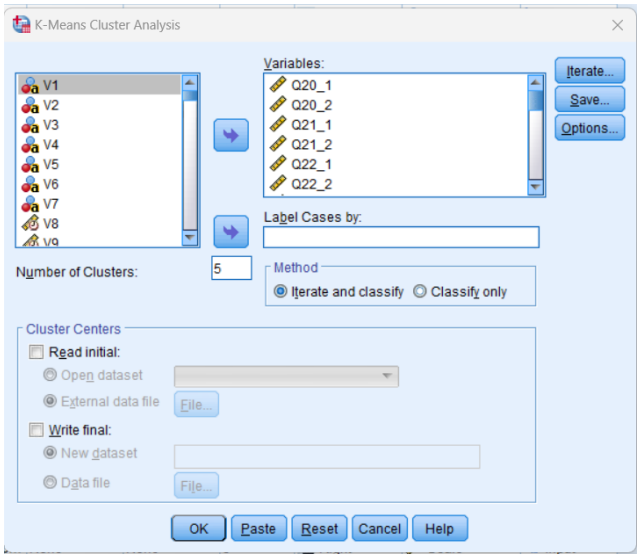
Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	532	548	.000	0	0	3
2	305	540	.000	0	0	8
3	377	532	.000	0	1	4
4	352	377	.000	0	3	5

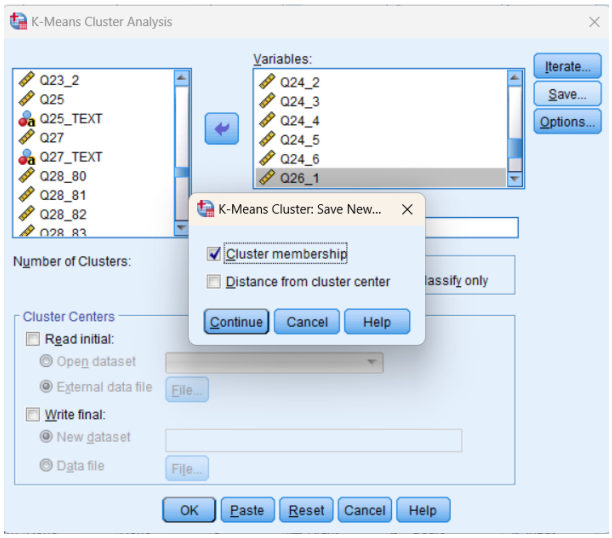


378	1	7	65.569	373	377	382
379	82	341	67.500	311	0	382
380	51	115	72.333	352	350	383
381	22	394	74.500	363	0	388
382	1	82	77.695	378	379	384
383	51	77	89.400	380	0	385
384	1	59	90.459	382	376	387
385	51	444	96.833	383	371	392
386	163	411	98.500	361	0	390
387	1	121	100.695	384	0	388
388	1	22	106.046	387	381	389
389	1	13	106.801	388	366	390
390	1	163	110.406	389	386	391
391	1	124	125.885	390	0	392
392	1	51	165.500	391	385	0

Now, apply K-means clustering to finely segment the data into these 5 clusters, focusing on optimizing groupings.

Analyze -> Classify -> K-means Clustering





Iteration History[a]

Iteration	Change in Cluster Centers				
	1	2	3	4	5
1	6.479	6.105	6.631	6.067	4.799
2	.631	1.463	.431	.659	.423
3	.508	.557	.235	.264	.295
4	.483	.629	.172	.469	.489
5	.341	.726	.081	.456	.523
6	.214	.598	.067	.000	.306
7	.099	.225	.091	.000	.118
8	.076	.000	.072	.000	.047
9	.052	.140	.000	.000	.060
10	.064	.142	.000	.000	.095

a. Iterations stopped because the maximum number of iterations was performed. Iterations failed to converge. The maximum absolute coordinate change for any center is .053. The current iteration is 10. The minimum distance between initial centers is 11.662.

From the below K-means clustering output table, we can analyze each cluster's centroid to understand the defining characteristics for each variable.

Final Cluster Centers

	Cluster				
	1	2	3	4	5
Plant care or gardening					
How would you describe your desire to participate in each of the following, regardless of your cu...-Lawn care	2	3	3	4	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	2	2	3	4	1
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	2	3	3	5	1
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	2	2	3	4	1
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	2	3	3	4	1
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	2	3	2	3	1
Please read the following statements about lawns and garden care, and	2	2	3	4	1

Final Cluster Centers

	Cluster				
	1	2	3	4	5
being a good neighbor					
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)	2	2	3	4	1
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	3	3	4	2
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	2	3	3	3	1

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.)	4	4	4	4	2
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	3	2	3	4	2
Please read the following statements about lawns and garden care, and	3	3	3	4	2

Final Cluster Centers

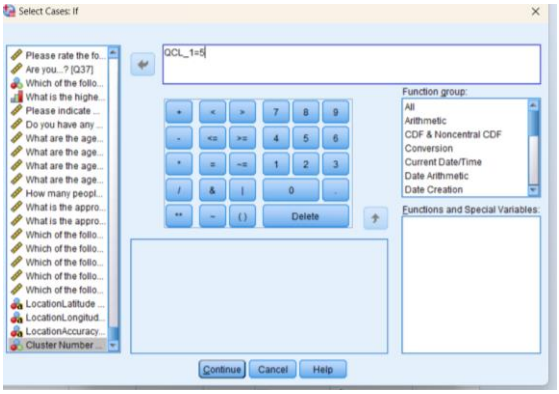
	Cluster				
	1	2	3	4	5
Please read the following statements about lawns and garden care, and indicate how much you agree...-I'd pay more for environmentally- friendly lawn and garden products	3	3	3	4	2
Below is a list of statements that may explain why you have or grow plants at your home. Please t...-For what they yield/the crop	2	2	3	4	1
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	2	3	2	4	1
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	2	3	2	4	1
Below is a list of statements that may explain why you have or grow plants at your home. Please t...-Because they were already at the home when I purchased it/moved in	4	4	3	4	2
Below is a list of statements that may explain why you have or grow plants at your home. Please t...-Because they create a more enjoyable atmosphere for gatherings with my family and friends	2	3	3	4	1
Below is a list of statements that may explain why you have or	2	2	3	4	1

Final Cluster Centers

	Cluster				
	1	2	3	4	5
Please t...-Because they create a more enjoyable atmosphere for gatherings with my family and friends					
Below is a list of statements that may explain why you have or grow plants at your home. Please t...-Because having/growing plants is relaxing to me	2	2	3	4	1
Below is a list of statements that may explain why you maintain (mow, fertilize, treat for weeds,...-For how it looks/the aesthetics	2	3	2	3	1
Below is a list of statements that may explain why you maintain (mow, fertilize, treat for weeds,...-To keep the yard looking neat and tidy/because it's part of being a responsible homeowner	1	3	2	3	1
Below is a list of statements that may explain why you maintain (mow, fertilize, treat for weeds,...-Because it was already at the home when I purchased it/moved in	3	3	3	3	1
Below is a list of statements that may explain why you maintain (mow, fertilize, treat for weeds,...-Because it creates a more enjoyable atmosphere for gatherings with my family and friends	2	3	2	4	1
Below is a list of statements that may explain why you maintain (mow, fertilize, treat for weeds,...-Because maintaining the lawn is relaxing to me	2	3	3	4	2

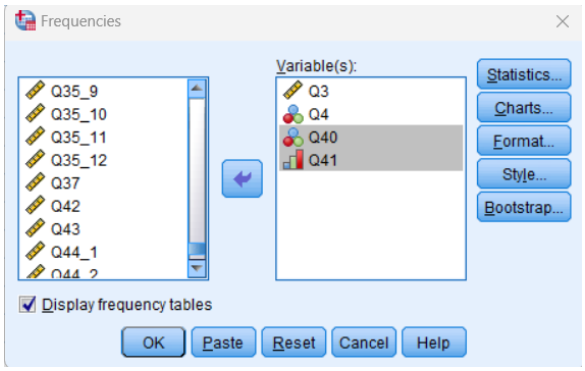
From the above Final clustering table from K-means analysis, we found that 5th cluster is most important to our analysis (due to its high alignment with favorable L&G engagement indicators), as per the variable labels, Label 1 is considered as highly favourable which is occurring frequently in the 5th cluster which is High levels of knowledge, interest, and engagement in lawn and gardening activities.

So, we are creating a new filter with cluster = 5 to analyze the demographic composition and characteristics of Cluster 5 to understand its unique attributes, using below steps:



Profiling:

Analysing the Age, Gender, Marital Status and Education.



Are you...?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	44	57.9	57.9	57.9
	Female	32	42.1	42.1	100.0
	Total	76	100.0	100.0	

Which of the following best describes you?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never Married	23	30.3	30.3	30.3
	Now Married	38	50.0	50.0	80.3
	Divorced	6	7.9	7.9	88.2
	Separated (legally)	2	2.6	2.6	90.8
	Living with a partner/significant other	7	9.2	9.2	100.0
	Total	76	100.0	100.0	

The Male population (57.9%) and Now married (50%) are most frequently occurring amongst others in 5th cluster.

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	2.6	2.6	2.6
	High School Graduate - High School Diploma, or the equivalent (e.g., GED)	14	18.4	18.4	21.1
	Some college but no degree	17	22.4	22.4	43.4
	Associate Degree in College (Occupational/Vocational or Academic program)	7	9.2	9.2	52.6
	Bachelor's Degree (e.g., BA, AB, BS)	26	34.2	34.2	86.8
	Master's Degree (e.g., MA, MS, MEng, MEd, MSW, MBA)	5	6.6	6.6	93.4
	Professional School Degree (e.g., MD, DDS, DVM, LLB, JD)	1	1.3	1.3	94.7
	Doctorate Degree (e.g., PhD, EdD)	4	5.3	5.3	100.0
	Total	76	100.0	100.0	

The population with bachelor's degree is frequently occurring in 5th cluster.

Please indicate your age.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	19	1	1.3	1.3	1.3
	20	2	2.6	2.6	3.9
	21	4	5.3	5.3	9.2
	22	3	3.9	3.9	13.2
	23	1	1.3	1.3	14.5
	24	3	3.9	3.9	18.4
	25	2	2.6	2.6	21.1
	26	2	2.6	2.6	23.7
	27	3	3.9	3.9	27.6
	28	2	2.6	2.6	30.3
	29	2	2.6	2.6	32.9
	30	5	6.6	6.6	39.5
	31	2	2.6	2.6	42.1
	32	2	2.6	2.6	44.7
	34	6	7.9	7.9	52.6
	35	2	2.6	2.6	55.3
	36	2	2.6	2.6	57.9
	38	4	5.3	5.3	63.2
	40	3	3.9	3.9	67.1
	42	3	3.9	3.9	71.1
	43	1	1.3	1.3	72.4
	45	5	6.6	6.6	78.9
	46	1	1.3	1.3	80.3
	47	2	2.6	2.6	82.9
	50	1	1.3	1.3	84.2
	53	1	1.3	1.3	85.5
	55	4	5.3	5.3	90.8
	58	2	2.6	2.6	93.4
	59	1	1.3	1.3	94.7
	60	1	1.3	1.3	96.1
	64	2	2.6	2.6	98.7
	68	1	1.3	1.3	100.0
	Total	76	100.0	100.0	

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Please indicate your age.	76	3	52	20.62	12.448
Valid N (listwise)	76				

Since the average label here is 20, from the labels of Q3 we can say that average age in 5th cluster is 36.

As per the Descriptive Analysis from the clusters, the **primary target should be married men around the age of 34, with a bachelor's degree, who show a high interest in lawn and garden activities**. These insights enable the L&G firm to tailor their marketing and service strategies to this specific, engaged customer segment, enhancing the potential for market success.