Automated Data Analysis Report

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1. Clustering Results

Best Parameters: {'epsilon': 4.180812541640952, 'min_samples': 4, 'silhouette': 0.5462857069724237},
Best Silhouette Score: 0.546

2. ANOVA Results

Results for capital-gain: F-value = 228027.175, P-value = 0.000
Tukey-HSD Test Results: Multiple Comparison of Means - Tukey HSD, FWER=0.05
== group1 group2 meandiff p-adj lower upper reject ---------- 1 2 13.3387 0.0 13.2937 13.3837 True 1 3 1.0125 0.0 0.9949 1.0301 True 1 4 -0.0 1.0 -0.0143 0.0143 False 2 3 -12.3262 0.0 -12.3703 -12.2821 True 2 4 -13.3387 0.0 -13.3816 -13.2958 True 3 4 -1.0125 0.0 -1.0238 -1.0012 True
---

Results for capital-loss: F-value = 259301.391, P-value = 0.000
Tukey-HSD Test Results: Multiple Comparison of Means - Tukey HSD, FWER=0.05
== group1 group2 meandiff p-adj lower upper reject ---------- 1 2 -4.6088 0.0 -4.6511 -4.5665 True 1 3 -4.6088 0.0 -4.6254 -4.5922 True 1 4 -4.6088 0.0 -4.6223 -4.5954 True 2 3 0.0 1.0 -0.0415 0.0415 False 2 4 -0.0 1.0 -0.0403 0.0403 False 3 4 -0.0 1.0 -0.0106 0.0106 False
---

Results for positive_capital_gain: F-value = inf, P-value = 0.000
Tukey-HSD Test Results: Multiple Comparison of Means - Tukey HSD, FWER=0.05
== group1 group2 meandiff p-adj lower upper reject ---------- 1 2 3.5999 0.0 3.5999 3.5999 True 1 3 3.5999 0.0 3.5999 3.5999 True 1 4 -0.0 0.0 -0.0 -0.0 True 2 3 0.0 0.0 0.0 0.0 True 2 4 -3.5999 0.0 -3.5999 -3.5999 True 3 4 -3.5999 0.0 -3.5999 -3.5999 True ----------

Results for positive_capital_loss: F-value = inf, P-value = 0.000
Tukey-HSD Test Results: Multiple Comparison of Means - Tukey HSD, FWER=0.05
== group1 group2 meandiff p-adj lower upper reject ---------- 1 2 -4.6989 0.0 -4.6989 -4.6989 True 1 3 -4.6989 0.0 -4.6989 -4.6989 True 1 4 -4.6989 0.0 -4.6989 -4.6989 True 2 3 -0.0 0.0 -0.0 -0.0 True 2 4 -0.0 0.0 -0.0 -0.0 True 3 4 -0.0 0.0 -0.0 -0.0 True ----------

Results for age_education_interaction: F-value = 436.789, P-value = 0.000
Tukey-HSD Test Results: Multiple Comparison of Means - Tukey HSD, FWER=0.05
== group1 group2 meandiff p-adj lower upper reject ---------- 1 2 0.8181 0.0 0.6055 1.0306 True 1 3 0.0993 0.0118 0.016 0.1825 True 1 4 -0.4841 0.0 -0.5517 -0.4165 True 2 3 -0.7188 0.0 -0.9272 -0.5104 True 2 4 -1.3021 0.0 -1.5048 -1.0995 True 3 4 -0.5833 0.0 -0.6366 -0.5301 True
---

3. Cluster Variability

	antecedent support	consequent support	support	confidence	\
count	107.000000	107.000000	107.000000	107.000000	
mean	0.083740	0.243636	0.048353	0.620479	
std	0.045382	0.086054	0.023328	0.156351	
min	0.029992	0.125719	0.027116	0.420732	
25%	0.045193	0.182005	0.030403	0.467670	
50%	0.067379	0.202958	0.036565	0.577586	
75%	0.112572	0.256368	0.057313	0.780303	
max	0.202958	0.410846	0.110107	0.917808	

	lift	leverage	conviction	zhangs_metric	total_items	\
count	107.000000	107.000000	107.000000	107.000000	107.000000	
mean	2.742092	0.028951	2.434190	0.654361	2.906542	
std	0.921510	0.015991	1.158408	0.125715	0.292443	
min	1.794985	0.013956	1.327059	0.488225	2.000000	
25%	2.034365	0.017920	1.459066	0.545493	3.000000	
50%	2.285053	0.023929	1.895184	0.600917	3.000000	
75%	3.255464	0.029946	3.161177	0.781146	3.000000	
max	5.463524	0.074919	7.168036	0.872680	3.000000	

		coverage
	count	107.000000
	mean	0.083740
	std	0.045382
	min	0.029992
	25%	0.045193
	50%	0.067379
	75%	0.112572
3	max	0.202958

	antecedent support	consequent support	support	confidence	\
count	84.000000	84.000000	84.000000	84.000000	
mean	0.104050	0.262216	0.058999	0.614567	
std	0.069485	0.080317	0.035814	0.187857	
min	0.029878	0.145305	0.025305	0.395207	
25%	0.051265	0.201912	0.031340	0.437138	
50%	0.076101	0.223768	0.043524	0.552176	
75%	0.139138	0.344592	0.068107	0.752674	
max	0.344592	0.437263	0.142643	0.991416	

		lift	leverage	conviction	zhangs_metric	total_items	coverage
	count	84.000000	84.000000	84.000000	84.000000	84.000000	84.000000
	mean	2.386512	0.033274	5.248958	0.635994	2.904762	0.104050
	std	0.455398	0.020977	12.523368	0.099000	0.295307	0.069485
	min	1.747838	0.012210	1.293575	0.462519	2.000000	0.029878
	25%	2.039033	0.018263	1.447832	0.567646	3.000000	0.051265
	50%	2.343404	0.024154	1.673277	0.619573	3.000000	0.076101
	75%	2.623155	0.041694	3.012710	0.709479	3.000000	0.139138
4	max	4.146542	0.087095	65.558819	0.931602	3.000000	0.344592

	antecedent support	consequent support	support	confidence	\
count	121.000000	121.000000	121.000000	121.000000	
mean	0.076982	0.254484	0.048076	0.681212	
std	0.048871	0.081904	0.025380	0.172412	
min	0.026694	0.112252	0.026010	0.417323	
25%	0.043121	0.199863	0.031485	0.531429	
50%	0.060233	0.220397	0.034908	0.647887	
75%	0.092402	0.296372	0.056810	0.825397	
max	0.220397	0.396988	0.123203	1.000000	

	lift	leverage	conviction	zhangs_metric	total_items	\
count	121.000000	121.000000	121.000000	121.000000	121.000000	
mean	2.826871	0.029753	inf	0.672363	2.900826	
std	0.874105	0.016434	NaN	0.102405	0.300138	
min	1.973658	0.013525	1.370859	0.524092	2.000000	
25%	2.186272	0.018517	1.665150	0.586575	3.000000	
50%	2.469574	0.024001	2.187918	0.634925	3.000000	
75%	3.028221	0.034722	4.186069	0.786848	3.000000	
max	5.826753	0.079154	inf	0.865708	3.000000	

	coverage
count	121.000000
mean	0.076982
std	0.048871
min	0.026694
25%	0.043121
50%	0.060233
75%	0.092402
1 max	0.220397

	antecedent support	consequent support	support	confidence	\
count	24.000000	24.000000	24.000000	24.000000	
mean	0.048925	0.138172	0.037634	0.785230	
std	0.010406	0.055561	0.005268	0.099019	
min	0.032258	0.077419	0.032258	0.666667	
25%	0.043548	0.108065	0.032258	0.714286	
50%	0.051613	0.129032	0.038710	0.750000	
75%	0.053226	0.148387	0.038710	0.833333	
max	0.070968	0.296774	0.051613	1.000000	

	lift	leverage	conviction	zhangs_metric	total_items	coverage
count	24.000000	24.000000	24.000000	24.000000	24.000000	24.000000
mean	6.266899	0.031079	inf	0.868886	2.875000	0.048925
std	1.880070	0.004561	NaN	0.056527	0.337832	0.010406
min	3.369565	0.022685	2.748387	0.726667	2.000000	0.032258
25%	5.054348	0.028377	3.203226	0.845805	3.000000	0.043548
50%	5.794449	0.031384	3.470968	0.873016	3.000000	0.051613
75%	7.799679	0.033933	5.293548	0.906081	3.000000	0.053226
2 max	10.219780	0.042456	inf	0.944820	3.000000	0.070968

4. Rule Metrics Comparison

mean	std	min	25%	50%	75%
04794584438373	0.15635136856818543	0.42073170731707316	0.467670011148272	0.5775862068965517	0.78030303030
45667263102756	0.1878566850199141	0.395206527281999	0.43713793237028264	0.5521755153060461	0.75267441860
12121151123937	0.17241245748440304	0.4173228346456693	0.5314285714285715	0.6478873239436619	0.82539682539
52302789802789	0.09901864756375088	0.6666666666666666	0.7142857142857143	0.75	0.83333333333
49058149800485	0.17700274639572697	0.39316325501663807	0.46019592388244573	0.5493871665465033	0.74370860927

5. Top Unique Rules per Cluster

Cluster 3:

Rule: frozenset({'education_Masters'}) -> frozenset({'sex_Male', 'age_education_interaction_(494.0, 1350.0]'}) (Support: 0.060, Confidence: 0.590, Lift: 1.812)
Rule: frozenset({'occupation_aggregated_Other', 'age_education_interaction_(261.0, 369.0]'}) -> frozenset({'education_HS-grad'}) (Support: 0.034, Confidence: 0.562, Lift: 2.191)
Rule: frozenset({'workclass_Self-emp-inc', 'marital-status_Married-civ-spouse'}) -> frozenset({'occupation_aggregated_Exec-managerial'}) (Support: 0.028, Confidence: 0.507, Lift: 2.417)
Rule: frozenset({'hours_per_week_binned_41-50', 'age_education_interaction_(261.0, 369.0]'}) -> frozenset({'education_HS-grad'}) (Support: 0.057, Confidence: 0.504, Lift: 1.964)
Rule: frozenset({'native_country_aggregated_United-States', 'workclass_Self-emp-inc'}) -> frozenset({'occupation_aggregated_Exec-managerial'}) (Support: 0.029, Confidence: 0.483, Lift: 2.299)

Cluster 4:

Rule: frozenset({'relationship_Wife'}) -> frozenset({'marital-status_Married-civ-spouse'}) (Support: 0.043, Confidence: 0.991, Lift: 2.267)
Rule: frozenset({'relationship_Wife', 'race_White'}) -> frozenset({'marital-status_Married-civ-spouse'}) (Support: 0.036, Confidence: 0.991, Lift: 2.266)
Rule: frozenset({'relationship_Wife', 'workclass_Private'}) -> frozenset({'marital-status_Married-civ-spouse'}) (Support: 0.030, Confidence: 0.990, Lift: 2.265)
Rule: frozenset({'native_country_aggregated_United-States', 'relationship_Wife'}) -> frozenset({'marital-status_Married-civ-spouse'}) (Support: 0.037, Confidence: 0.990, Lift: 2.264)
Rule: frozenset({'relationship_Own-child', 'hours_per_week_binned_21-30'}) -> frozenset({'marital-status_Never-married'}) (Support: 0.029, Confidence: 0.956, Lift: 2.775)

Cluster 1:

Rule: frozenset({'race_White', 'education_Doctorate'}) -> frozenset({'age_education_interaction_(494.0, 1350.0]'}) (Support: 0.031, Confidence: 1.000, Lift: 2.519)
Rule: frozenset({'native_country_aggregated_United-States', 'education_Doctorate'}) -> frozenset({'age_education_interaction_(494.0, 1350.0]'}) (Support: 0.029, Confidence: 1.000, Lift: 2.519)
Rule: frozenset({'education_Doctorate'}) -> frozenset({'age_education_interaction_(494.0, 1350.0]'}) (Support: 0.034, Confidence: 0.980, Lift: 2.470)
Rule: frozenset({'marital-status_Married-civ-spouse', 'education_Doctorate'}) -> frozenset({'age_education_interaction_(494.0, 1350.0]'}) (Support: 0.029, Confidence: 0.977, Lift:

2.460)
Rule: frozenset({'sex_Male', 'education_Doctorate'}) -> frozenset({'age_education_interaction_(494.0, 1350.0]'}) (Support: 0.026, Confidence: 0.974, Lift: 2.454)

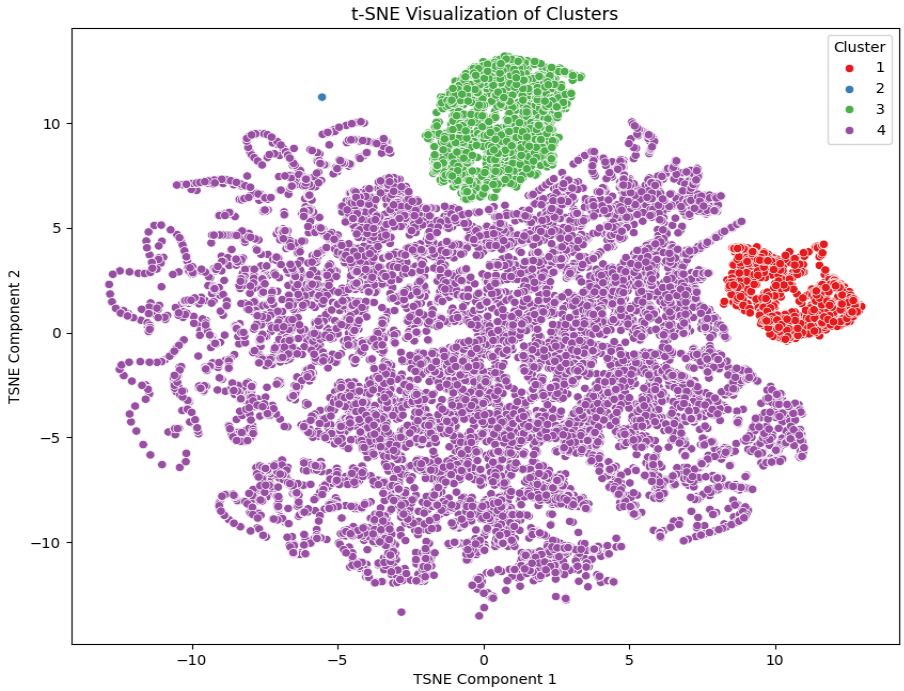
Cluster 2:

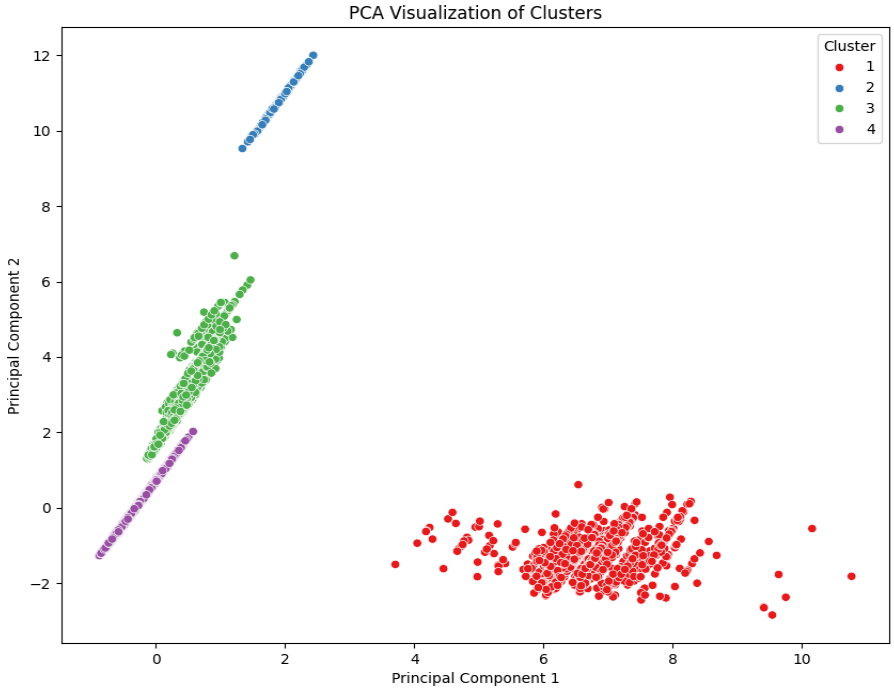
Rule: frozenset({'education_HS-grad', 'age_education_interaction_(494.0, 1350.0]'}) -> frozenset({'hours_per_week_binned_41-50'}) (Support: 0.032, Confidence: 1.000, Lift: 3.370)
Rule: frozenset({'occupation_aggregated_Prof-specialty', 'race_Asian-Pac-Islander'}) -> frozenset({'education_Prof-school'}) (Support: 0.032, Confidence: 1.000, Lift: 3.370)
Rule: frozenset({'race_Asian-Pac-Islander', 'marital-status_Married-civ-spouse'}) -> frozenset({'native_country_aggregated_Other'}) (Support: 0.039, Confidence: 0.857, Lift: 10.220)
Rule: frozenset({'race_Asian-Pac-Islander', 'workclass_Private'}) -> frozenset({'native_country_aggregated_Other'}) (Support: 0.032, Confidence: 0.833, Lift: 9.936)
Rule: frozenset({'occupation_aggregated_Craft-repair', 'marital-status_Married-civ-spouse'}) -> frozenset({'education_HS-grad'}) (Support: 0.032, Confidence: 0.833, Lift: 5.616)

6. Top 10 Common Rules Sorted by Absolute Coverage Difference

Rule: frozenset({'relationship_Own-child', 'marital-status_Never-married'}) (Abs Coverage Difference: 0.292)
Rule: frozenset({'relationship_Own-child', 'marital-status_Never-married'}) (Abs Coverage Difference: 0.275)
Rule: frozenset({'race_White', 'marital-status_Never-married', 'relationship_Not-in-family'}) (Abs Coverage Difference: 0.271)
Rule: frozenset({'relationship_Own-child', 'marital-status_Never-married'}) (Abs Coverage Difference: 0.271)
Rule: frozenset({'native_country_aggregated_United-States', 'marital-status_Never-married', 'relationship_Not-in-family'}) (Abs Coverage Difference: 0.265)
Rule: frozenset({'native_country_aggregated_United-States', 'relationship_Own-child', 'marital-status_Never-married'}) (Abs Coverage Difference: 0.260)
Rule: frozenset({'native_country_aggregated_United-States', 'relationship_Own-child', 'marital-status_Never-married'}) (Abs Coverage Difference: 0.256)
Rule: frozenset({'relationship_Own-child', 'marital-status_Never-married'}) (Abs Coverage Difference: 0.254)
Rule: frozenset({'marital-status_Never-married', 'relationship_Not-in-family'}) (Abs Coverage Difference: 0.252)
Rule: frozenset({'native_country_aggregated_United-States', 'relationship_Own-child', 'marital-status_Never-married'}) (Abs Coverage Difference: 0.242)

7. Cluster Visualizations


t-SNE Visualization of Clusters
Cluster
1
2
3
4
TSNE Component 2
TSNE Component 1
10
5
0
−5
−10
−10
−5
0
5
10


PCA Visualization of Clusters
Cluster
1
2
3
4
Principal Component 2
Principal Component 1
12
10
8
6
4
2
0
−2
0
2
4
6
8
10