

I. Research Background and Motivation

Customer personality analysis represents a comprehensive examination of a company's ideal clients. It aids businesses in better understanding their customers, enabling them to tailor their products more effectively based on the specific needs, behaviors, and concerns of various customer types. Customer personality analysis assists companies in modifying their offerings for target customer segments drawn from different types of customer groups. For instance, instead of spending money to promote new products to every customer in the company's database, a firm can analyze which customer group is most likely to purchase the product and then market the product exclusively to that particular group.

To identify target customers for wine, meat products, and gold, it is proposed to first investigate the factors that influence customer purchasing intentions

II. Research Objectives

The study aims to analyze whether customers' spending on wine, meat products, and gold is related to their educational level, emotional status, and household annual income.

III. Variable Introduction

- 1. ID (Customer ID):** A unique identifier assigned to each customer.
- 2. Year_Birth (Customer's Year of Birth):** The year in which the customer was born.
- 3. Education (Customer's Education Level):**
 - Basic: Elementary or Middle School
 - Graduation: High School
 - 2n Cycle: Master's Degree
 - Master: Bachelor's Degree
 - PhD: Doctorate
- 4. Marital_Status (Emotional Status):**
 - Divorced: The customer is divorced.
 - Married: The customer is married.
 - Single: The customer is single.
 - Together: The customer is in a relationship but not married.

- Widow: The customer is a widow/widower.
5. **Income (Household Annual Income):** The total yearly income of the customer's household.
 6. **Recency:** The number of days since the customer's last purchase.
 7. **MntWines (Spending on Wines in the Last Two Years):** The amount of money spent on wine in the past two years.
 8. **MntMeatProducts (Spending on Meat Products in the Last Two Years):** The amount of money spent on meat products in the past two years.
 9. **MntGoldProds (Spending on Gold in the Last Two Years):** The amount of money spent on gold in the past two years.
 10. **Wine:** Categorization of the MntWines variable into five groups based on spending amount:
 - Less than 300
 - 300 to 600
 - 600 to 900
 - 900 to 1200
 - More than 1200
 11. **Meat:** Categorization of the MntMeatProducts variable into five groups based on spending amount:
 - Less than 150
 - 150 to 300
 - 300 to 450
 - 450 to 700
 - More than 700
 12. **Gold:** Categorization of the MntGoldProds variable into five groups based on spending amount:
 - Less than 50
 - 50 to 100
 - 100 to 150
 - 150 to 200

- More than 200

13. Incomegp (Income Groups): Categorization of the Income variable into four groups based on amount:

- Less than 30,000
- 30,000 to 50,000
- 50,000 to 70,000
- More than 70,000

IV. Data Source

The dataset for this study was obtained from Kaggle, an online community of data scientists and machine learning practitioners. The specific dataset, titled "Customer Personality Analysis," was used to analyze customer spending behaviors on wine, meat products, and gold. This dataset includes detailed information on customer demographics, purchasing history, and socio-economic indicators. The dataset can be accessed through the following URL:

<https://www.kaggle.com/code/armanmostafazadeh/customer-personality-analysis-k-means/input>, provided by the user Arman Mostafazadeh.

V. Descriptive Statistics

Descriptive statistics provide a concise summary of data through measures of central tendency (mean, median) and measures of variability (standard deviation, variance, range, quartiles).

The descriptive statistics for continuous variables such as "MntWines" (amount spent on wines), "MntMeatProducts" (amount spent on meat products), and "MntGoldProds" (amount spent on gold) over the past two years :

The MEANS Procedure									
Variable	N	Maximum	Minimum	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean	Skewness	Kurtosis
MntWines	2216	1493.00	0.00	305.09	337.33	291.04	319.14	1.17	0.58
MntMeatProducts	2216	1725.00	0.00	167.00	224.28	157.65	176.34	2.03	5.06
MntGoldProds	2216	321.00	0.00	43.97	51.82	41.81	46.12	1.84	3.16

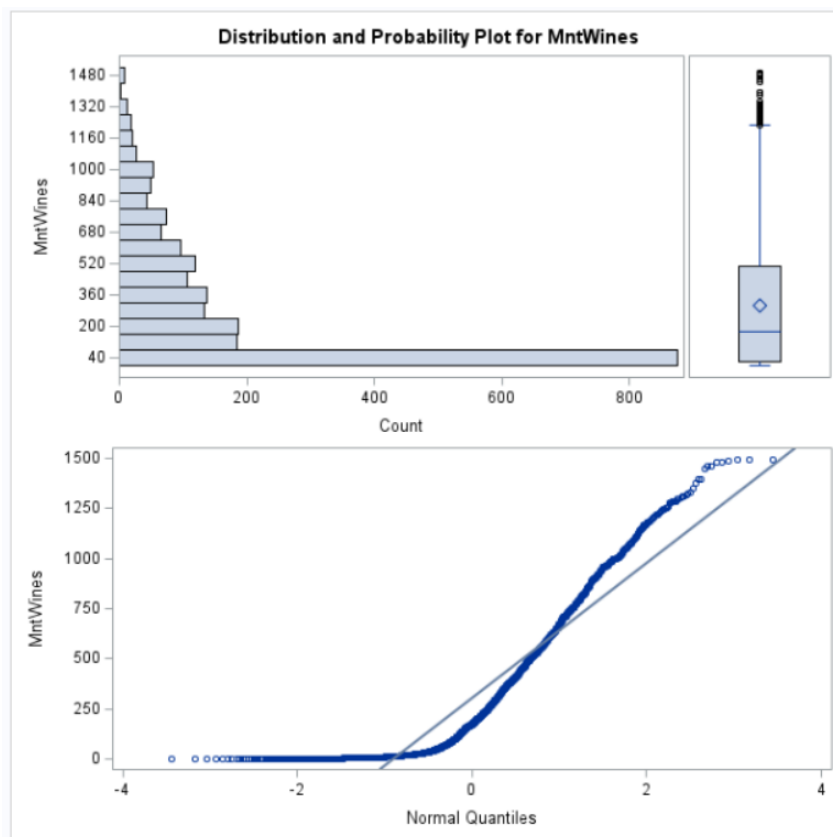
- For the continuous data of "MntWines"

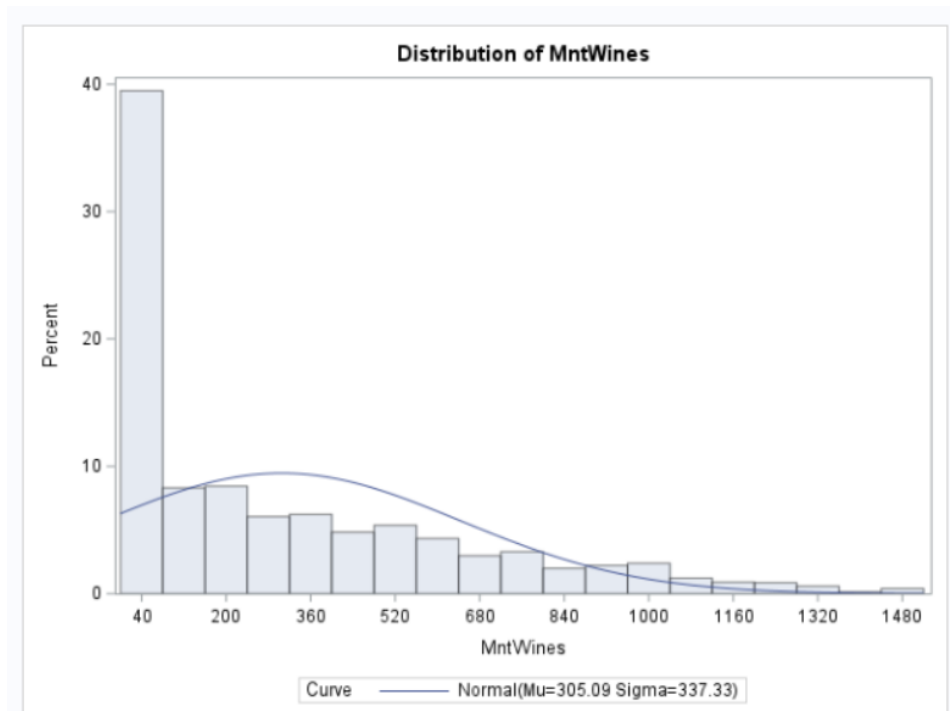
as indicated by the part circled in red, the goodness-of-fit test for normal distribution indicates that the p-value is less than 0.05, indicating that this variable does not follow a normal distribution.

The UNIVARIATE Procedure
Variable: MntWines

Moments			
N	2216	Sum Weights	2216
Mean	305.091606	Sum Observations	676083
Std Deviation	337.32792	Variance	113790.126
Skewness	1.1707201	Kurtosis	0.58274112
Uncorrected SS	458312377	Corrected SS	252045128
Coeff Variation	110.56611	Std Error Mean	7.16584501

Basic Statistical Measures			
Location		Variability	
Mean	305.0916	Std Deviation	337.32792
Median	174.5000	Variance	113790
Mode	2.0000	Range	1493
		Interquartile Range	481.00000





**The UNIVARIATE Procedure
Fitted Normal Distribution for MntWines**

Parameters for Normal Distribution		
Parameter	Symbol	Estimate
Mean	Mu	305.0916
Std Dev	Sigma	337.3279

Goodness-of-Fit Tests for Normal Distribution				
Test	Statistic		p Value	
Kolmogorov-Smirnov	D	0.182882	Pr > D	<0.010
Cramer-von Mises	W-Sq	20.374027	Pr > W-Sq	<0.005
Anderson-Darling	A-Sq	120.907622	Pr > A-Sq	<0.005

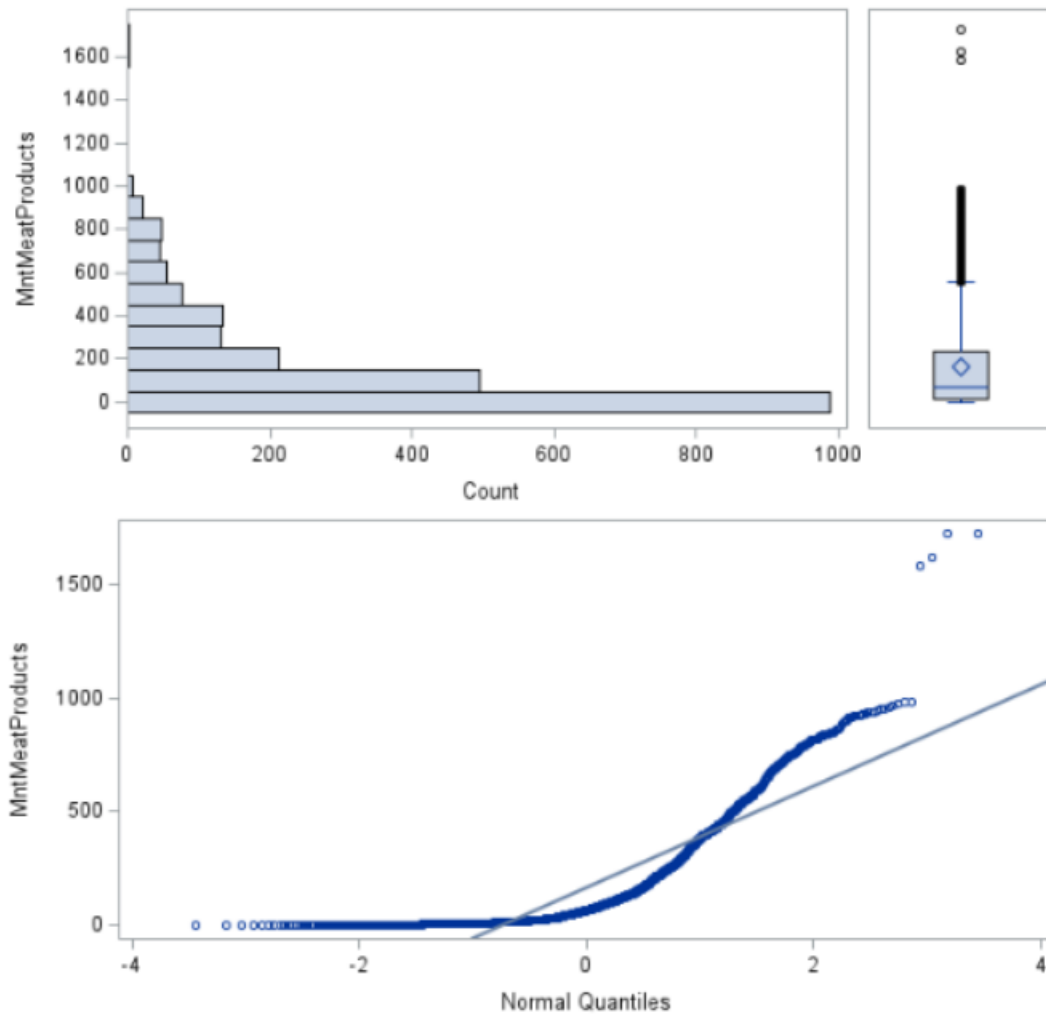
- For the continuous data of " MntMeatProducts"

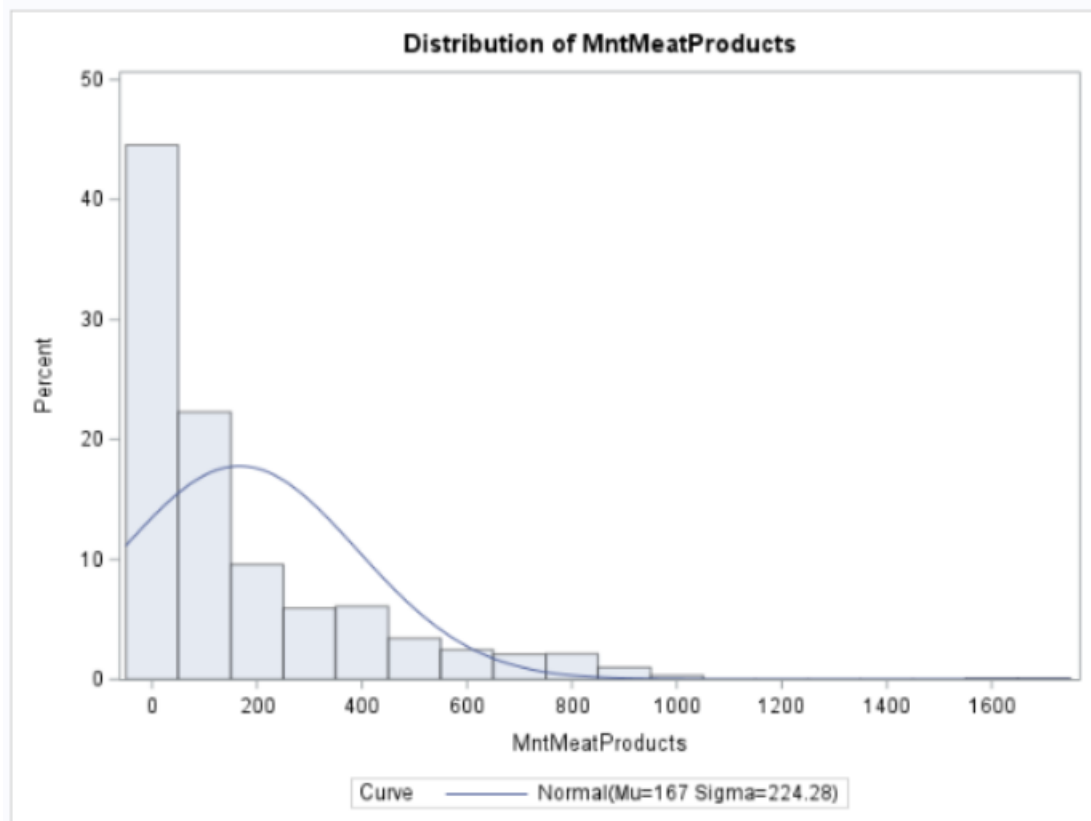
The UNIVARIATE Procedure
Variable: MntMeatProducts

Moments			
N	2216	Sum Weights	2216
Mean	166.995939	Sum Observations	370063
Std Deviation	224.283273	Variance	50302.9864
Skewness	2.02557681	Kurtosis	5.05547668
Uncorrected SS	173220133	Corrected SS	111421115
Coeff Variation	134.304627	Std Error Mean	4.76444159

Basic Statistical Measures			
Location		Variability	
Mean	166.9959	Std Deviation	224.28327
Median	68.0000	Variance	50303
Mode	7.0000	Range	1725
		Interquartile Range	216.50000

Distribution and Probability Plot for MntMeatProducts





The UNIVARIATE Procedure
Fitted Normal Distribution for MntMeatProducts

Parameters for Normal Distribution		
Parameter	Symbol	Estimate
Mean	M u	166.9959
Std Dev	Sigma	224.2833

Goodness-of-Fit Tests for Normal Distribution				
Test	Statistic		p Value	
Kolmogorov-Smirnov	D	0.229163	Pr> D	<0.010
Cramer-von Mises	W-Sq	37.559807	Pr> W-Sq	<0.005
Anderson-Darling	A-Sq	202.411856	Pr> A-Sq	<0.005

- **For the continuous data of "MntGoldProds"**

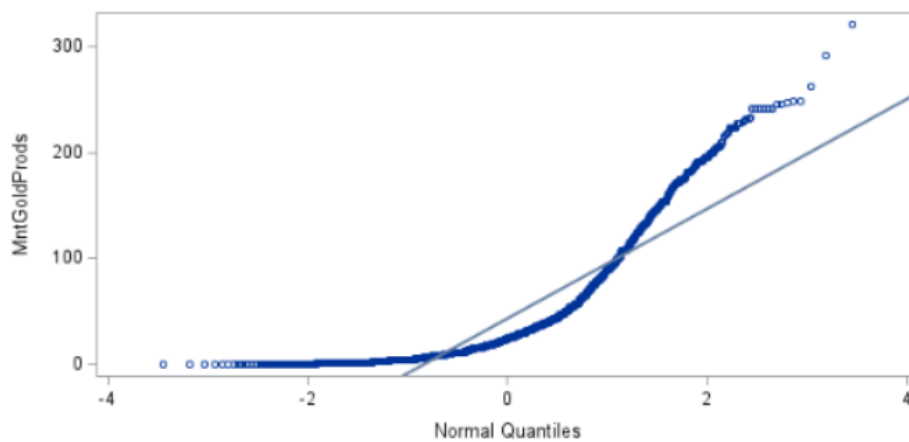
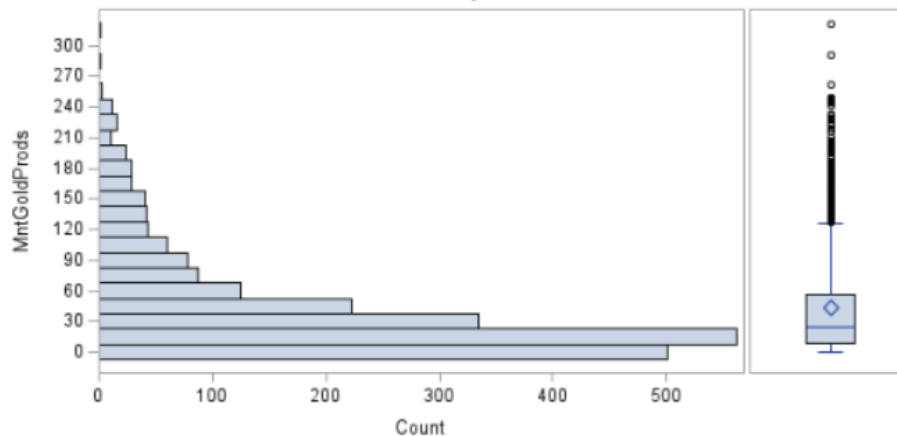
as indicated by the portion encircled in red, the goodness-of-fit test for normal distribution reveals that the p-value is less than 0.05. Consequently, this suggests that the variable does not adhere to a normal distribution.

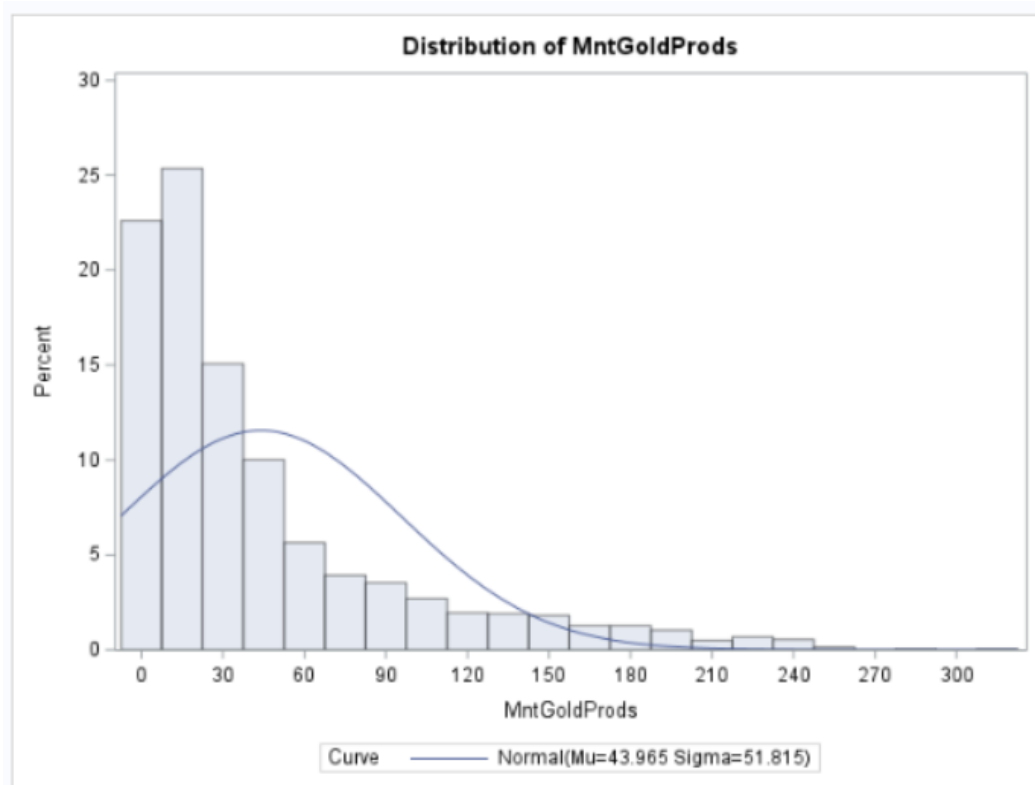
The UNIVARIATE Procedure
Variable: MntGoldProds

Moments			
N	2216	Sum Weights	2216
Mean	43.9652527	Sum Observations	97427
Std Deviation	51.8154144	Variance	2684.83717
Skewness	1.83923094	Kurtosis	3.15634186
Uncorrected SS	10230317	Corrected SS	5946914.32
Coeff Variation	117.855377	Std Error Mean	1.100713

Basic Statistical Measures			
Location		Variability	
Mean	43.96525	Std Deviation	51.81541
Median	24.50000	Variance	2685
Mode	1.00000	Range	321.00000
		Interquartile Range	47.00000

Distribution and Probability Plot for MntGoldProds





The UNIVARIATE Procedure
Fitted Normal Distribution for MntGoldProds

Parameters for Normal Distribution		
Parameter	Symbol	Estimate
Mean	M u	43.96525
Std Dev	Sigma	51.81541

Goodness-of-Fit Tests for Normal Distribution				
Test	Statistic		p Value	
Kolmogorov-Smirnov	D	0.198080	Pr> D	<0.010
Cramer-von Mises	W-Sq	30.696421	Pr> W-Sq	<0.005
Anderson-Darling	A-Sq	170.123046	Pr> A-Sq	<0.005

VI. Independence Test

- Using independence test to test whether there is a significant relationship between customers' education level, marital status, household annual income, and their spending on wine over the past two years

Frequency Percent Row Pct Col Pct	Table of Education by wine					
	Education	wine				
		300~600	600~900	900~1200	<300	>1200
2n Cycle		38	17	4	140	1
		1.71	0.77	0.18	6.32	0.05
		19.00	8.50	2.00	70.00	0.50
		8.68	6.91	2.96	10.35	2.27
Basic		0	0	0	54	0
		0.00	0.00	0.00	2.44	0.00
		0.00	0.00	0.00	100.00	0.00
		0.00	0.00	0.00	3.99	0.00
Graduation		240	114	50	698	14
		10.83	5.14	2.26	31.50	0.63
		21.51	10.22	4.48	62.54	1.25
		54.79	46.34	37.04	51.59	31.82
Master		63	42	33	219	8
		2.84	1.90	1.49	9.88	0.36
		17.26	11.51	9.04	60.00	2.19
		14.38	17.07	24.44	16.19	18.18
PhD		97	73	48	242	21
		4.38	3.29	2.17	10.92	0.95
		20.17	15.18	9.98	50.31	4.37
		22.15	29.67	35.56	17.89	47.73
Total		438	246	135	1353	44
		19.77	11.10	6.09	61.06	1.99

Figure 1: Contingency Table of Education Level and Wine Spending Over the Past Two Years

Statistics for Table of Education by wine			
Statistic	DF	Value	Prob
Chi-Square	16	105.2841	<.0001
Likelihood Ratio Chi-Square	16	121.6763	<.0001
Mantel-Haenszel Chi-Square	1	7.0954	0.0077
Phi Coefficient		0.2180	
Contingency Coefficient		0.2130	
Cramer's V		0.1090	
Sample Size = 2216			

Figure 2: Chi-square Test for Independence Between Education Level and Wine Spending Over the Past Two Years

From Figure 2, it can be observed that the Chi-square p-value is less than 0.05, allowing us to reject the null hypothesis (H_0). This means that education level and wine spending over the past two years are not independent of each other; rather, they are interrelated and **influence** each other.

Frequency Percent Row Pct Col Pct	Table of Marital_Status by wine					
	Marital_Status	wine				
		300~600	600~900	900~1200	<300	>1200
		Total				
Divorced		45	27	19	138	3
		2.03	1.22	0.86	6.23	0.14
		19.40	11.64	8.19	59.48	1.29
		10.27	10.98	14.07	10.20	6.82
Married		169	95	46	528	19
		7.63	4.29	2.08	23.83	0.86
		19.72	11.09	5.37	61.61	2.22
		38.58	38.62	34.07	39.02	43.18
Single		86	50	32	303	7
		3.88	2.26	1.44	13.67	0.32
		17.99	10.46	6.69	63.39	1.46
		19.63	20.33	23.70	22.39	15.91
Together		115	65	33	347	13
		5.19	2.93	1.49	15.66	0.59
		20.07	11.34	5.76	60.56	2.27
		26.26	26.42	24.44	25.65	29.55
Widow		23	9	5	37	2
		1.04	0.41	0.23	1.67	0.09
		30.26	11.84	6.58	48.68	2.63
		5.25	3.66	3.70	2.73	4.55
Total		438	246	135	1353	44
		19.77	11.10	6.09	61.06	1.99
						100.00

Figure 3: Contingency Table of Marital Status and Wine Spending Over the Past Two Years

Statistics for Table of Marital_Status by wine			
Statistic	DF	Value	Prob
Chi-Square	16	12.5082	0.7083
Likelihood Ratio Chi-Square	16	12.0450	0.7409
Mantel-Haenszel Chi-Square	1	0.6669	0.4142
Phi Coefficient		0.0751	
Contingency Coefficient		0.0749	
Cramer's V		0.0376	

Sample Size = 2216

Figure 4: Chi-square Test for Independence Between Marital Status and Wine Spending Over the Past Two Years

From Figure 4, it is evident that the Chi-square p-value is greater than 0.05, therefore we cannot reject the null hypothesis (H_0). This indicates that marital status and wine spending over the past two years are independent of each other, meaning they do **not** influence each other.

Frequency Percent Row Pct Col Pct	Table of incomegp by wine					
	incomegp	wine				
		300~600	600~900	900~1200	<300	>1200
30000~50000		40	6	2	642	0
		1.81	0.27	0.09	28.97	0.00
		5.80	0.87	0.29	93.04	0.00
		9.13	2.44	1.48	47.45	0.00
50000~70000		223	114	44	259	8
		10.06	5.14	1.99	11.69	0.36
		34.41	17.59	6.79	39.97	1.23
		50.91	46.34	32.59	19.14	18.18
<30000		0	0	0	370	0
		0.00	0.00	0.00	16.70	0.00
		0.00	0.00	0.00	100.00	0.00
		0.00	0.00	0.00	27.35	0.00
>70000		175	126	89	82	36
		7.90	5.69	4.02	3.70	1.62
		34.45	24.80	17.52	16.14	7.09
		39.95	51.22	65.93	6.06	81.82
Total		438	246	135	1353	44
		19.77	11.10	6.09	61.06	1.99

Figure 5: Contingency Table of Household Annual Income and Wine Spending Over the Past Two Years

Statistics for Table of incomegp by wine			
Statistic	DF	Value	Prob
Chi-Square	12	1165.7824	<.0001
Likelihood Ratio Chi-Square	12	1358.4041	<.0001
Mantel-Haenszel Chi-Square	1	191.6056	<.0001
Phi Coefficient		0.7253	
Contingency Coefficient		0.5871	
Cramer's V		0.4188	
Sample Size = 2216			

Figure 6: Chi-square Test for Independence Between Household Annual Income and Wine Spending Over the Past Two Years

From Figure 6, it is apparent that the Chi-square p-value is less than 0.05, allowing for the rejection of the null hypothesis (H_0). This implies that household annual income and wine spending over the past two years are not independent of each other; rather, they **influence** each other.

- Testing whether education level, marital status, and household annual income are related to customers' spending on meat products over the past two years.

Frequency Percent Row Pct Col Pct	Table of Education by meat						
	Education	meat					
		150~300	300~500	450~700	<150	>700	Total
	2n Cycle	23	15	9	147	6	200
		1.04	0.68	0.41	6.63	0.27	9.03
		11.50	7.50	4.50	73.50	3.00	
		7.90	6.76	7.63	9.93	5.77	
	Basic	0	0	0	54	0	54
		0.00	0.00	0.00	2.44	0.00	2.44
		0.00	0.00	0.00	100.00	0.00	
		0.00	0.00	0.00	3.65	0.00	
	Graduation	166	133	58	701	58	1116
		7.49	6.00	2.62	31.63	2.62	50.36
		14.87	11.92	5.20	62.81	5.20	
		57.04	59.91	49.15	47.33	55.77	
	Master	47	22	23	254	19	365
		2.12	0.99	1.04	11.46	0.86	16.47
		12.88	6.03	6.30	69.59	5.21	
		16.15	9.91	19.49	17.15	18.27	
	PhD	55	52	28	325	21	481
		2.48	2.35	1.26	14.67	0.95	21.71
		11.43	10.81	5.82	67.57	4.37	
		18.90	23.42	23.73	21.94	20.19	
Total	291	222	118	1481	104	2216	
	13.13	10.02	5.32	66.83	4.69	100.00	

Figure 7: Contingency Table of Education Level and Meat Product Spending Over the Past Two Years

Statistics for Table of Education by meat			
Statistic	DF	Value	Prob
Chi-Square	16	50.0353	<.0001
Likelihood Ratio Chi-Square	16	67.7092	<.0001
Mantel-Haenszel Chi-Square	1	0.0432	0.8353
Phi Coefficient		0.1503	
Contingency Coefficient		0.1486	
Cramer's V		0.0751	
Sample Size = 2216			

Figure 8: Chi-square Test for Independence Between Education Level and Meat Product Spending Over the Past Two Years

From Figure 8, it is evident that the Chi-square p-value is less than 0.05, thus we can reject the null hypothesis (H0). This means that education level and spending on meat products over the past two years are not independent of each other; instead, they **influence** each other.

Frequency Percent Row Pct Col Pct	Table of Marital_Status by meat						
	Marital_Status	meat					Total
		150~300	300~500	450~700	<150	>700	
	Divorced	39	27	9	152	5	232
		1.76	1.22	0.41	6.86	0.23	10.47
		16.81	11.64	3.88	65.52	2.16	
		13.40	12.16	7.63	10.26	4.81	
	Married	114	78	36	588	41	857
		5.14	3.52	1.62	26.53	1.85	38.67
		13.30	9.10	4.20	68.61	4.78	
		39.18	35.14	30.51	39.70	39.42	
	Single	44	48	32	321	33	478
		1.99	2.17	1.44	14.49	1.49	21.57
		9.21	10.04	6.69	67.15	6.90	
		15.12	21.62	27.12	21.67	31.73	
	Together	79	64	32	375	23	573
		3.56	2.89	1.44	16.92	1.04	25.86
		13.79	11.17	5.58	65.45	4.01	
		27.15	28.83	27.12	25.32	22.12	
	Widow	15	5	9	45	2	76
		0.68	0.23	0.41	2.03	0.09	3.43
		19.74	6.58	11.84	59.21	2.63	
		5.15	2.25	7.63	3.04	1.92	
	Total	291	222	118	1481	104	2216
		13.13	10.02	5.32	66.83	4.69	100.00

Figure 9: Contingency Table of Marital Status and Meat Product Spending Over the Past Two Years

Statistics for Table of Marital_Status by meat			
Statistic	DF	Value	Prob
Chi-Square	16	35.2067	0.0037
Likelihood Ratio Chi-Square	16	34.3213	0.0049
Mantel-Haenszel Chi-Square	1	0.0509	0.8215
Phi Coefficient		0.1260	
Contingency Coefficient		0.1251	
Cramer's V		0.0630	
Sample Size = 2216			

Figure 10: Chi-square Test for Independence Between Marital Status and Meat Product Spending Over the Past Two Years

From Figure 10, it is evident that the Chi-square p-value is less than 0.05, therefore we can reject the null hypothesis (H0). This indicates that marital status and spending on meat products over the past two years are not independent of each other; rather, they **influence** each other.

Frequency Percent Row Pct Col Pct	Table of incomegp by meat					
	incomegp	meat				
		150~300	300~500	450~700	<150	>700
30000~50000		26	0	0	664	0
		1.17	0.00	0.00	29.96	0.00
		3.77	0.00	0.00	96.23	0.00
		8.93	0.00	0.00	44.83	0.00
50000~70000		161	71	16	386	14
		7.27	3.20	0.72	17.42	0.63
		24.85	10.96	2.47	59.57	2.16
		55.33	31.98	13.56	26.06	13.46
<30000		2	0	0	367	1
		0.09	0.00	0.00	16.56	0.05
		0.54	0.00	0.00	99.19	0.27
		0.69	0.00	0.00	24.78	0.96
>70000		102	151	102	64	89
		4.60	6.81	4.60	2.89	4.02
		20.08	29.72	20.08	12.60	17.52
		35.05	68.02	86.44	4.32	85.58
Total		291	222	118	1481	104
		13.13	10.02	5.32	66.83	4.69

Figure 11: Contingency Table of Household Annual Income and Meat Product

Spending Over the Past Two Years

Statistics for Table of incomegp by meat			
Statistic	DF	Value	Prob
Chi-Square	12	1365.4681	<.0001
Likelihood Ratio Chi-Square	12	1480.1994	<.0001
Mantel-Haenszel Chi-Square	1	148.3916	<.0001
Phi Coefficient		0.7850	
Contingency Coefficient		0.6175	
Cramer's V		0.4532	

Sample Size = 2216

Figure 12: Chi-square Test for Independence Between Household Annual Income and Meat Product Spending Over the Past Two Years

From Figure 12, it is apparent that the Chi-square p-value is less than 0.05, therefore we can reject the null hypothesis (H_0). This means that household annual income and spending on meat products over the past two years are not independent of each other; instead, they **influence** each other.

- Testing whether education level, marital status, and household annual income are related to customers' spending on gold over the past two years.

Frequency Percent Row Pct Col Pct	Table of Education by gold					
	Education	gold				
		100~150	150~200	50~100	<50	>200
	2n Cycle	13	8	31	142	6
		0.59	0.36	1.40	6.41	0.27
		6.50	4.00	15.50	71.00	3.00
		8.33	8.33	9.48	8.93	13.04
	Basic	2	0	0	52	0
		0.09	0.00	0.00	2.35	0.00
		3.70	0.00	0.00	96.30	0.00
		1.28	0.00	0.00	3.27	0.00
	Graduation	98	63	183	742	30
		4.42	2.84	8.26	33.48	1.35
		8.78	5.65	16.40	66.49	2.69
		62.82	65.63	55.96	46.64	65.22
	Master	21	13	63	264	4
		0.95	0.59	2.84	11.91	0.18
		5.75	3.56	17.26	72.33	1.10
		13.46	13.54	19.27	16.59	8.70
	PhD	22	12	50	391	6
		0.99	0.54	2.26	17.64	0.27
		4.57	2.49	10.40	81.29	1.25
		14.10	12.50	15.29	24.58	13.04
	Total	156	96	327	1591	46
		7.04	4.33	14.76	71.80	2.08
						100.00

Figure 13: Contingency Table of Education Level and Gold Spending Over the Past Two Years

Statistics for Table of Education by gold			
Statistic	DF	Value	Prob
Chi-Square	16	61.8731	<.0001
Likelihood Ratio Chi-Square	16	74.4447	<.0001
Mantel-Haenszel Chi-Square	1	6.5461	0.0105
Phi Coefficient		0.1671	
Contingency Coefficient		0.1648	
Cramer's V		0.0835	
Sample Size = 2216			

Figure 14: Chi-square Test for Independence Between Education Level and Gold

Spending Over the Past Two Years

From Figure 14, it is evident that the Chi-square p-value is less than 0.05, thus we can reject the null hypothesis (H_0). This indicates that education level and spending on gold over the past two years are not independent of each other; rather, they **influence** each other.

Frequency Percent Row Pct Col Pct	Table of Marital_Status by gold						
	Marital_Status	gold					
		100~150	150~200	50~100	<50	>200	Total
	Divorced	17	13	35	162	5	232
		0.77	0.59	1.58	7.31	0.23	10.47
		7.33	5.60	15.09	69.83	2.16	
		10.90	13.54	10.70	10.18	10.87	
	Married	58	33	122	624	20	857
		2.62	1.49	5.51	28.16	0.90	38.67
		6.77	3.85	14.24	72.81	2.33	
		37.18	34.38	37.31	39.22	43.48	
	Single	34	17	66	351	10	478
		1.53	0.77	2.98	15.84	0.45	21.57
		7.11	3.56	13.81	73.43	2.09	
		21.79	17.71	20.18	22.06	21.74	
	Together	38	28	87	411	9	573
		1.71	1.26	3.93	18.55	0.41	25.86
		6.63	4.89	15.18	71.73	1.57	
		24.36	29.17	26.61	25.83	19.57	
	Widow	9	5	17	43	2	76
		0.41	0.23	0.77	1.94	0.09	3.43
		11.84	6.58	22.37	56.58	2.63	
		5.77	5.21	5.20	2.70	4.35	
	Total	156	96	327	1591	46	2216
		7.04	4.33	14.76	71.80	2.08	100.00

Figure 15: Contingency Table of Marital Status and Gold Spending Over the Past Two Years

Statistics for Table of Marital_Status by gold			
Statistic	DF	Value	Prob
Chi-Square	16	13.5253	0.6340
Likelihood Ratio Chi-Square	16	12.7848	0.6884
Mantel-Haenszel Chi-Square	1	1.2111	0.2711
Phi Coefficient		0.0781	
Contingency Coefficient		0.0779	
Cramer's V		0.0391	
Sample Size = 2216			

Figure 16: Chi-square Test for Independence Between Marital Status and Gold Spending Over the Past Two Years

From Figure 16, it is apparent that the Chi-square p-value is greater than 0.05, therefore we cannot reject the null hypothesis (H0). This means that marital status and spending on gold over the past two years are independent of each other, indicating they do **not influence** each other.

Frequency Percent Row Pct Col Pct	Table of incomegp by gold					
	incomegp	gold				
		100~150	150~200	50~100	<50	>200
	30000~50000	23	7	50	609	1
		1.04	0.32	2.26	27.48	0.05
		3.33	1.01	7.25	88.26	0.14
		14.74	7.29	15.29	38.28	2.17
	50000~70000	68	47	140	382	11
		3.07	2.12	6.32	17.24	0.50
		10.49	7.25	21.60	58.95	1.70
		43.59	48.96	42.81	24.01	23.91
	<30000	3	0	7	357	3
		0.14	0.00	0.32	16.11	0.14
		0.81	0.00	1.89	96.49	0.81
		1.92	0.00	2.14	22.44	6.52
	>70000	62	42	130	243	31
		2.80	1.90	5.87	10.97	1.40
		12.20	8.27	25.59	47.83	6.10
		39.74	43.75	39.76	15.27	67.39
	Total	156	96	327	1591	46
		7.04	4.33	14.76	71.80	2.08
						100.00

Figure 17: Contingency Table of Household Annual Income and Gold Spending Over the Past Two Years

Statistics for Table of incomegp by gold			
Statistic	DF	Value	Prob
Chi-Square	12	425.8055	<.0001
Likelihood Ratio Chi-Square	12	473.6206	<.0001
Mantel-Haenszel Chi-Square	1	45.7861	<.0001
Phi Coefficient		0.4383	
Contingency Coefficient		0.4015	
Cramer's V		0.2531	
Sample Size = 2216			

Figure 18: Chi-square Test for Independence Between Household Annual Income and Gold Spending Over the Past Two Years

From Figure 18, it is evident that the Chi-square p-value is less than 0.05, thus we can reject the null hypothesis (H_0). This indicates that household annual income and spending on gold over the past two years are not independent of each other; rather, they **influence** each other.

VII. Conclusion

Synthesizing Figures 1 to 18, the following conclusions can be drawn:

	Spending on Wine Over the Past Two Years	Spending on Meat Products Over the Past Two Years	Spending on Gold Over the Past Two Years
Customer Education Level	Related	Related	Related
Customer Marital Status	Not Related	Related	Not Related
Customer Household Annual Income	Related	Related	Related

Spending on wine, meat products, or gold is related to a customer's level of education and annual household income; however, a customer's relationship status only correlates with spending on meat products and is unrelated to expenditures on wine or gold. This means if a manufacturer wants to sell wine, meat products, or gold items,

they can tailor their pricing and promotional activities for customers with different levels of education and household incomes. However, if a manufacturer wishes to set sales prices based on customers' relationship status for holidays like Valentine's Day, this approach would be more suitable only for meat product vendors.