Chi-Square test

Using the Chi-Square test for independence to determine if there's a significant association between the type of smart home device purchased (Smart Thermostats vs. Smart Lights) and the customer satisfaction level.

*Comparison between Satisfaction and Smart Thermostats*

*Step 1*:Stating the Hypotheses

* Ho: Variables are Independent on each other (No Relationship )
* H1: Variables are dependent on each other (There is a Relationship )

*Step 2*:

* Copied the given data into Excel and converted into csv file

Import the csv file into jupyter notebook by using the library Pandas

* import pandas as pd
* df = pd.read\_csv(”chi.csv”)

df

*Step 3*:

Now useing the Crosstab for Satisfaction and Smart Thermostat to analyse the relationship between them

* pd.crosstab(df['Satisfaction'], df["Smart Thermostat"],margins=True)

*Step 4*: Computing the Chi-Square Statistic

* import researchpy as rp
* table,results = rp.crosstab(df['Satisfaction'], df["Smart Thermostat"], test='chi-square')
* results

Pearson Chi-square ( 12.0)= 15.0000

p-value =0.24142

Cramer's V =1.0000

*Step 5*:

Determining the Critical Value:

Using the significance level (alpha) of 0.05 and the degrees of freedom (numbers of rows -1)(numbers of columns -1)

* import scipy.stats as stats
* chi\_table = stats.chi2.ppf(q = 0.95, df = 12)
* chi\_table.round(4)

21.0261

*Step 6*: Making a Decision**:**

As the Chi-square calculated value is less than the Chi table value (15.0000<21.0261) so the value falls under Accepted Region than

* Ho is accepted and H1 is rejected.
* Comparing P value with aplha

alpha = 0.05

p\_value = 0.24142

if p\_value <alpha:

print("Ho is rejected and H1 is accepted")

else:

print("Ho is accepted and H1 is rejected")

* Ho is accepted and H1 is rejected

*Conclusion*:

We have a significance evidence to say that those two variables are independent on each other.

*Comparison between Satisfaction and Smart Lights*

*Step 1*:Stating the Hypotheses

* Ho: Variables are Independent on each other (No Relationship )
* H1: Variables are dependent on each other (There is a Relationship )

*Step 2*:

* Copied the given data into Excel and converted into csv file

Import the csv file into jupyter notebook by using the library Pandas

* import pandas as pd
* df = pd.read\_csv(”chi.csv”)

df

*Step 3*:

Now useing the Crosstab for Satisfaction and Smart Lights to analyse the relationship between them

* pd.crosstab(df['Satisfaction'], df["Smart Lights"],margins=True)

*Step 4*: Computing the Chi-Square Statistic

* import researchpy as rp
* table,results = rp.crosstab(df['Satisfaction'], df["Smart Lights"], test='chi-square')
* results

Pearson Chi-square ( 9.0)= 11.250

p-value =0.259

Cramer's V =0.866

*Step 5*:

Determining the Critical Value:

Using the significance level (alpha) of 0.05 and the degrees of freedom (numbers of rows -1)(numbers of columns -1)

* import scipy.stats as stats
* chi\_table = stats.chi2.ppf(q = 0.95, df = 9)
* chi\_table.round(4)

16.919

*Step 6*: Making a Decision**:**

As the Chi-square calculated value is less than the Chi table value (11.250<16.919) so the value falls under Accepted Region than

* Ho is accepted and H1 is rejected.
* Comparing P value with aplha

alpha = 0.05

p\_value =0.259

if p\_value <alpha:

print("Ho is rejected and H1 is accepted")

else:

print("Ho is accepted and H1 is rejected")

* Ho is accepted and H1 is rejected

*Conclusion*:

We have a significance evidence to say that those two variables are independent on each other.