**Report Assignment 3**

Statistics Analysis

Abstract:

Introduction:

This report presents the results of the chi-square test conducted to compare the number of successes and failures between two algorithms, Algorithm 1 (Veronica Gavagna) and Algorithm 2 (Simone Borelli) when given the same initial conditions.

The chi-square test can be used to determine if there is a significant difference in the failure and success rates between two algorithms given the same initial condition. The test compares the observed frequencies of failures and successes with the expected frequencies under the assumption that both algorithms have the same failure and success rates.

Methodology:

1. Data Collection:

The number of successes and failures were recorded for both Algorithm 1 and Algorithm 2 under identical initial conditions. The radius of the internal circle was set to 1 and the radius of the external circle was set to 2. The number of boxes was chosen randomly between 2 and 10.

A contingency table was constructed to organize the observed frequencies, with two rows representing the two algorithms and two columns representing the number of failures and successes.

1. Hypotheses:

* Null Hypothesis (H0): There is no significant difference in the failure and success rates between Algorithm 1 and Algorithm 2.
* Alternative Hypothesis (Ha): There is a significant difference in the failure and success rates between Algorithm 1 and Algorithm 2.

1. Calculation of Expected Frequencies:

Under the assumption that both algorithms have the same failure and success rates, the expected frequencies were calculated for each cell of the contingency table.

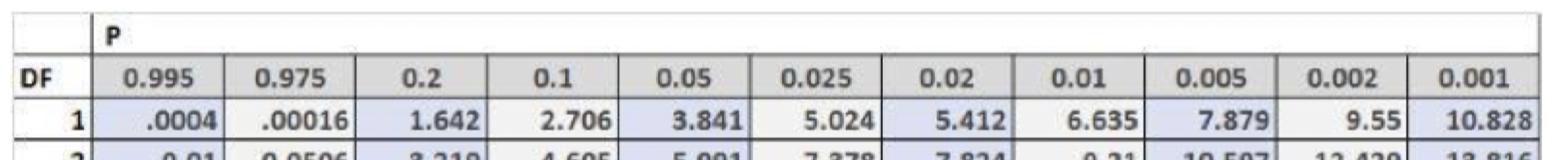
The expected frequency for the two categories (success and failure) was determined using the formula:

* Expected success:
* Expected failure:

1. Chi-square Test:

The chi-square statistic was calculated using the formula:

The calculated chi-square value was compared to the critical chi-square value corresponding to the desired significance level and degrees of freedom.



If the calculated chi-square value was greater than the critical chi-square value, the null hypothesis is rejected, indicating a significant difference in the failure and success rates between the algorithms. Otherwise, the null hypothesis is not rejected.

Results:

Immagine che contiene testo, schermata, Carattere, numero

Descrizione generata automaticamente Immagine che contiene testo, schermata, Carattere, numero

Descrizione generata automaticamente

I made two analyses:

1. Using 80

Immagine che contiene testo, schermata, diagramma, linea

Descrizione generata automaticamente

Conclusion:

Grado di dipendenza tra due elementi.

Based on the results of the chi-square test, we can conclude:

1. In the first case, the probability of …… If the null hypothesis is rejected, there is a significant difference in the failure and success rates between Algorithm 1 and Algorithm 2, indicating that one algorithm performs better or worse than the other.
2. If the null hypothesis is not rejected, there is insufficient evidence to suggest a significant difference in the failure and success rates between the two algorithms. This implies that Algorithm A and Algorithm B perform similarly under the given initial conditions.

It is important to note that the chi-square test assumes certain conditions, such as the independence of observations and an adequate sample size. These assumptions should be verified to ensure the validity of the results.

Based on the findings of this study, further analysis and investigation can be conducted to identify the factors that contribute to the observed differences in the failure and success rates between Algorithm 1 and Algorithm 2. This may involve examining additional variables, expanding the sample size, or conducting experiments with different initial conditions such (as the position of the boxes) to gain a more comprehensive understanding of their relative strengths and weaknesses.