

CASA0006 – Assessment Proposal

Proposed Research Question:

How are crime rates spatially distributed, and is there significant spatial autocorrelation?

Which types of crimes tend to co-occur, and how does this relate to overall crime rates?

Value of Research Question:

Crime distribution is rarely random; instead, it often exhibits spatial clustering influenced by socioeconomic and environmental factors. Identifying spatial autocorrelation in crime rates can help policymakers and law enforcement agencies design targeted interventions. Additionally, analyzing crime co-occurrence can provide insights into underlying criminal behaviors and systemic issues. Studies such as Andresen (2006) and Ratcliffe (2010) have explored spatial crime patterns, showing that certain crimes cluster in specific areas due to social and economic factors.

Methods and Approach:

This research will employ a combination of **spatial analysis, clustering techniques, and statistical tests** to examine crime distribution and co-occurrence patterns:

1. Spatial Autocorrelation Analysis:

- **Moran's I:** Measures overall spatial autocorrelation to determine whether crime rates are clustered, dispersed, or random.
- **Getis-Ord Gi***: Identifies crime hot spots and cold spots to highlight areas with significantly high or low crime densities.

2. Clustering Analysis:

- **Hierarchical Clustering:** Used to group crime types based on their co-occurrence patterns. This method allows for a dendrogram-based evaluation of crime similarities.

3. Statistical Association Analysis:

- **Chi-Square Test:** Determines whether the co-occurrence of different crime types is statistically significant and whether specific crime types are interrelated.

Expected Outcome and Interpretation:

This study will reveal whether crime rates follow spatial clustering patterns and whether different crime types tend to co-occur in specific areas. The findings will be visualized using spatial heatmaps, dendrograms, and chi-square contingency tables. These insights can help refine crime prevention policies and urban safety strategies.

References:

- Andresen, M. A. (2006). Crime measures and the spatial analysis of criminal activity. *British Journal of criminology*, 46(2), 258-285.
- Ratcliffe, J. (2010). Crime mapping: Spatial and temporal challenges. *Handbook of quantitative criminology*, 5-24.