

Research Proposal: Identifying Theft Crime Hotspots in London Using POI Data and Spatial Machine Learning

1. Proposed Research Problem

What types of points of interest (POIs) are most relevant to London's burglary crime hotspots and how can machine learning methods be used to analyse their spatial impact on crime distribution?

2. Dataset & Academic Paper

Primary Dataset:

1. Crime Data: MPS Recorded Crime: Geographic Breakdown (London Data Store)
2. POI Data: Extracted from OpenStreetMap (OSM)

Inspirational Academic Paper:

Povala, J. et al. (2020) *Burglary in London: insights from statistical heterogeneous spatial point processes*.

3. Relevance

Research confirms that burglary offences are spatially concentrated around specific POI types, proving that POI data is a key predictor of crime hotspots. Understanding the relationship between urban infrastructure and crime can improve urban planning, policing strategies and business security measures. Identifying high-risk POIs can guide targeted crime prevention efforts to reduce burglaries and enhance public safety.

4. Problem Type

Regression and spatial analysis: Predicting burglary crime rates and analysing spatial crime patterns based on POI densities.

5. Methodology

1. Spatial Interpolation (Kriging/IDW): Convert LSOA-level crime data into 200m×200m grid.
2. Machine Learning (XGBoost/Random Forest + SHAP Analysis): Identify high-risk POIs.
3. Geographically Weighted Regression (GWR): Examine spatial variations in POI influence.
4. Crime Hotspot Detection (DBSCAN/KDE): Locate high-risk areas.

6. Expected Outcome

1. Identify high-risk POI types linked to burglary.
2. Develop a predictive model for theft hotspots.
3. Provide urban planning insights for crime prevention.