

# Crime Hotspot Analysis Project

## Progress Update Report

### Progress so Far

#### Completed Tasks:

Data Acquisition and Preprocessing: Successfully sourced and preprocessed a crime dataset from the NIJ 2017 Real-Time Crime Forecasting Challenge. Key preprocessing steps included:

- Data type conversions, particularly transforming the `occ_date` column to datetime format.
- Extraction of the day of the week for each crime event.
- Spatial Grid Development: Developed a 50x50 grid system over Portland and assigned each crime incident to a grid cell based on its coordinates.
- Geospatial Visualization: Utilized `osmnx` to download Portland's map data and created a shapefile. Successfully plotted the crime data with the spatial grid overlay on this map, offering a preliminary visual of crime distribution across the city.

#### Data:

NIJ 2017 Real-Time Crime Forecasting Challenge: The primary dataset includes crime incidents with attributes such as type, location, and time of occurrence.

[Link to dataset](#)

### Challenges

#### Encountered Difficulties:

- Data Integrity and Completeness: Identified missing values in the `census_tract` column, which posed a challenge in ensuring data completeness.
- Technical Limitations: Encountered initial difficulties in integrating the spatial data with Python plotting libraries for effective visualization.

#### Addressing the Challenges:

- Visualization Techniques: Resolved technical challenges related to geospatial visualization by leveraging `osmnx` and `geopandas` for effective mapping and overlaying of the grid system.

## **Next Steps**

### **Remaining Tasks:**

- **Space-Time Cube Construction:** Aggregate the spatial-temporal data into a cube structure to facilitate a more detailed analysis of crime trends over time and space.
- **Predictive Modeling:** Develop and train a predictive model to identify potential future crime hotspots.
- **Model Evaluation and Validation:** Employ the Predictive Efficiency Index (PEI) and other relevant metrics to evaluate the model's performance.
- **Final Reporting:** Compile comprehensive documentation of the project, encapsulating methodologies, findings, and insights.

### **Plan to Complete Remaining Tasks:**

- **Structured Approach:** Continue to follow a structured approach, allocating specific timeframes to each remaining task.
- **Model Development and Testing:** Dedicate focused efforts on model selection, training, and testing, ensuring accuracy and reliability in predictions.
- **Regular Review and Adaptation:** Conduct regular reviews of progress and adapt strategies as needed to address any emerging challenges or obstacles.

### **Potential Future Challenges:**

- **Model Accuracy:** Ensuring the predictive model accurately identifies hotspots while considering the dynamic nature of crime patterns.
- **Data Complexity:** Navigating the complexities that may arise from the multi-dimensional nature of the space-time cube analysis.