Crashspot Research – Week 4 Report

Week 4

Focus: Kernel Density Estimation (KDE) Heatmaps & Raster Export

■ *Accomplishments:*

- Implemented bandwidth selection using GridSearchCV (with fallbacks for small datasets).
- Generated KDE rasters for Monroe and Louisiana crash datasets.
- Handled memory issues by creating a safe KDE raster function with auto cell-size adjustment.
- Exported visual heatmaps: Monroe and Louisiana side-by-side comparison.
- Exported Folium interactive heatmaps for Monroe and Louisiana.
- Added optional GeoTIFF export for KDE rasters (validated in QGIS).
- Verified raster output in QGIS with correct CRS (EPSG:32615).

■ *Key Outputs:*

- kde_monroe_vs_louisiana.png – side-by-side density plots
- la_kde.png – Louisiana KDE raster
- week4_monroe_heatmap.html – Interactive heatmap for Monroe
- week4_louisiana_heatmap.html – Interactive heatmap for Louisiana
- monroe_kde.tif – Monroe KDE raster (GeoTIFF)
- la_kde.tif – Louisiana KDE raster (GeoTIFF)

■ *Next Steps:*

- Week 5: Begin model preparation (feature engineering and target definition).
- Set up train/test split for predictive modeling.
- Test baseline machine learning models (Logistic Regression, Random Forest).