**Project Summary**

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| Progress Report 12/04/23  Contract 20231204.MAN | Team Leader:  Consultant: Prof Michael Mann |
| Tasks Completed | 1. Reviewed two research papers pertaining to visualize and predict crime using spatiotemporal analysis were reviewed.  2. Integrated Geodatabase (Project.gdb) was generated using raw datasets- Crime incidents, DC Properties and Census Economic Characteristics – and KDE based on crime incidents was additionally created. |
| Tasks Planned for next reporting period | 1. Feature Engineering for Visualization will be performed  using either Zonal statistics or Proximity feature between Crime spot and properties.  2. Crime patterns will be basically visualized focusing on Crime Types, Time phase (ex. pandemic Phase or normal), also numeric features will be shown to represent unique patterns by region.  3. Summary of finding will be presented by slides and recording. |

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| Milestone | % |  | Comments |
| Review of Literature | 100 | This stage is successfully completed with team discussion. | The following two research papers describe how to use crime incidents data to extract insight and create features by spatiotemporal analysis.  1. [Yue Deng, Rixing He, Yang Liu,Crime risk prediction incorporating geographical spatiotemporal dependency into machine learning models, Information Sciences](https://doi.org/10.1016/j.ins.2023.119414)  2. [Anneleen Rummens, Wim Hardyns, Lieven Pauwels, the use of predictive analysis in spatiotemporal crime forecasting: Building and testing a model in an urban context](https://doi.org/10.1016/j.apgeog.2017.06.011.) |
| Data collection | 100 | This stage is also successfully completed including sourcing raw data, basic examination of them. ( \*.shp format was used and \*.csv of crime incidents was additionally used) | Three datasets were gathered from [Open Data DC](https://opendata.dc.gov/datasets/DCGIS::crime-incidents-in-2023/about) and preprocessed.  1. CRIME INCIDENTS (5 years: ‘19~23)  2. Properties (13: ex. Public Schools, Liquor Licensed stores, etc.)  3. Census Economic Characteristics (78 Statistics) |
| Develop Data pipeline between ArcGIS and Python | 100 | All sources were Integrated into a Geodatabase (Project.gdb) | Batch imports of shapefiles were conducted on ArcPro. Also, each point/polygon features were symbolized with proper icons. |
| Visualization | 50 | KDE (density of crime points)  is completed and working on other visualizations liked based on Type of Crime.  If there is relation between Census data and Properties, Distance between property and crime spot, Number of properties from crime spot. | Kernel Density Estimation offers an intuitive method, for visualizing and analyzing crime data. By converting data into crime concentration patterns KDE assists in making informed decisions that improve urban safety and well-being. Modeling to predict crime pattern will be optionally performed depending on a progress.  Modeling to predict crime patterns will be optionally performed depending on progress. Task will be follow-up by Dec 11th. |
| Reports | 0 | Need to work on Final code files and presentation. | Finalize and comment code. Make a report and presentation. Deliverables will be submitted by Dec 19th |