Geographic Information System

Spatial Statistics I
Lab Practice

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Photo credit: ChatGPT

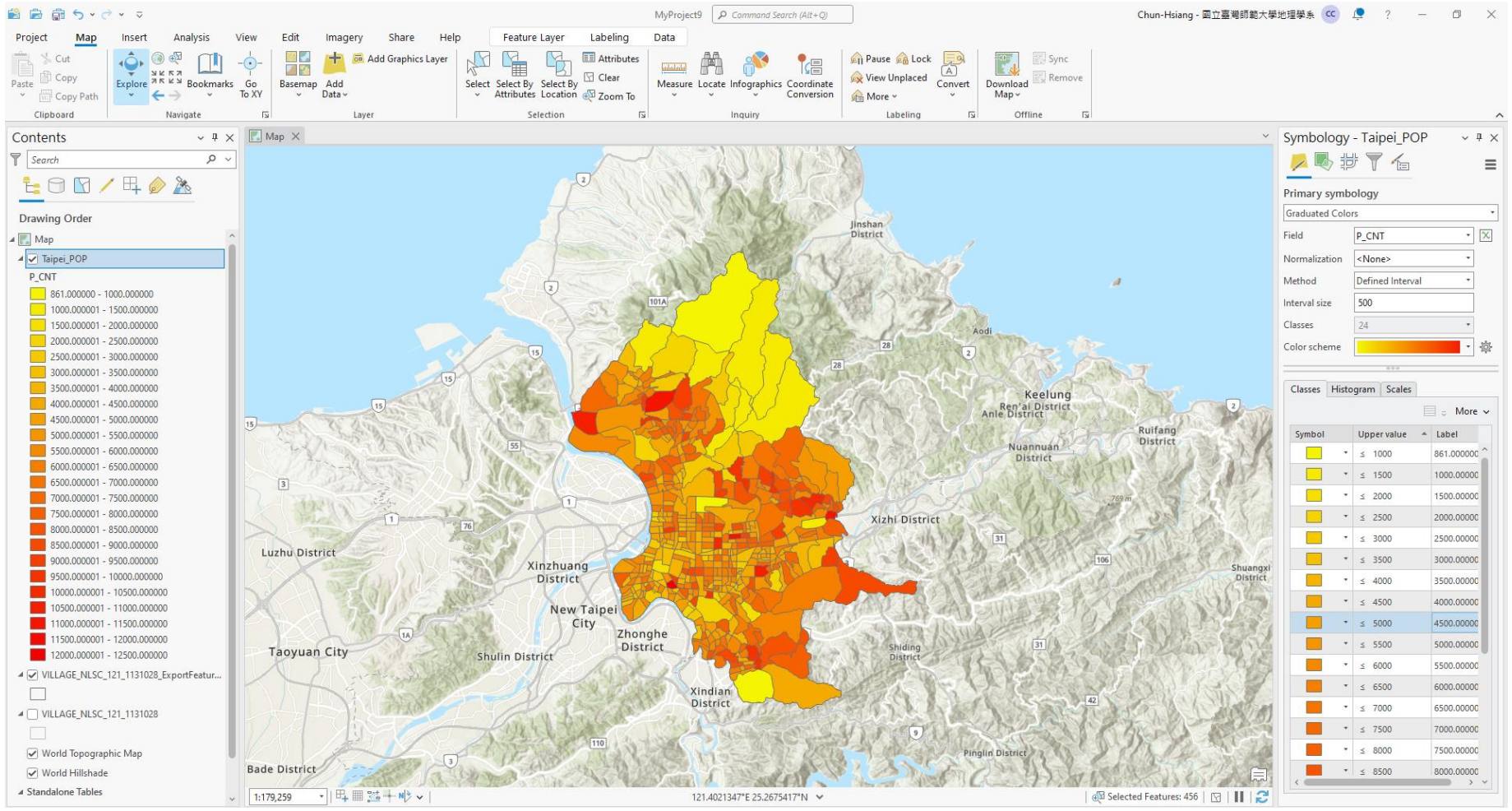
Outline

- Observe the central tendency of Taipei traffic accident data between January and July
- Observe the average nearest neighbor of Taipei traffic accident data between January and July
- Observe the spatial pattern of Taipei population data

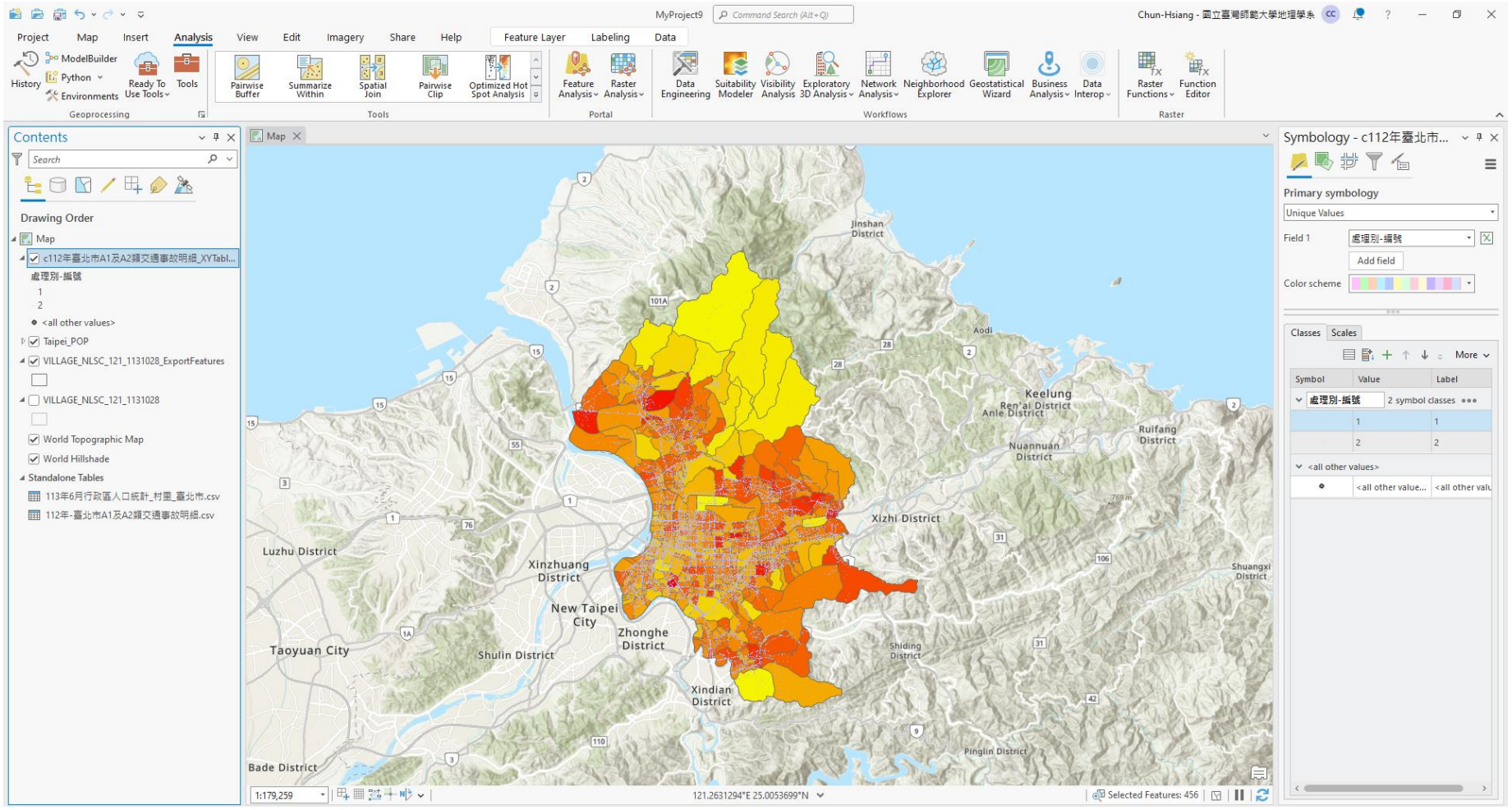
Initial Settings (...)

1) Set up the CRS of the map
2) Load Taipei Population Data, Taipei Traffic Accident Data, and Taiwan Village Data
3) Select all Taipei villages from the Taiwan village data and export as a new feature data named “Taipei_POP”
4) Join Taipei population into Taipei_POP
5) Use XY Table To Point to convert Taipei traffic accident data into Point data
6) Select 112/01 and 112/07 Taipei traffic accident and export as a new feature data, respectively, named “TrafficAccident_11201” and “TrafficAccident_11207”
7) Spatial Join Taipei traffic accident into Taipei_POP

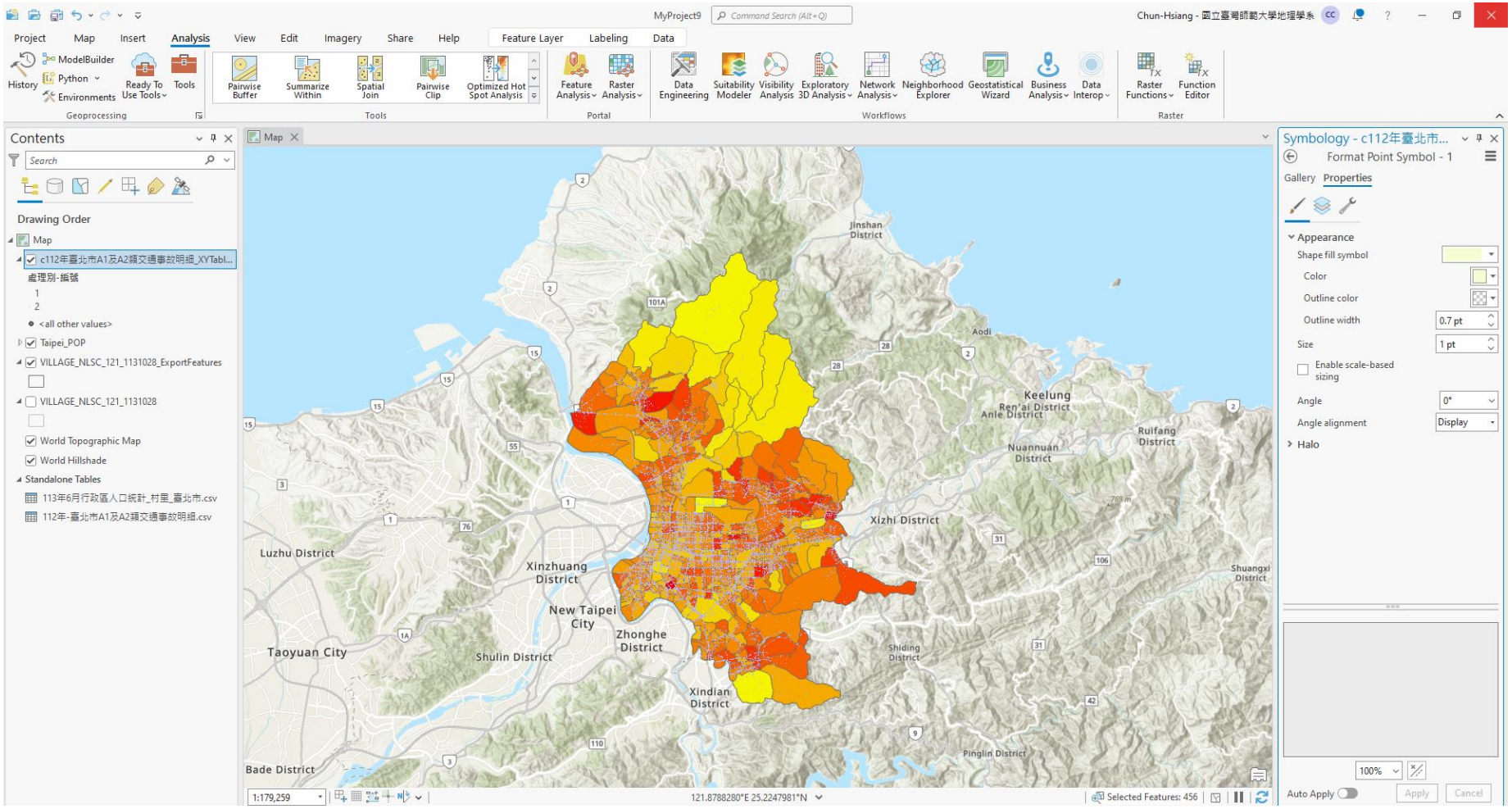
Taipei Population Data



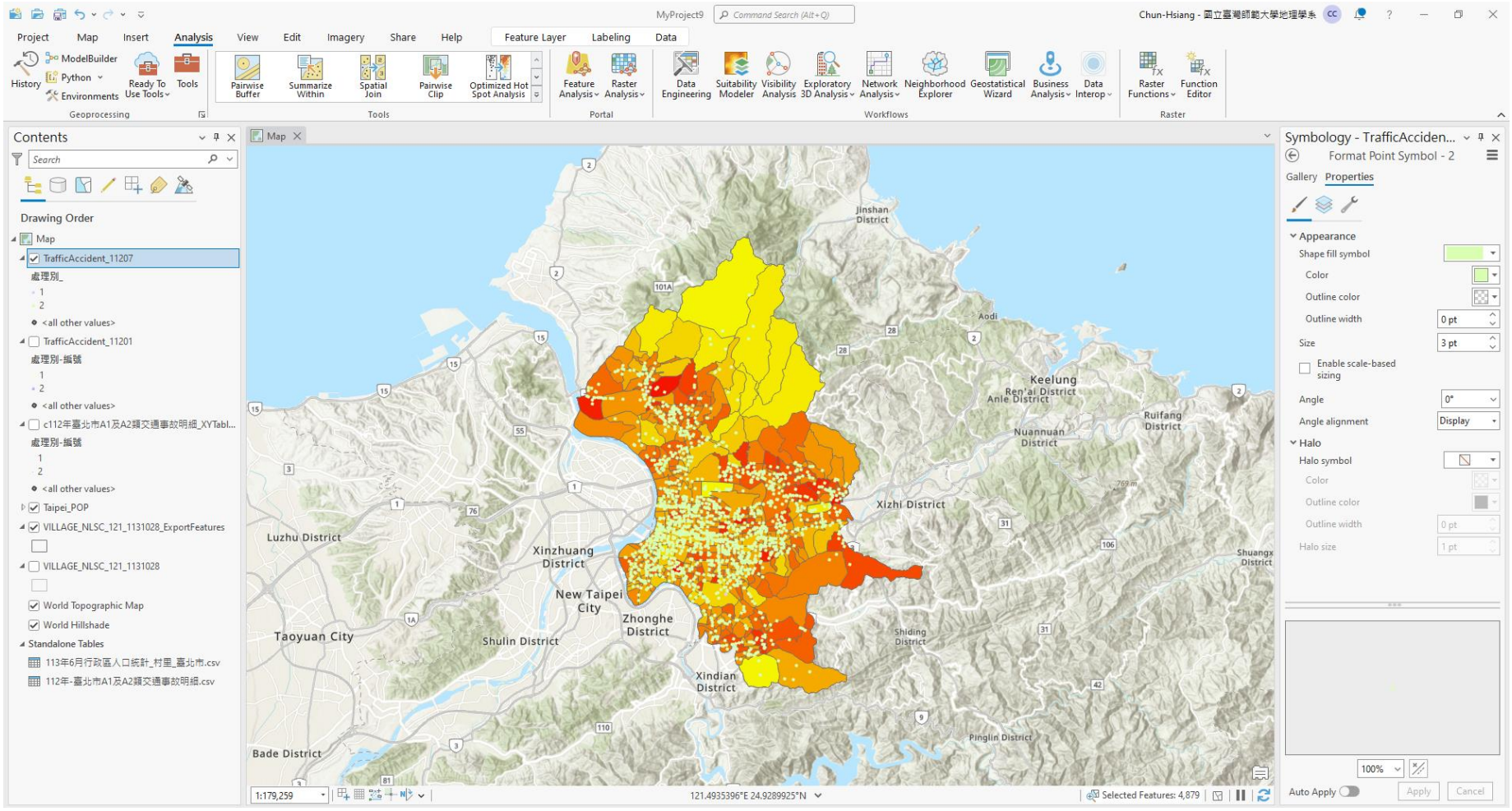
Overlay with Traffic Accident Data



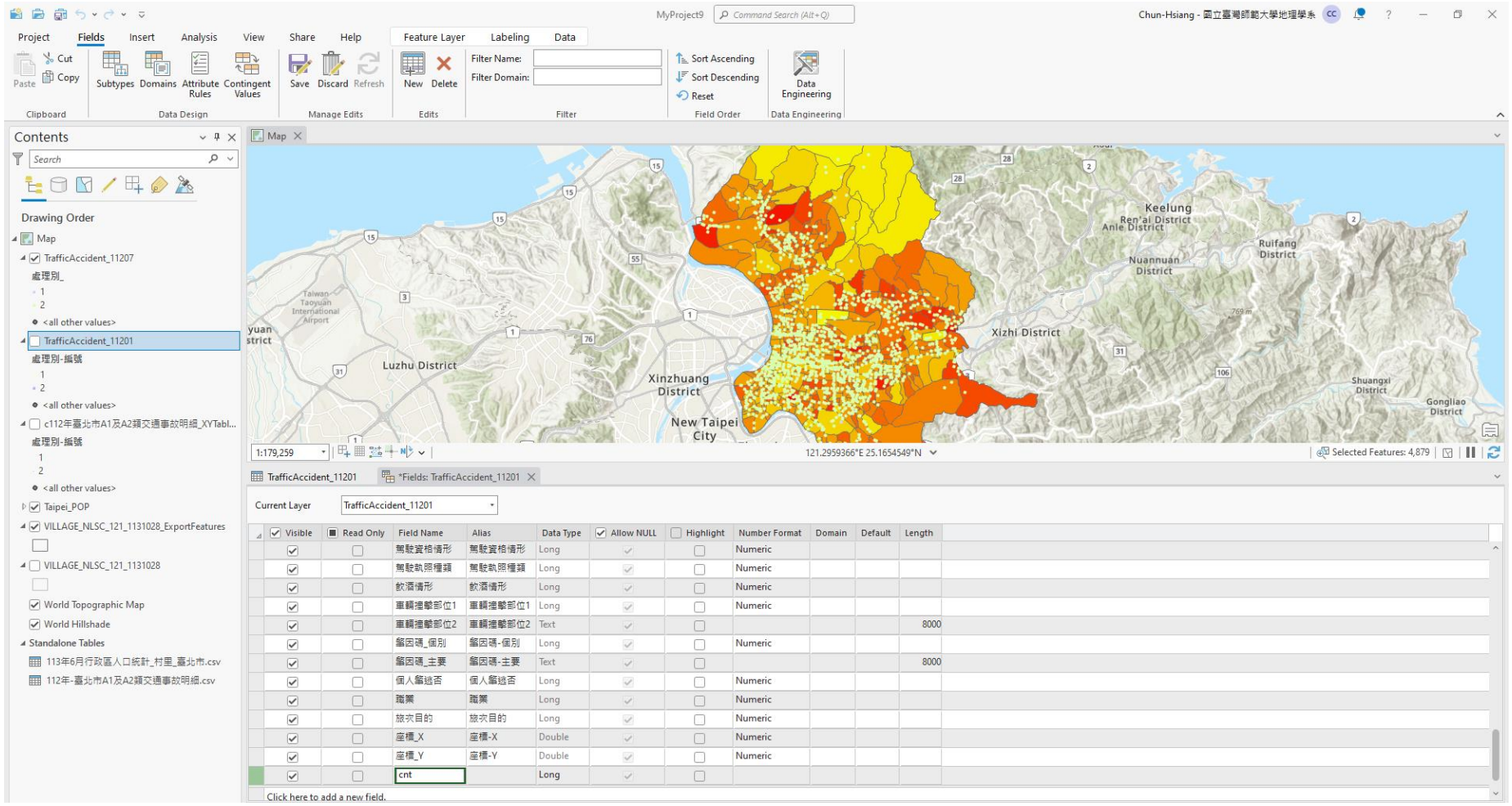
Overlay with Traffic Accident Data



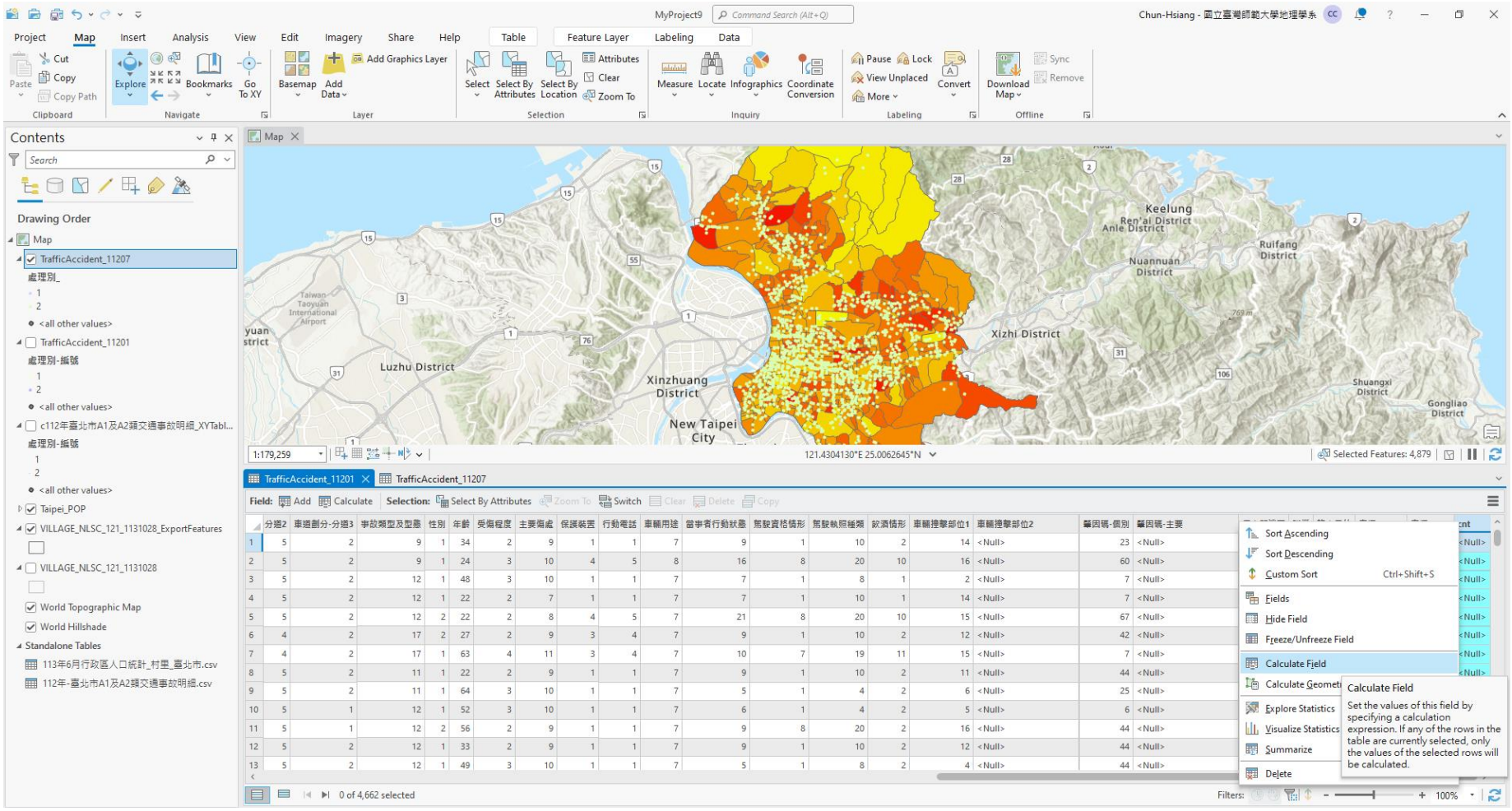
Overlay with Traffic Accident Data



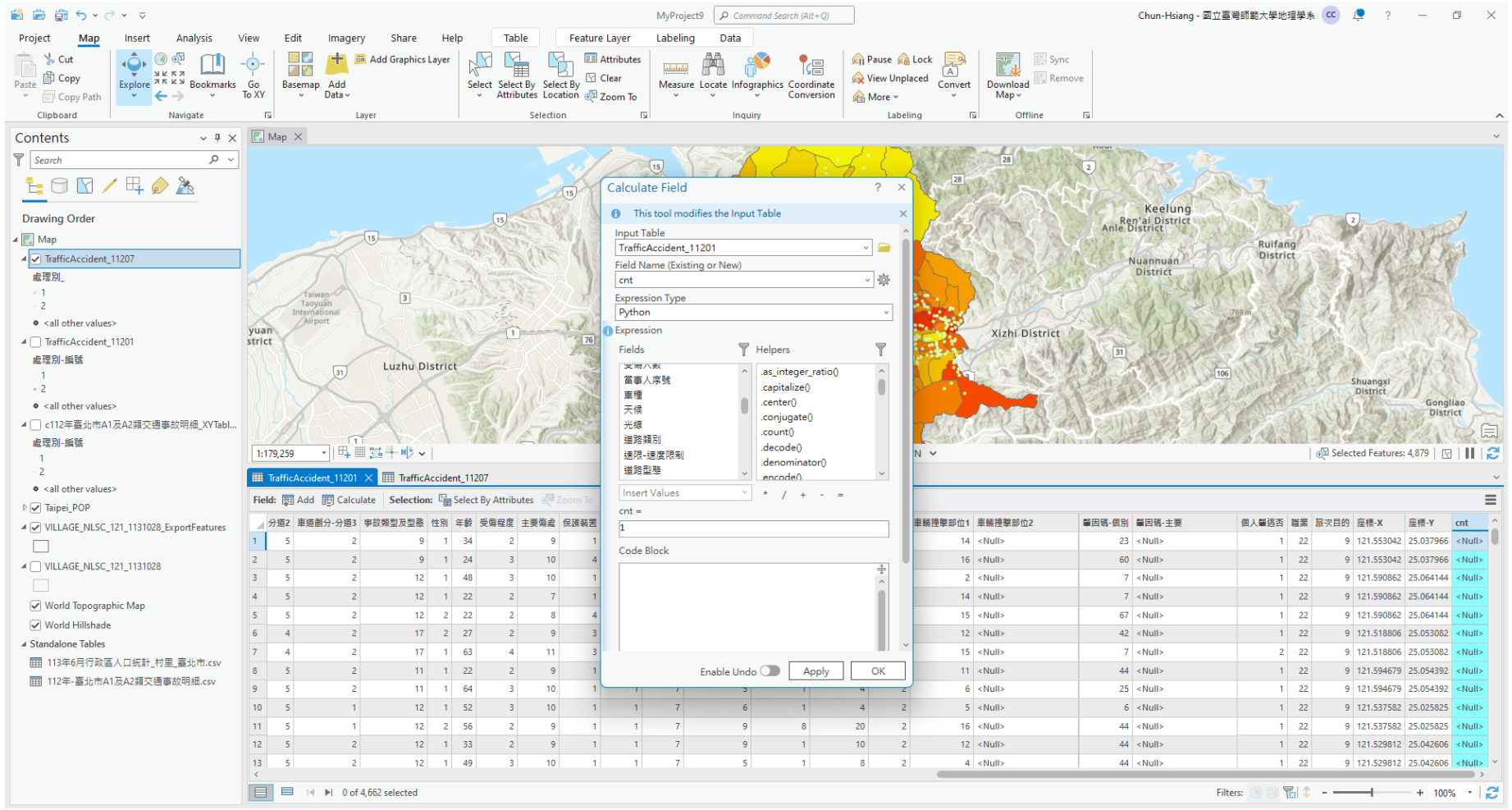
Add a New Field ”cnt” to both 11201 & 11207



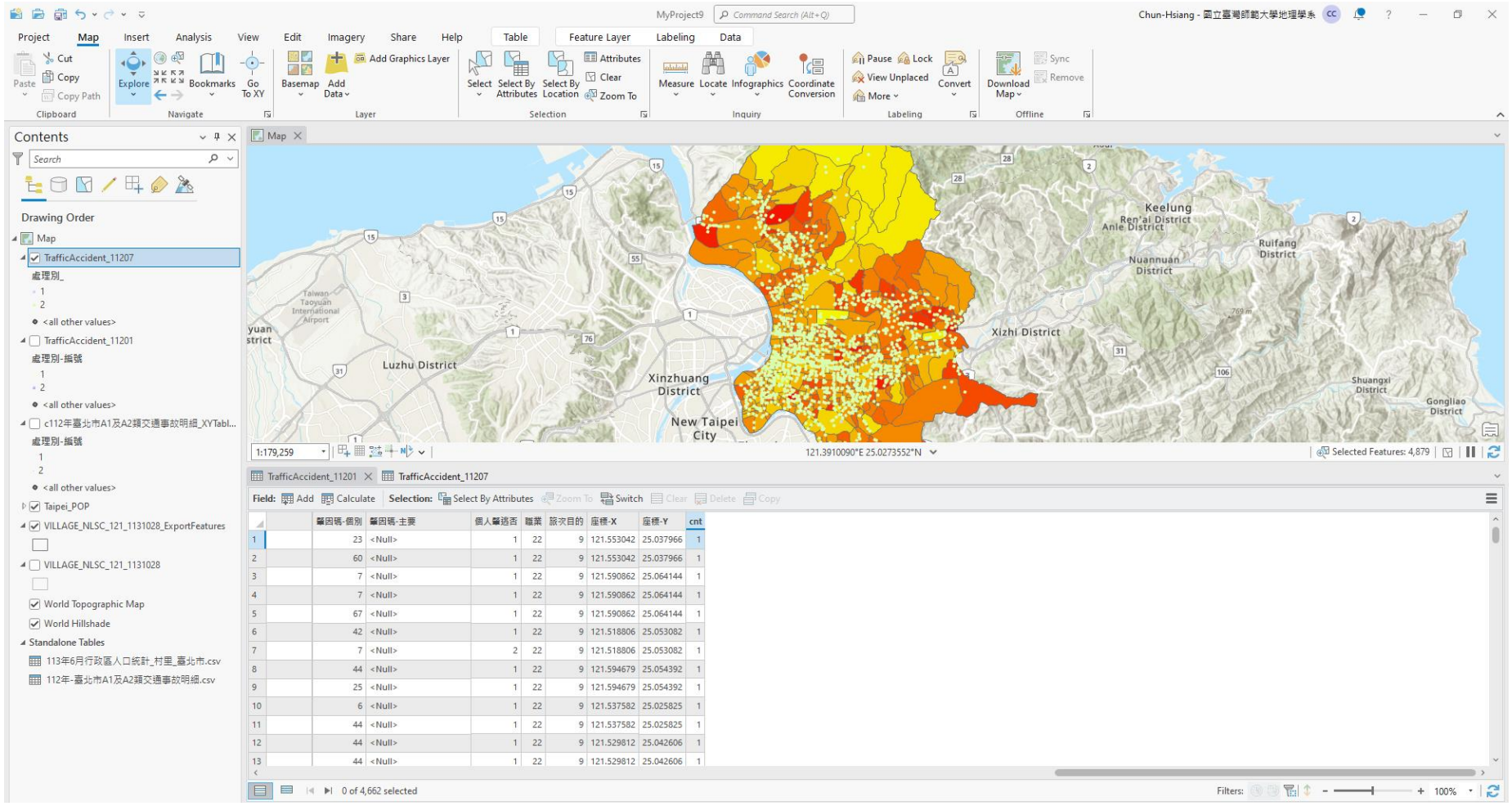
Fill 1 into “cnt” Field to both 11201 & 11207



Fill 1 into “cnt” Field to both 11201 & 11207



Fill 1 into “cnt” Field to both 11201 & 11207

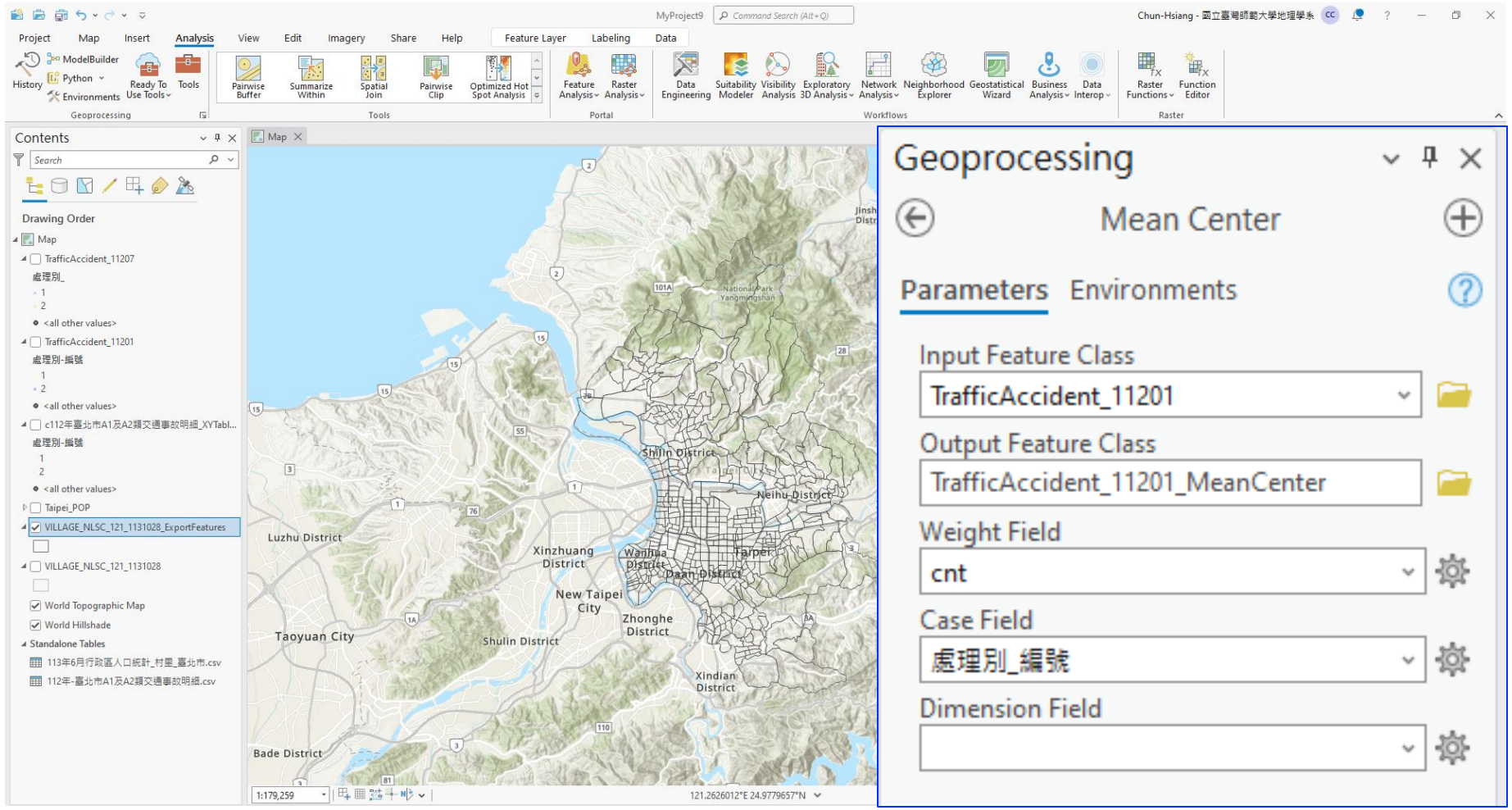


Central Tendency Analysis

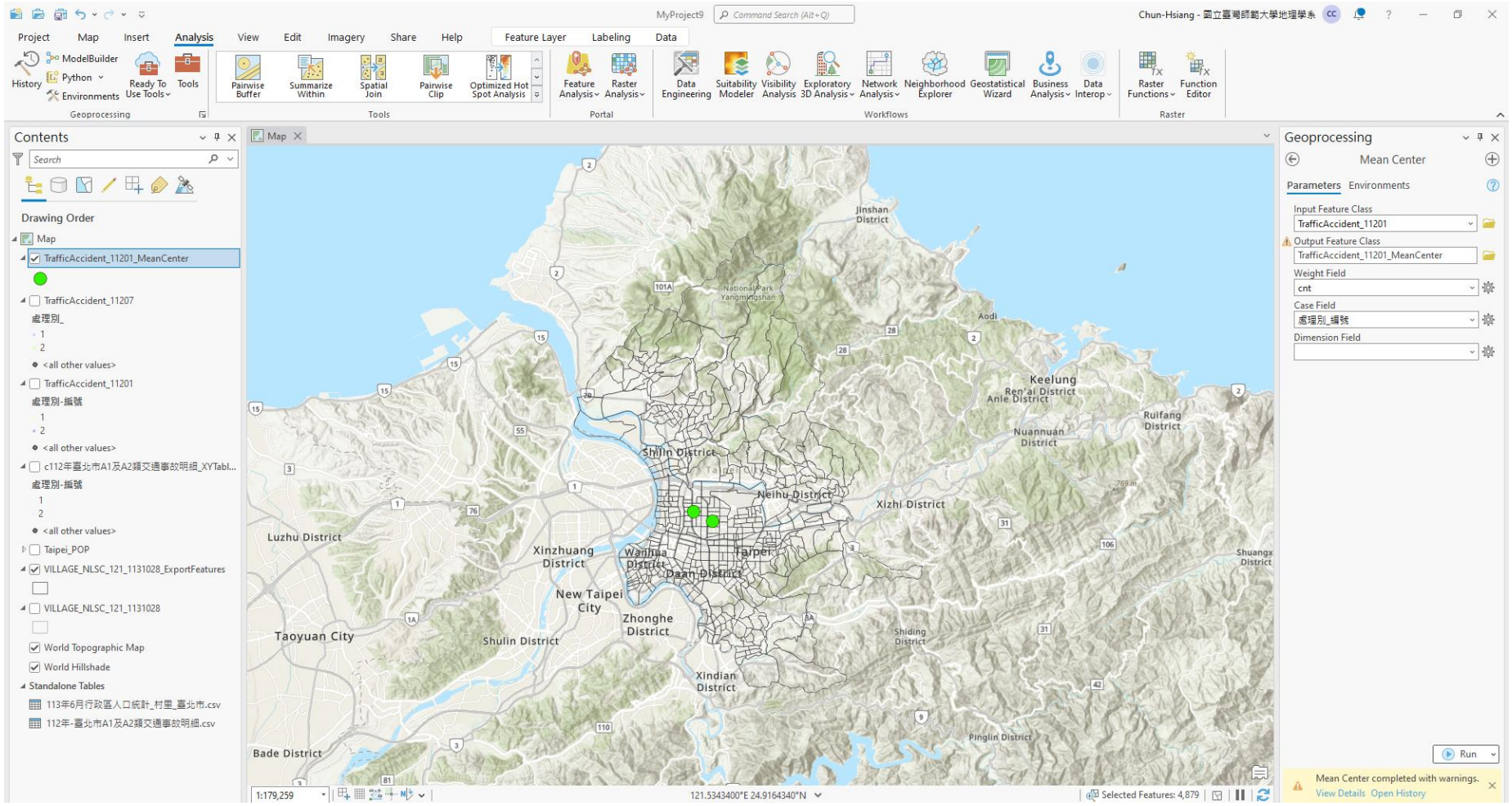
Compute the following functions with both TrafficAccident_11201 and TrafficAccident_11207

1) Mean Center
2) Median Center
3) Standard Distance
4) Central Feature
5) Directional Distribution

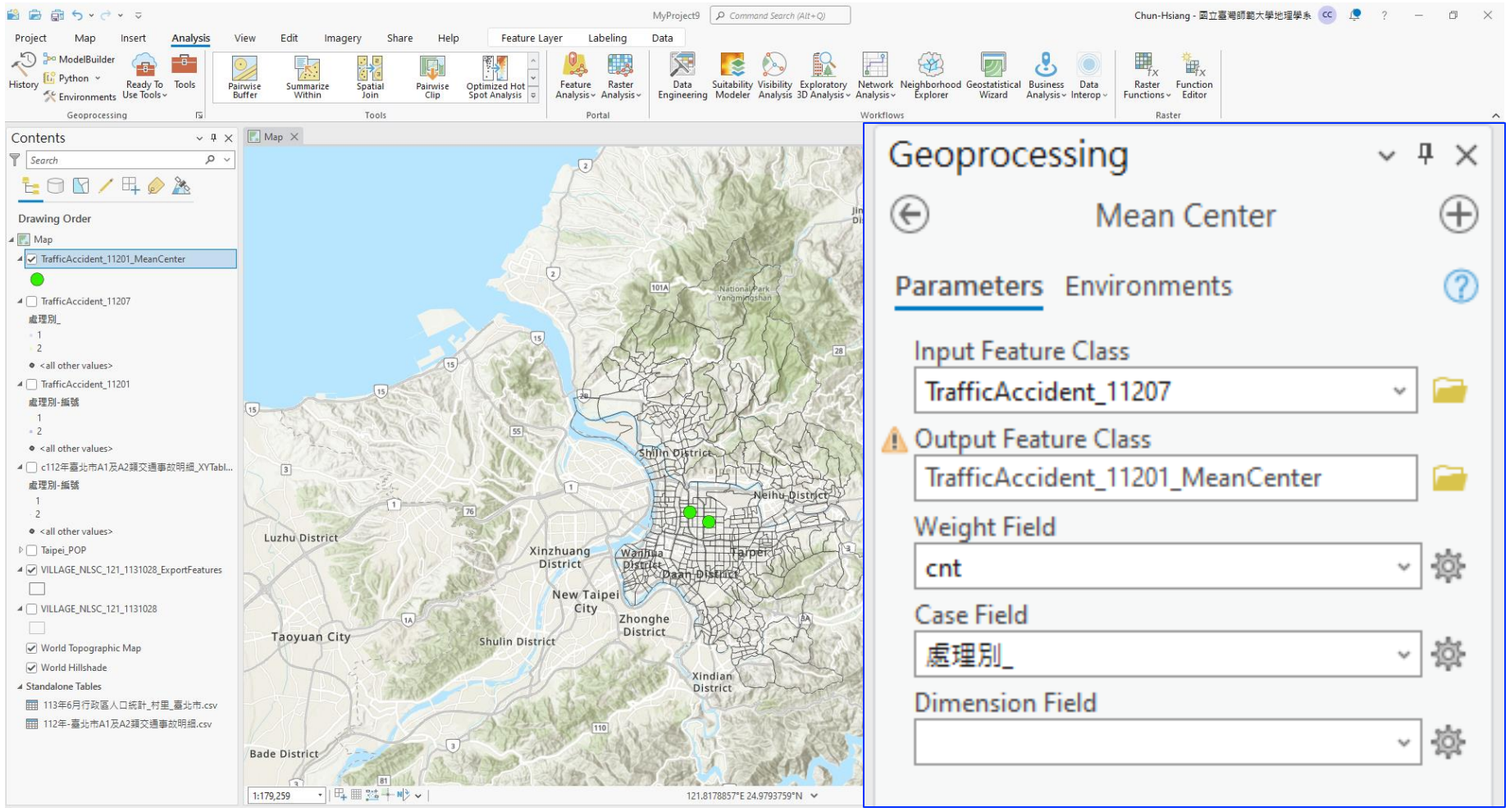
Mean Center


Geoprocessing
Mean Center
Parameters
Environments
Input Feature Class
TrafficAccident_11201
Output Feature Class
TrafficAccident_11201_MeanCenter
Weight Field
cnt
Case Field
處理別_編號
Dimension Field
Contents
Drawing Order
Map
TrafficAccident_11207
TrafficAccident_11201
VILLAGE_NLSC_121_1131028_ExportFeatures
VILLAGE_NLSC_121_1131028
World Topographic Map
World Hillshade
Standalone Tables
Shilin District
Neihu District
Luzhu District
Xinzhuang District
Wanhua District
Taipei
Daan District
New Taipei City
Zhonghe District
Taoyuan City
Shulin District
Xindian District
Bade District

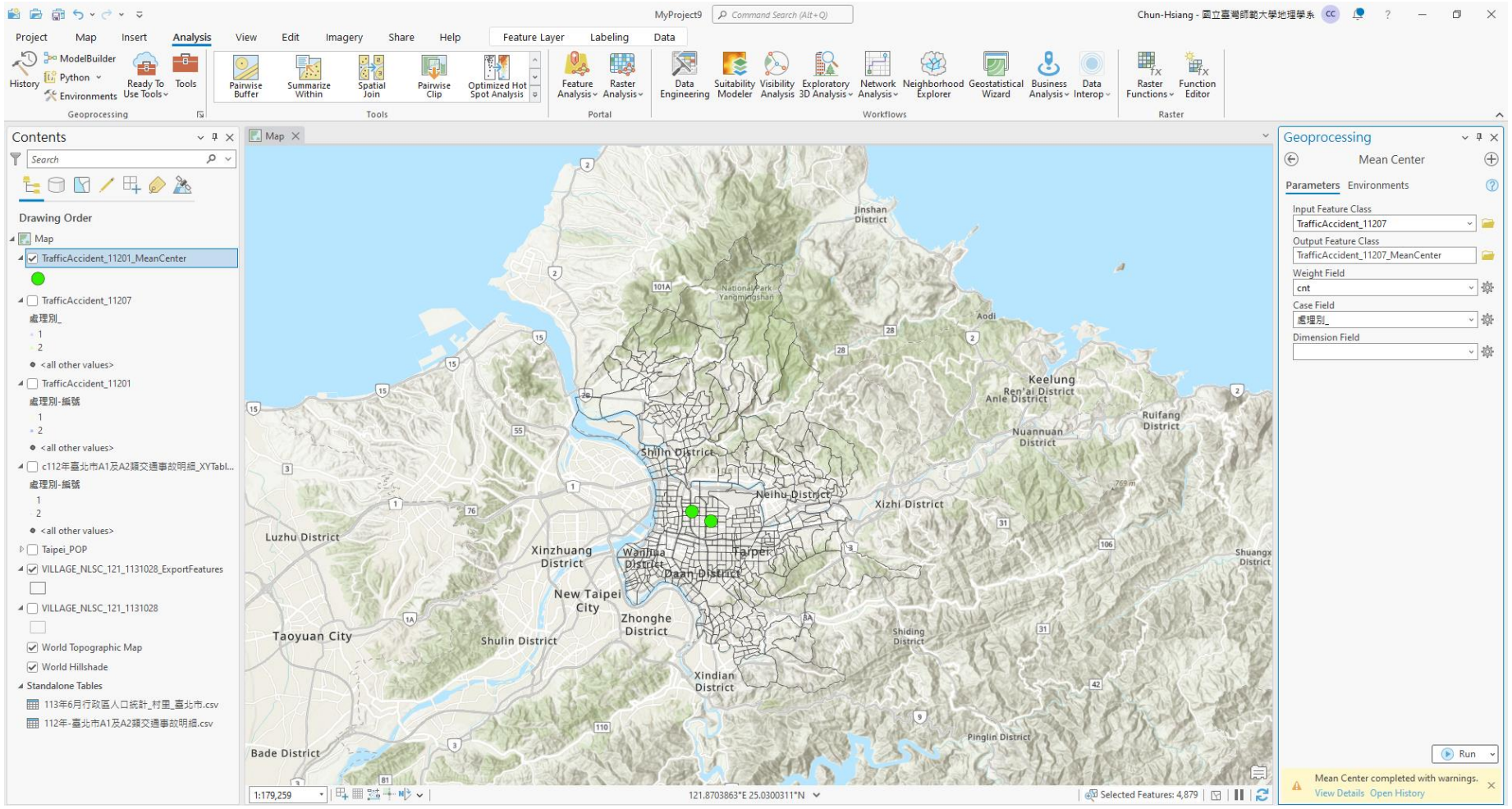
Mean Center


Project
Map
Insert
Analysis
View
Edit
Imagery
Share
Help
Feature Layer
Labeling
Data
Contents
Drawing Order
TrafficAccident_11201_MeanCenter
TrafficAccident_11207
TrafficAccident_11201
Taipei_POP
VILLAGE_NLSC_121_1131028_ExportFeatures
VILLAGE_NLSC_121_1131028
World Topographic Map
World Hillshade
Standalone Tables
Geoprocessing
Mean Center
Parameters
Environments
Input Feature Class
TrafficAccident_11201
Output Feature Class
TrafficAccident_11201_MeanCenter
Weight Field
cnt
Case Field
Dimension Field
Run
Mean Center completed with warnings.
View Details
Open History
Jinshan District
Keelung
Ren'ai District
Anle District
Nuannuan District
Ruifang District
Shilin District
Neihu District
Xizhi District
Luzhu District
Xinzhuang District
Wanhua District
Taipei
Daan District
New Taipei City
Zhonghe District
Taoyuan City
Shulin District
Xindian District
Shiding District
Pinglin District
Bade District
Shuangx District
Aodi

Mean Center


Geoprocessing
Mean Center
Parameters
Environments
Input Feature Class
TrafficAccident_11207
Output Feature Class
TrafficAccident_11201_MeanCenter
Weight Field
cnt
Case Field
處理別_
Dimension Field
Contents
Drawing Order
Map
TrafficAccident_11201_MeanCenter
TrafficAccident_11207
TrafficAccident_11201
Taipei_POP
VILLAGE_NLSC_121_1131028_ExportFeatures
VILLAGE_NLSC_121_1131028
World Topographic Map
World Hillshade
Standalone Tables
Luzhu District
Xinzhuang District
New Taipei City
Taoyuan City
Shulin District
Zhonghe District
Xindian District
Bade District
Shilin District
Neihu District
Taipei
Wanhua District
Daan District

Mean Center


Project
Map
Insert
Analysis
View
Edit
Imagery
Share
Help
Feature Layer
Labeling
Data
Contents
Drawing Order
TrafficAccident_11201_MeanCenter
TrafficAccident_11207
TrafficAccident_11201
c112年臺北市A1及A2類交通事故明細_XYTabl...
Taipei_POP
VILLAGE_NLSC_121_1131028_ExportFeatures
VILLAGE_NLSC_121_1131028
World Topographic Map
World Hillshade
Standalone Tables
113年6月行政區人口統計_村里_臺北市.csv
112年-臺北市A1及A2類交通事故明細.csv
Geoprocessing
Mean Center
Parameters
Environments
Input Feature Class
TrafficAccident_11207
Output Feature Class
TrafficAccident_11207_MeanCenter
Weight Field
cnt
Case Field
處理別_
Dimension Field
Run
Mean Center completed with warnings.
View Details
Open History
Jinshan District
Keelung
Ren'ai District
Anle District
Nuannuan District
Ruifang District
Shilin District
Neihu District
Xizhi District
Luzhu District
Xinzhuang District
Wanhua District
Taipei
Da'an District
New Taipei City
Zhonghe District
Taoyuan City
Shulin District
Shiding District
Xindian District
Pinglin District
Bade District
Shuangxi District
Aodi
1:179,259
Selected Features: 4,879

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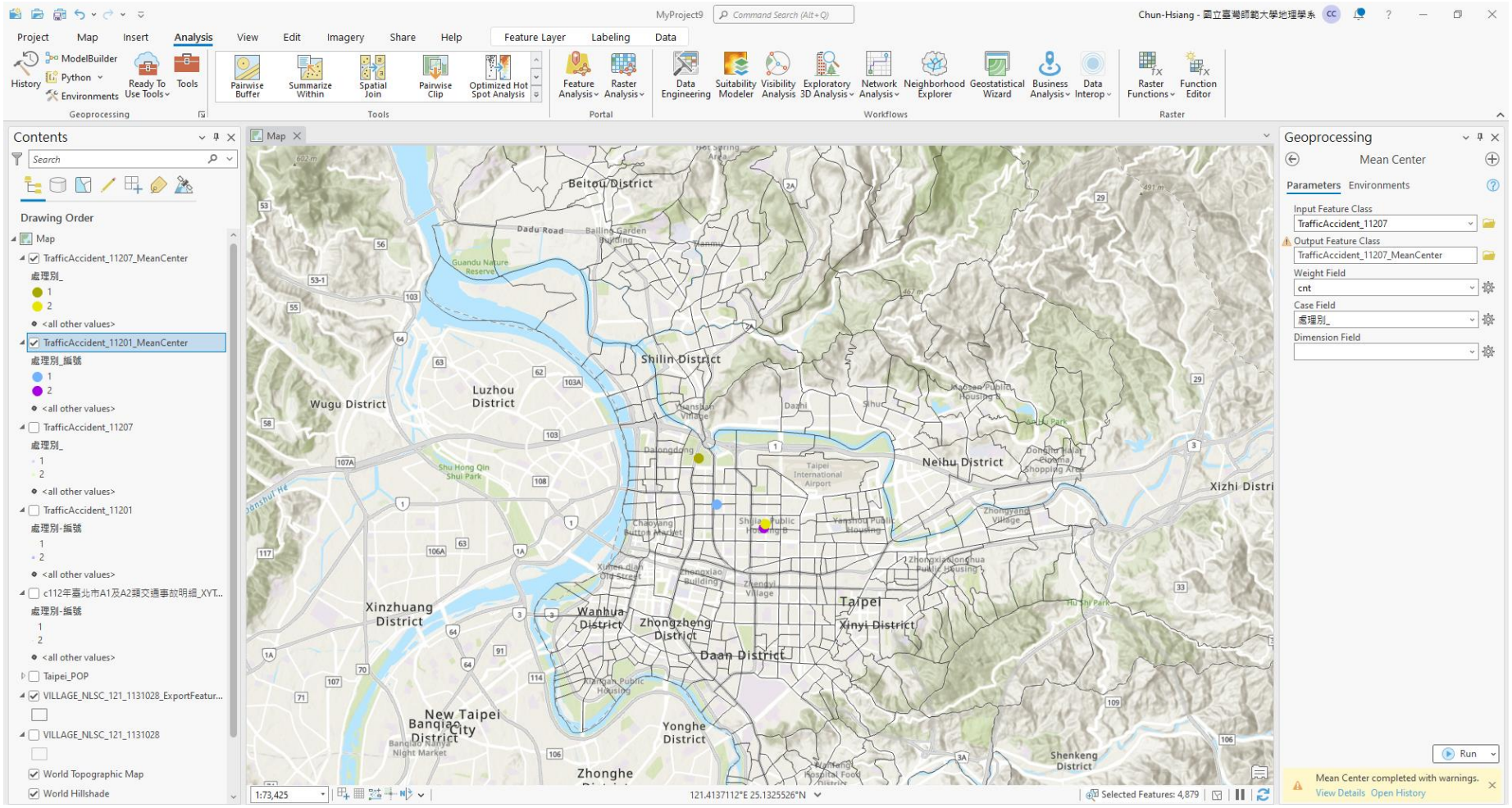
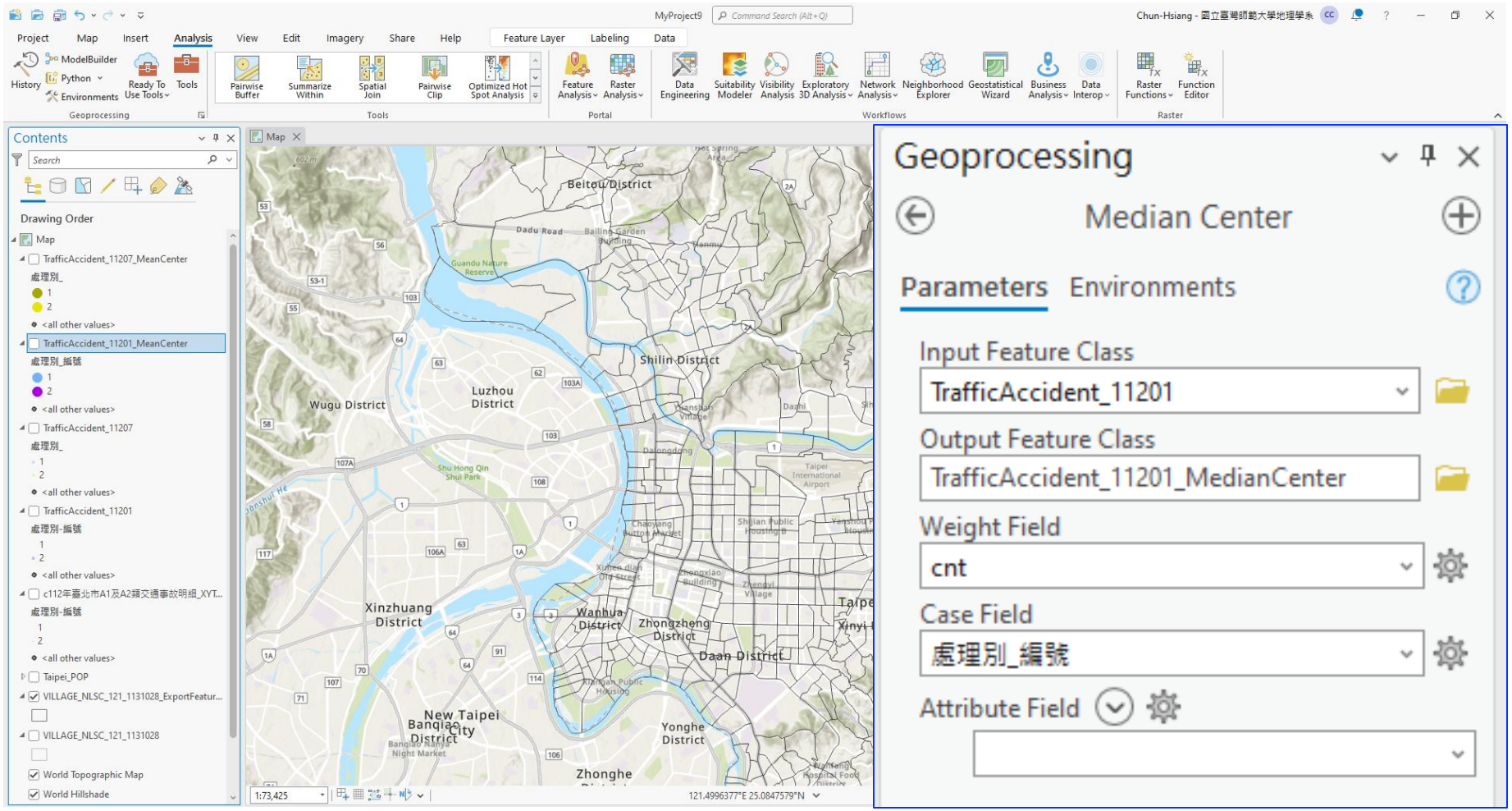
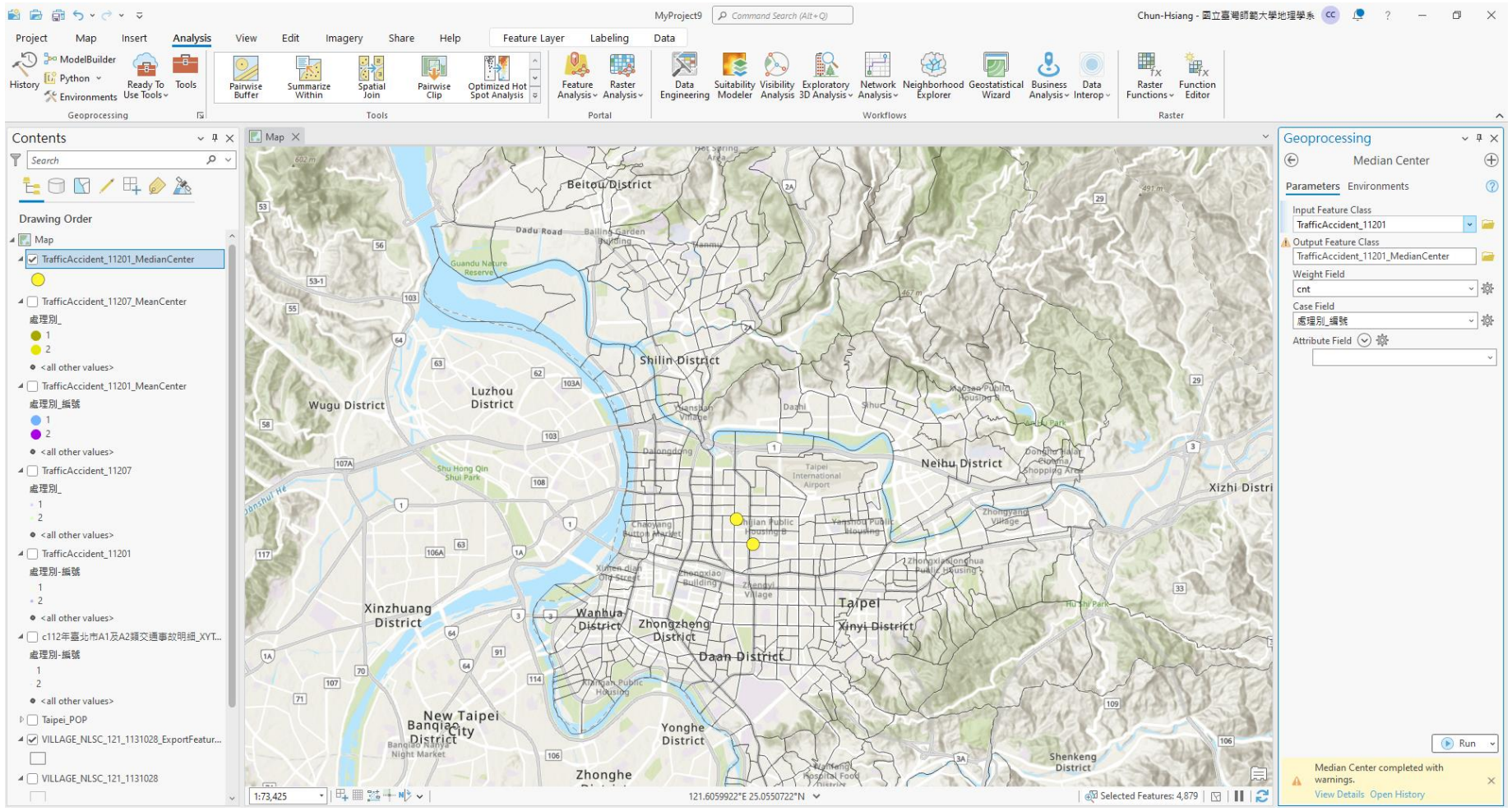
Mean Center :: Symbology



Median Center



Median Center



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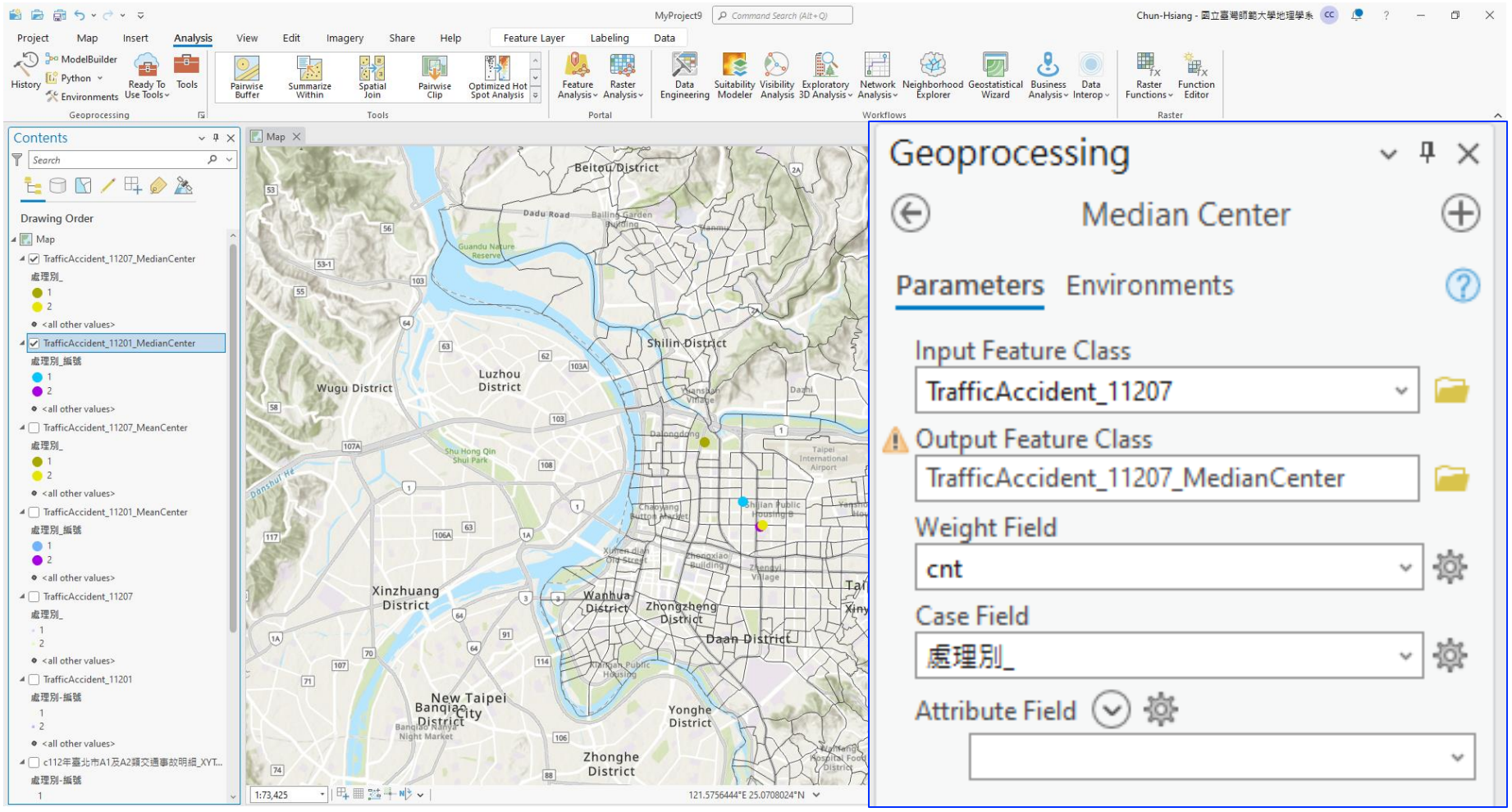
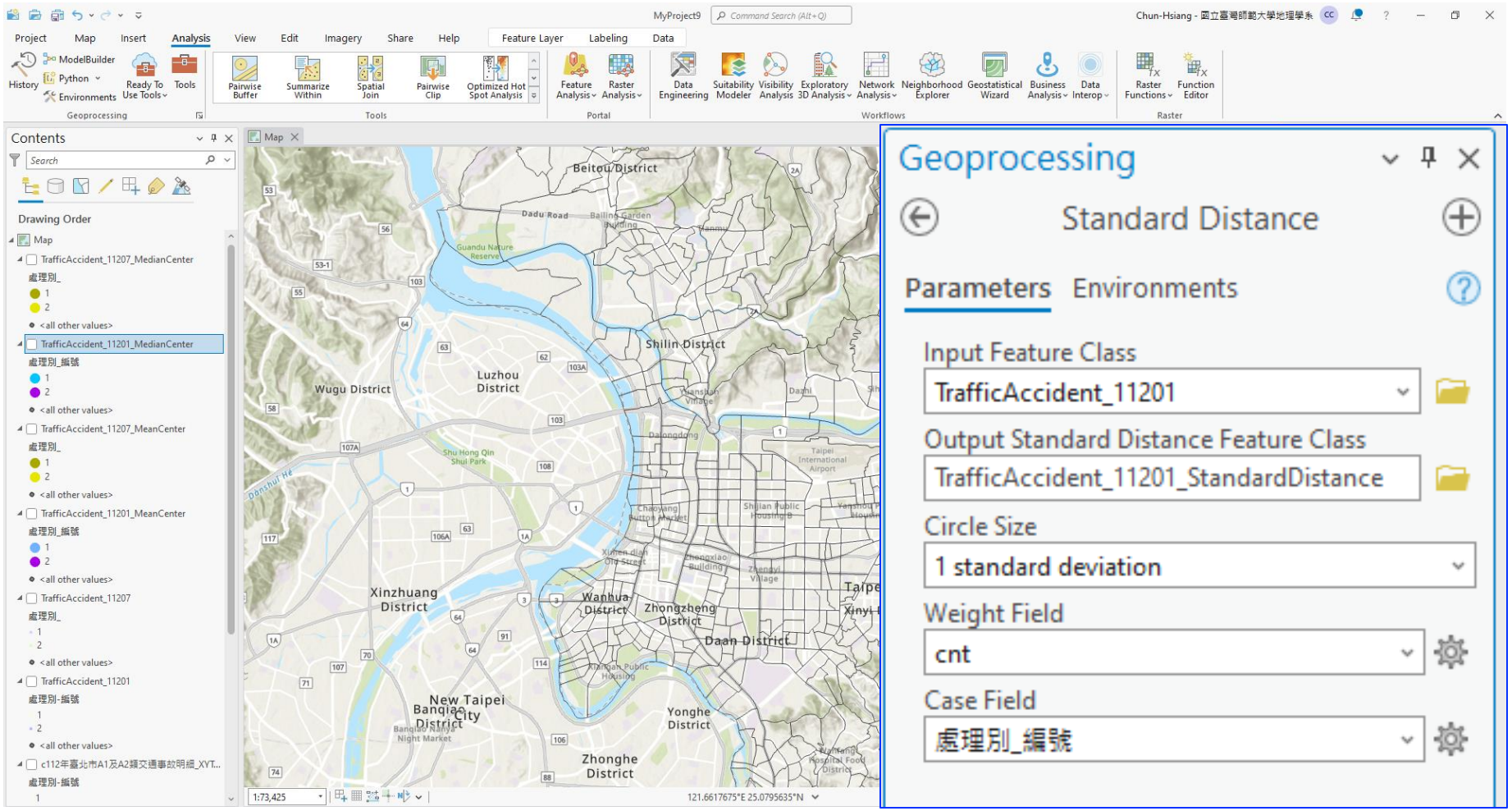
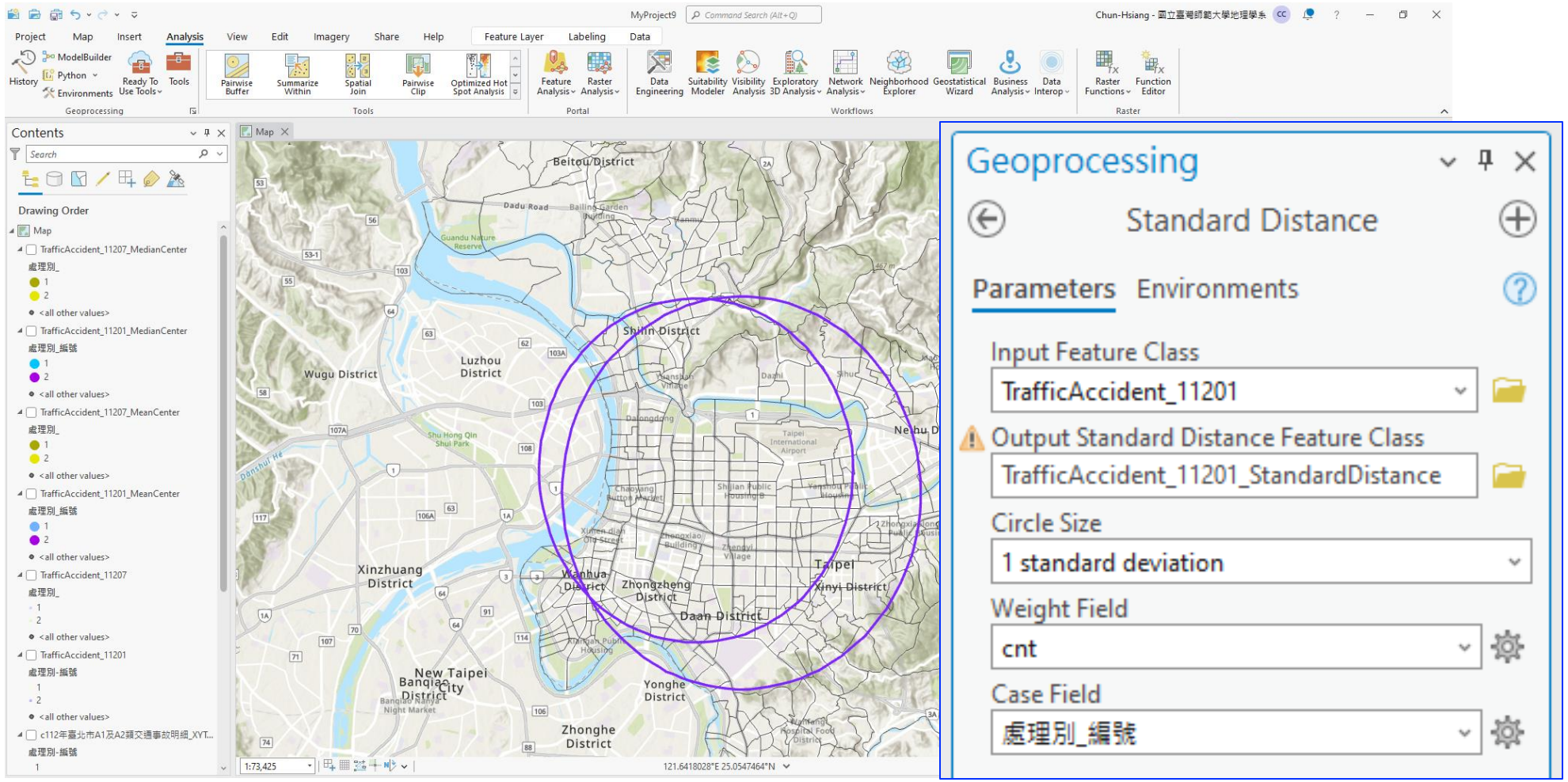
Median Center :: Symbology



Standard Distance



Standard Distance



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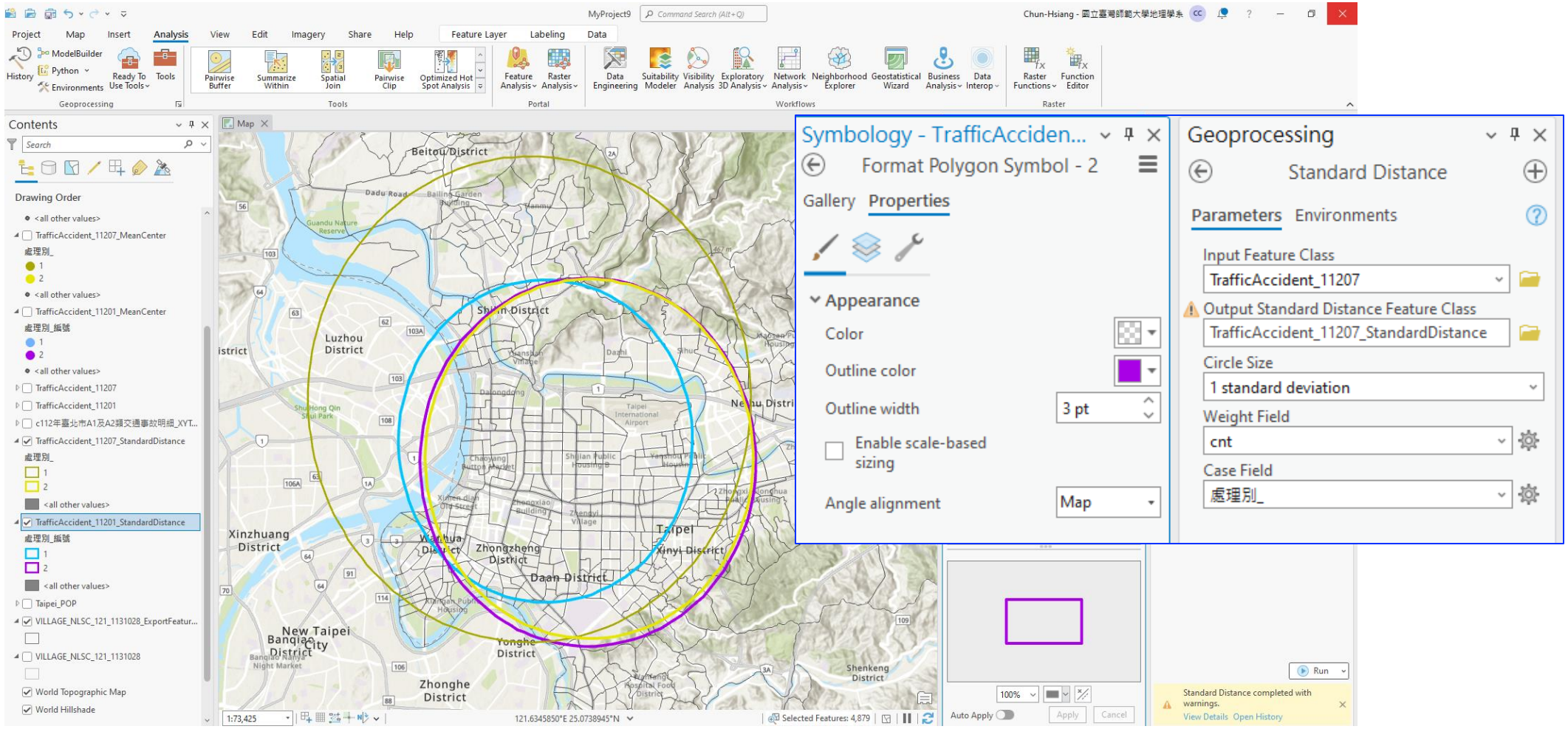
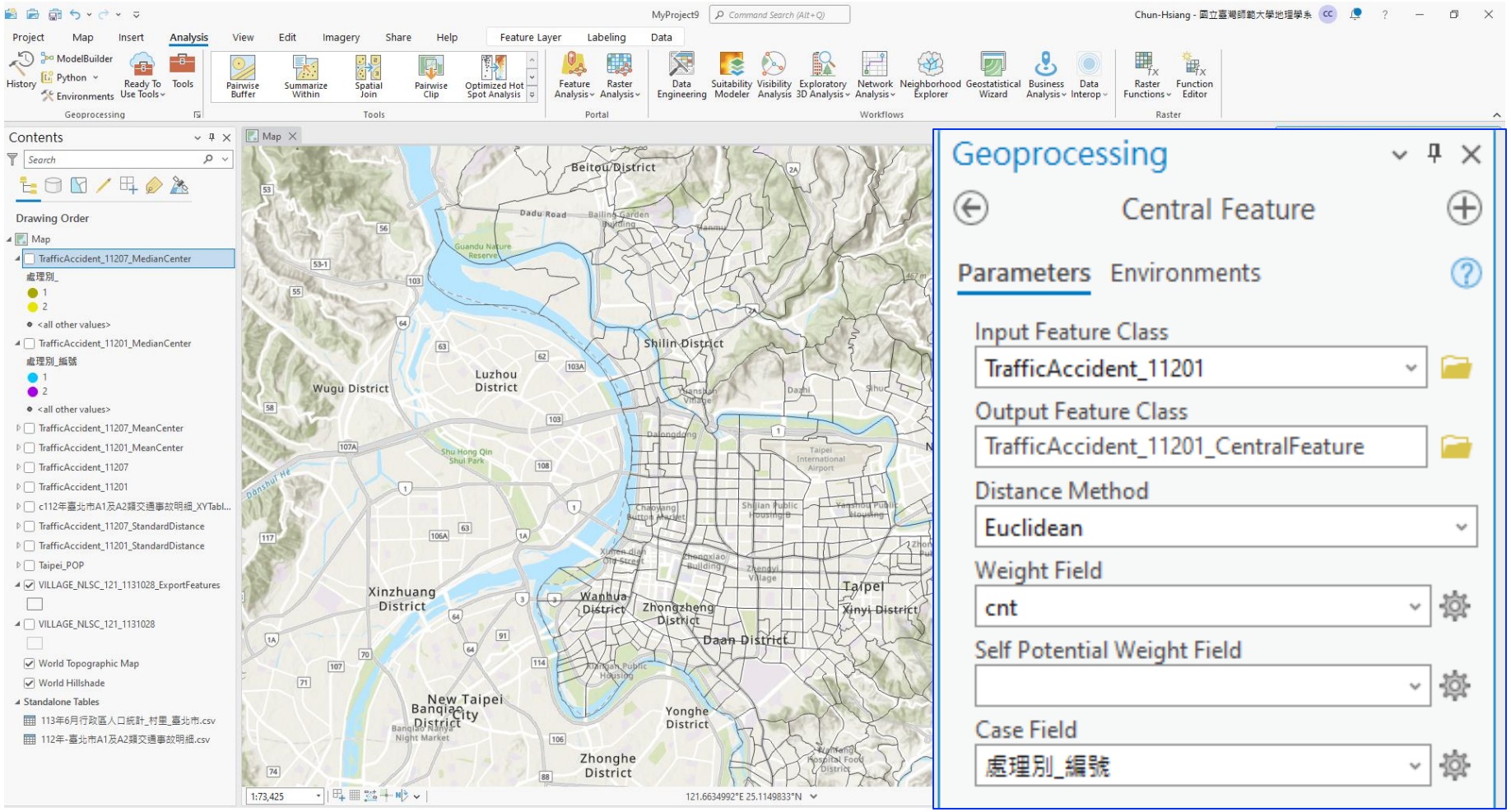
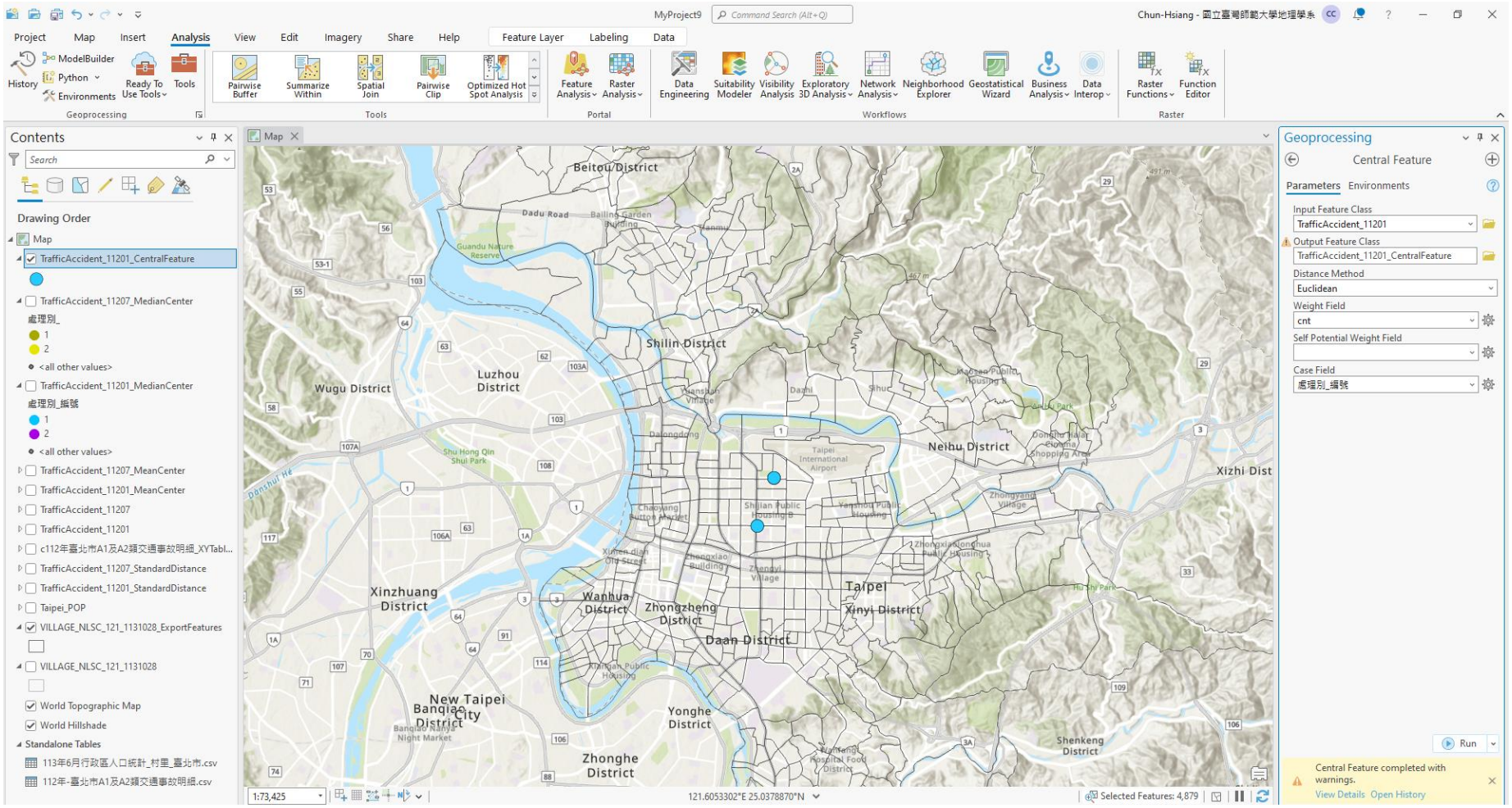
Standard Distance :: Symbology



Central Feature



Central Feature



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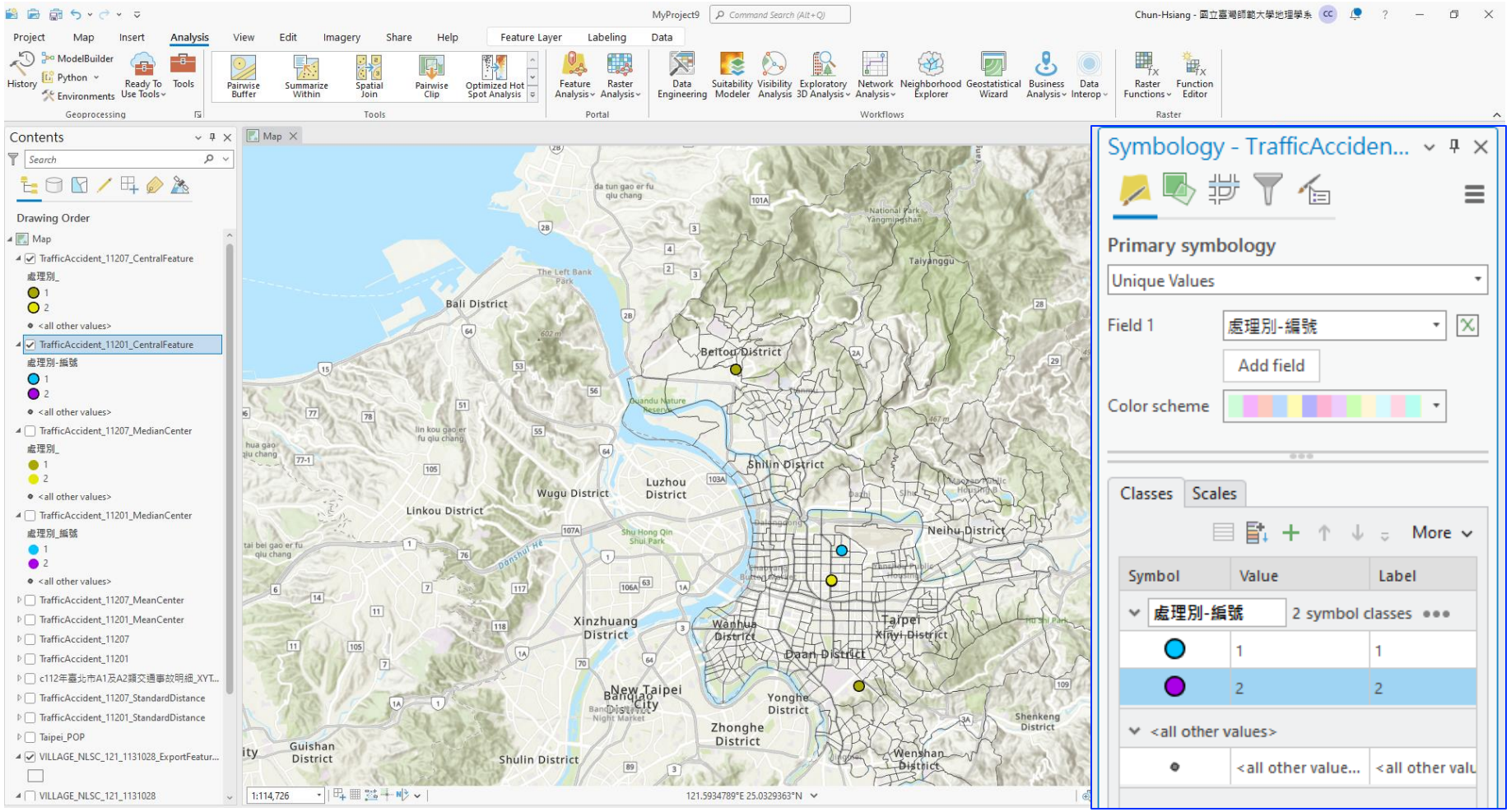
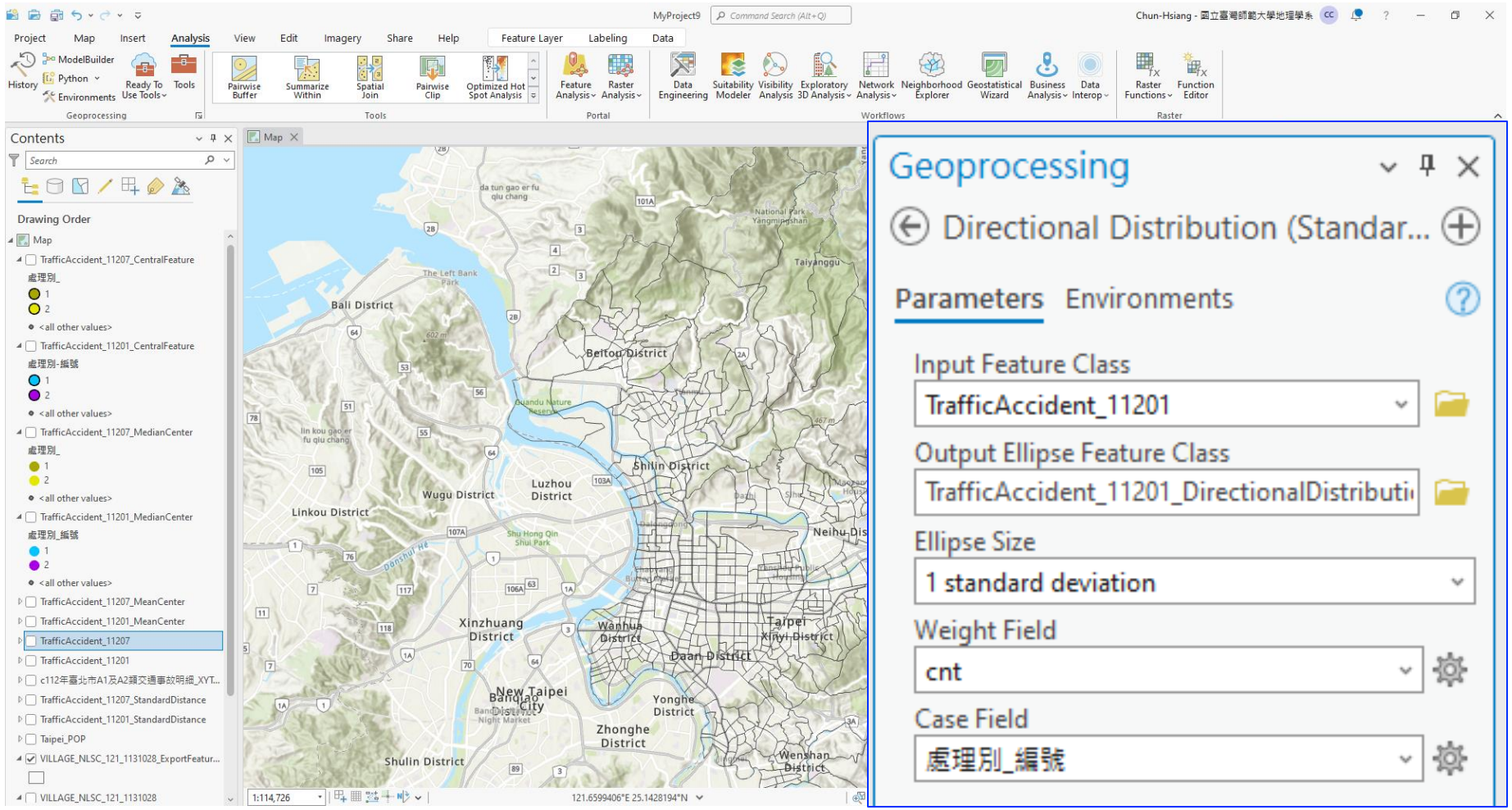
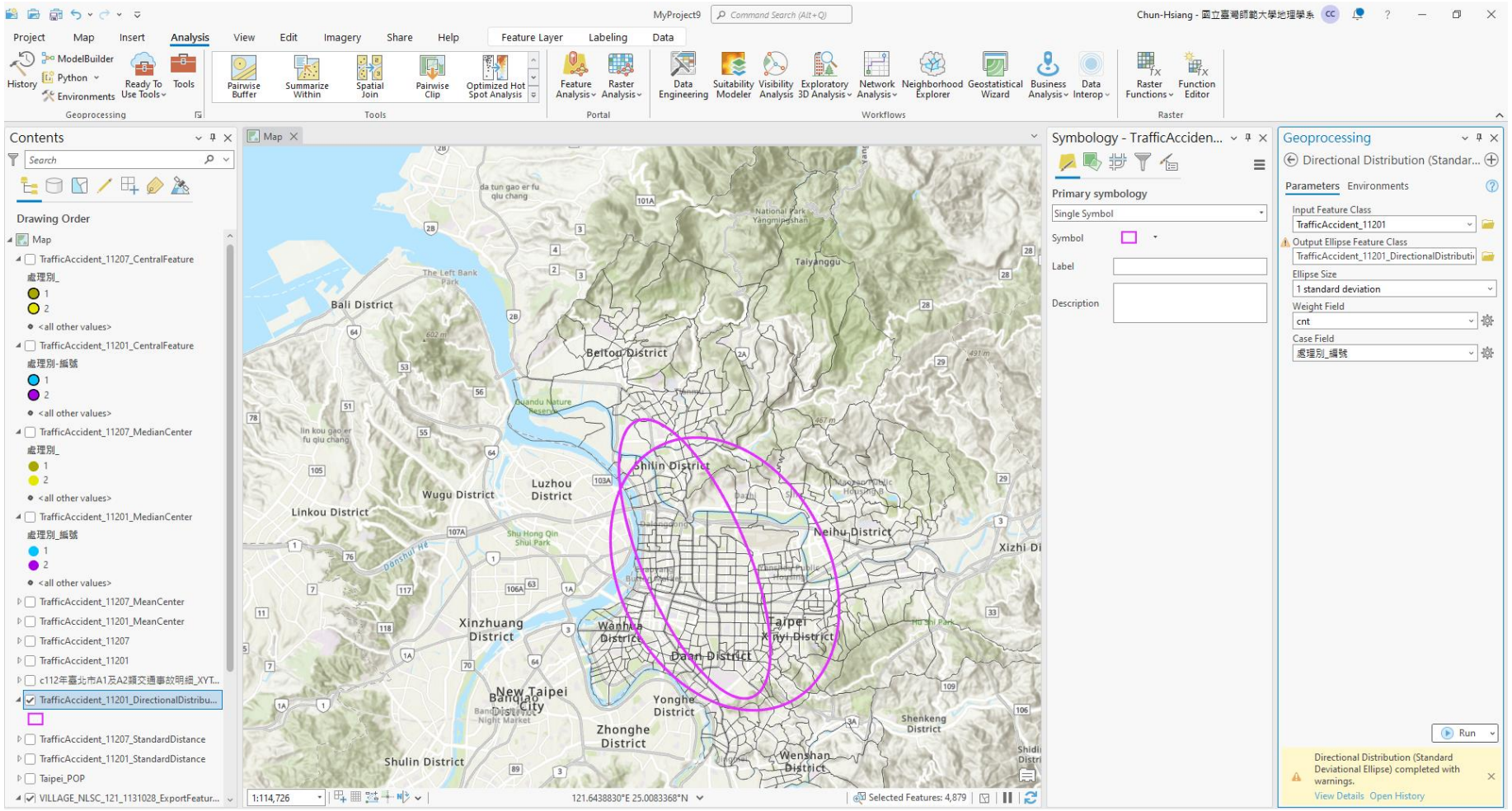
Central Feature :: Symbology



Directional Distribution



Directional Distribution



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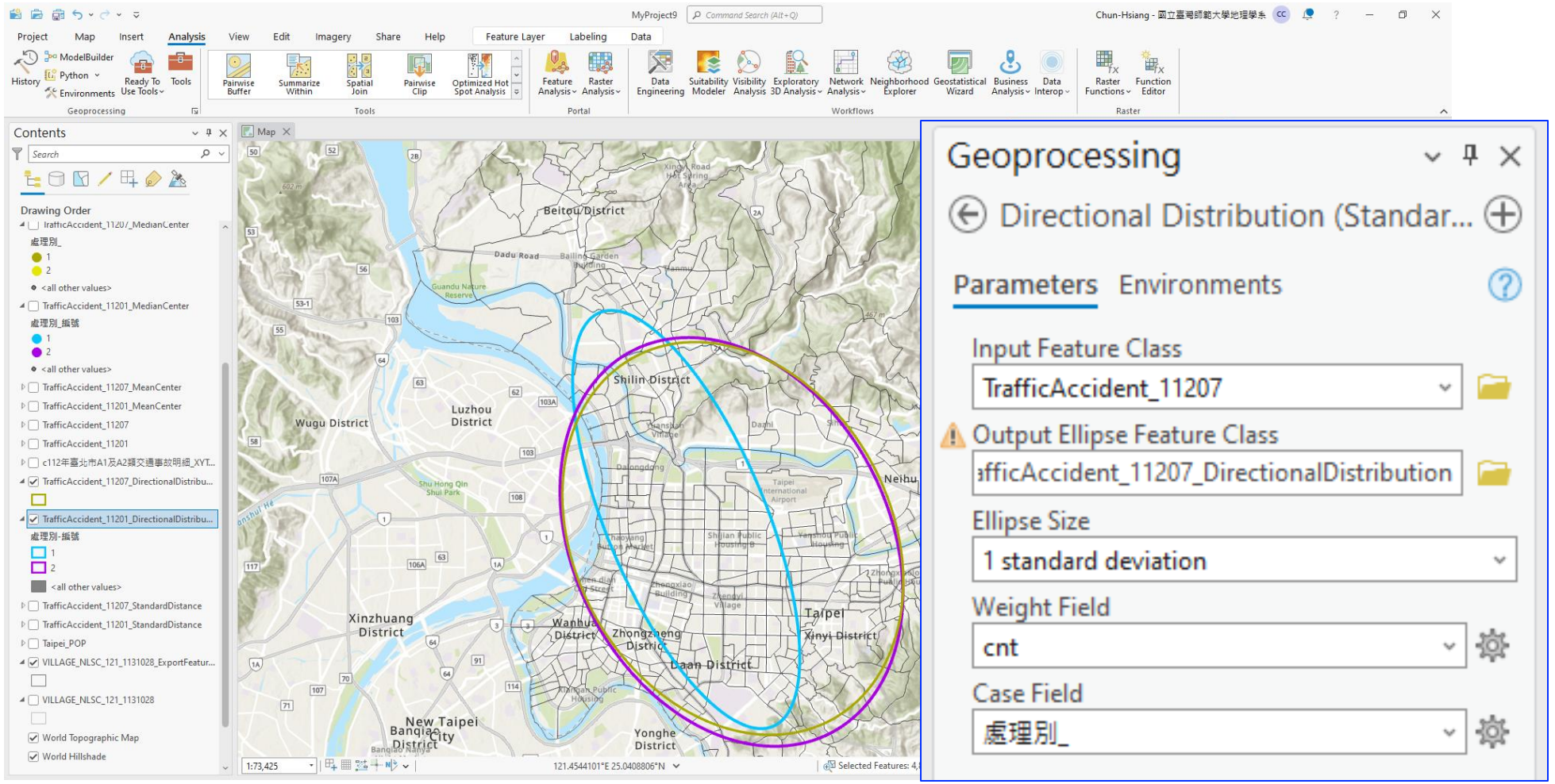
Directional Distribution :: Symbology



Spatial Statistics Analysis

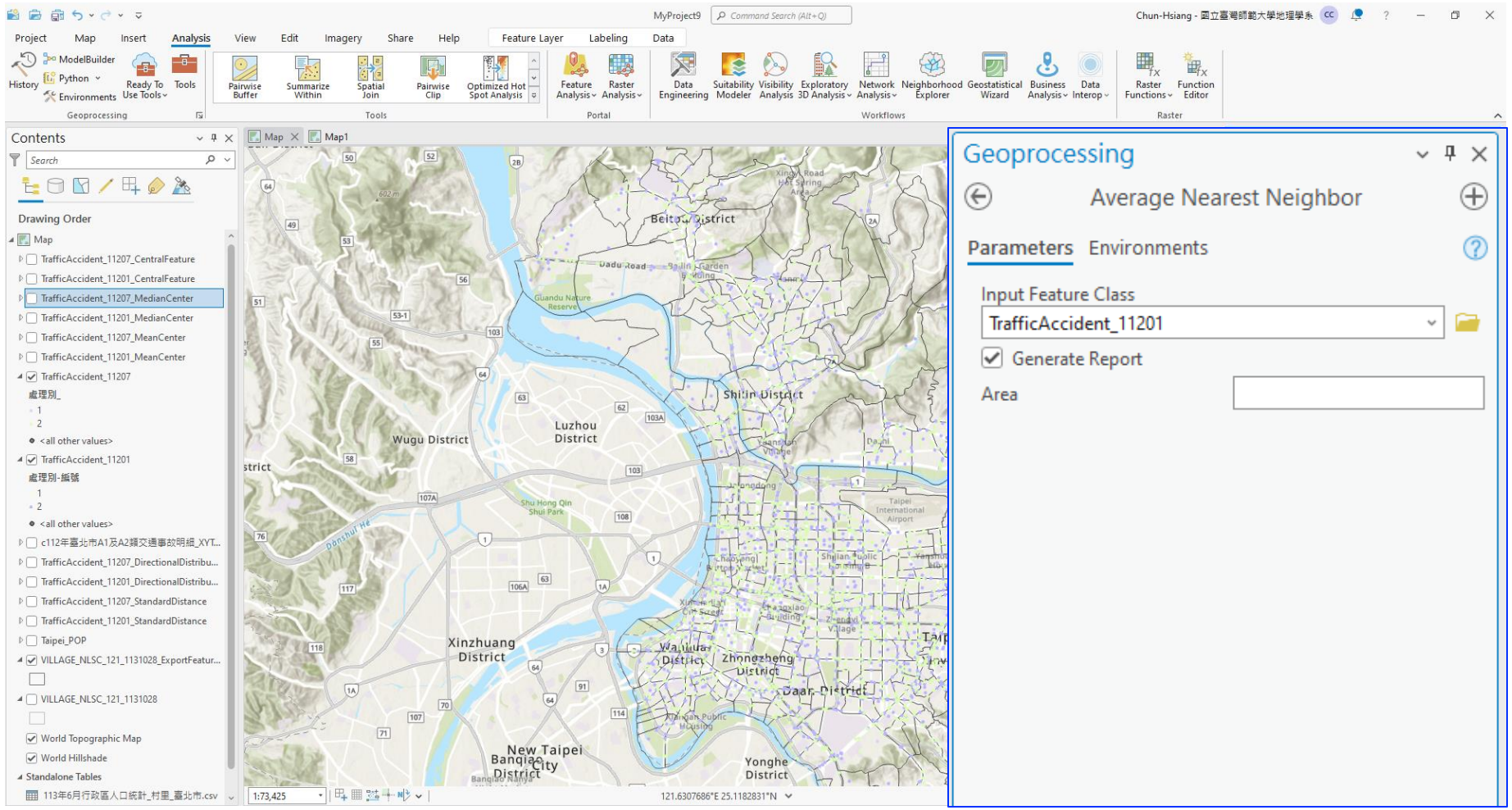
Compute the following function with both TrafficAccident_11201 and TrafficAccident_11207

1) Average Nearest Neighbor

Compute the following functions with the population data from Taipei POP data.

1) Incremental Spatial Autocorrelation
2) High/Low Clustering (Getis-Ord General G)
3) Repley's *k*-function
4) Spatial Autocorrelation (Global Moran's I)

Average Nearest Neighbor



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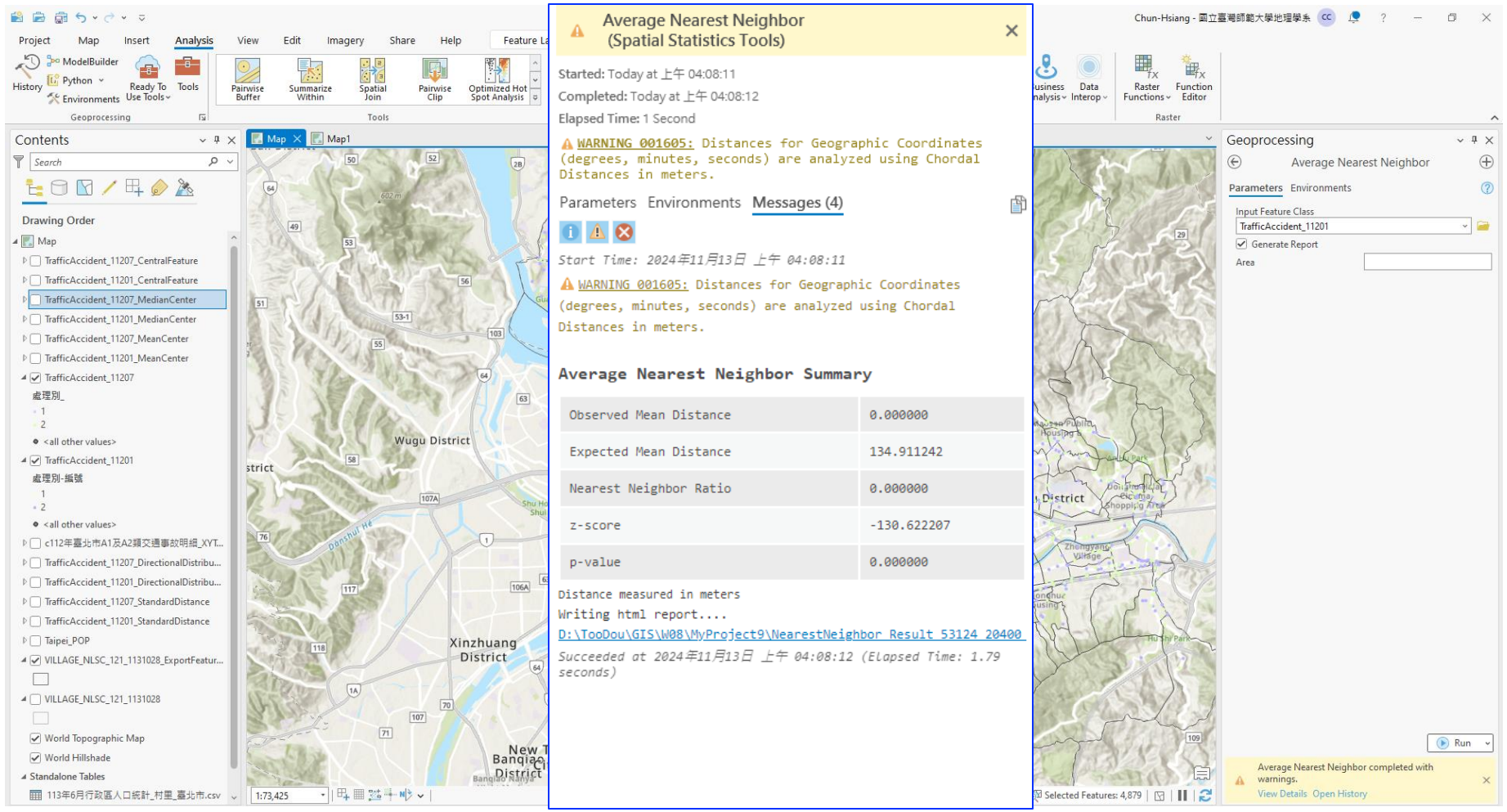
Average Nearest Neighbor



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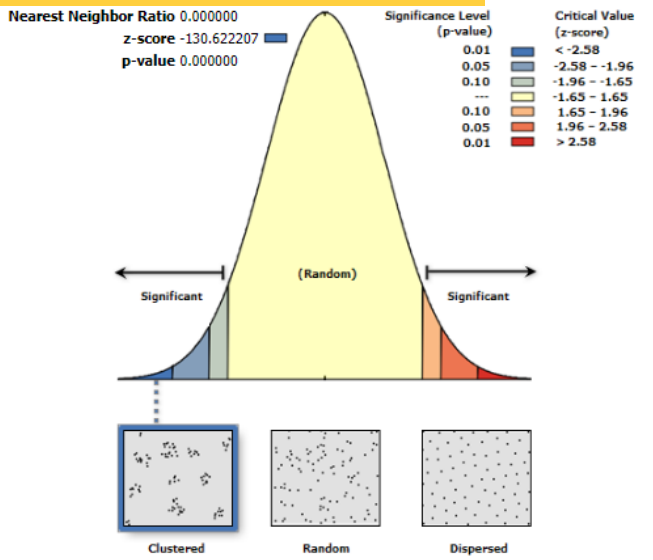
Average Nearest Neighbor

Traffic Accident 11201

Average Nearest Neighbor Summary



Given the z-score of -130.622207, there is a less than 1% likelihood that this clustered pattern could be the result of random chance.

Average Nearest Neighbor Summary

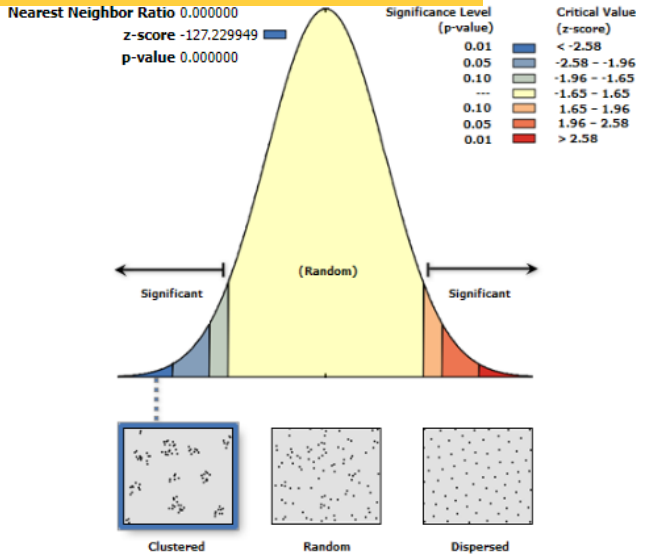
Observed Mean Distance	0.0000 meters
Expected Mean Distance	134.9112 meters
Nearest Neighbor Ratio	0.000000
z-score	-130.622207
p-value	0.000000

Dataset Information

Input Feature Class:	TrafficAccident_11201
Distance Method:	EUCLIDEAN
Study Area:	339413055.219921
Selection Set:	False

Traffic Accident 11207

Average Nearest Neighbor Summary



Given the z-score of -127.229949, there is a less than 1% likelihood that this clustered pattern could be the result of random chance.

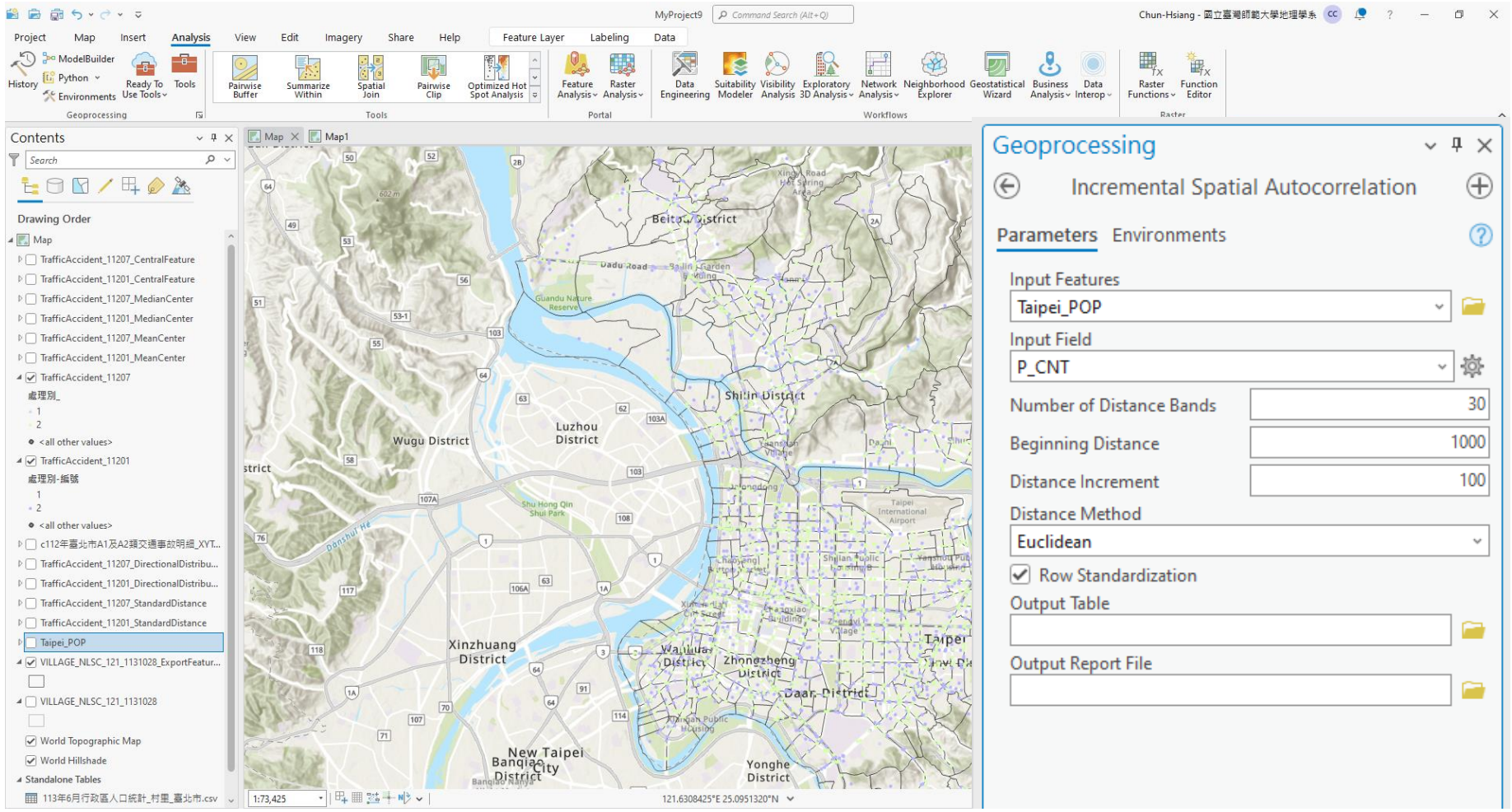
Average Nearest Neighbor Summary

Observed Mean Distance	0.0000 meters
Expected Mean Distance	137.7066 meters
Nearest Neighbor Ratio	0.000000
z-score	-127.229949
p-value	0.000000

Dataset Information

Input Feature Class:	TrafficAccident_11207
Distance Method:	EUCLIDEAN
Study Area:	335495527.346745
Selection Set:	False

Incremental Spatial Autocorrelation



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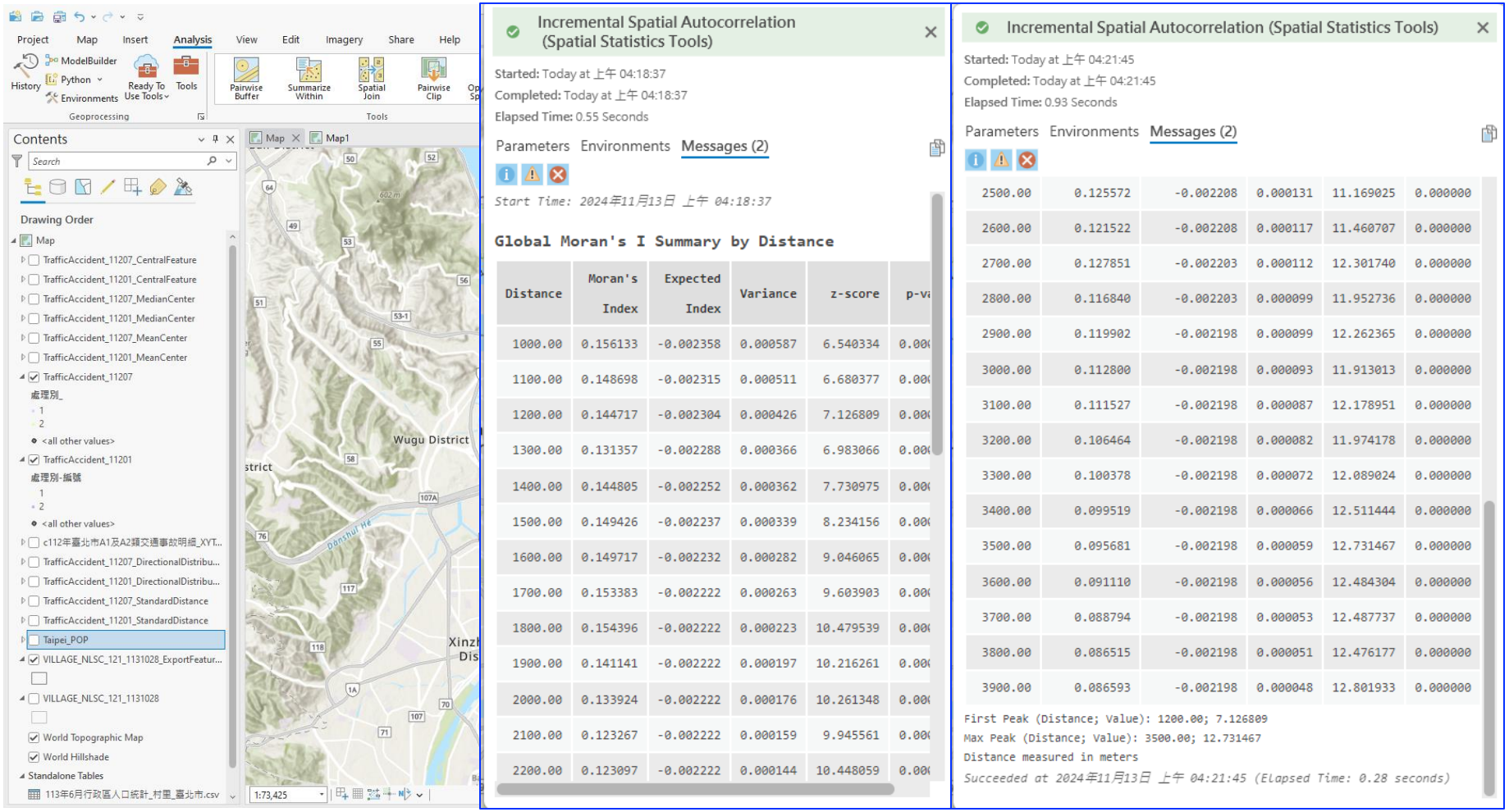
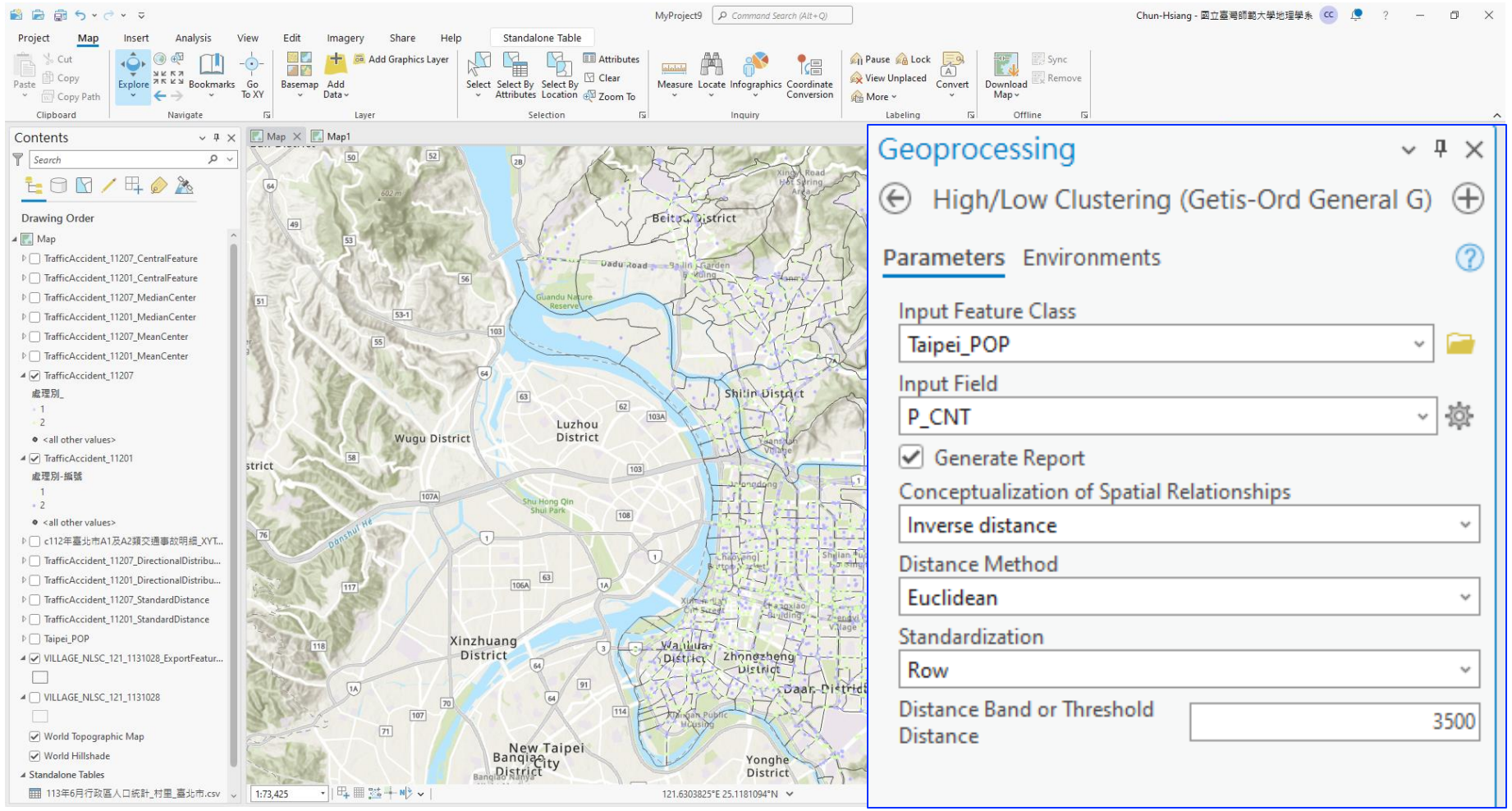
Incremental Spatial Autocorrelation



High/Low Clustering (Getis-Ord General G)



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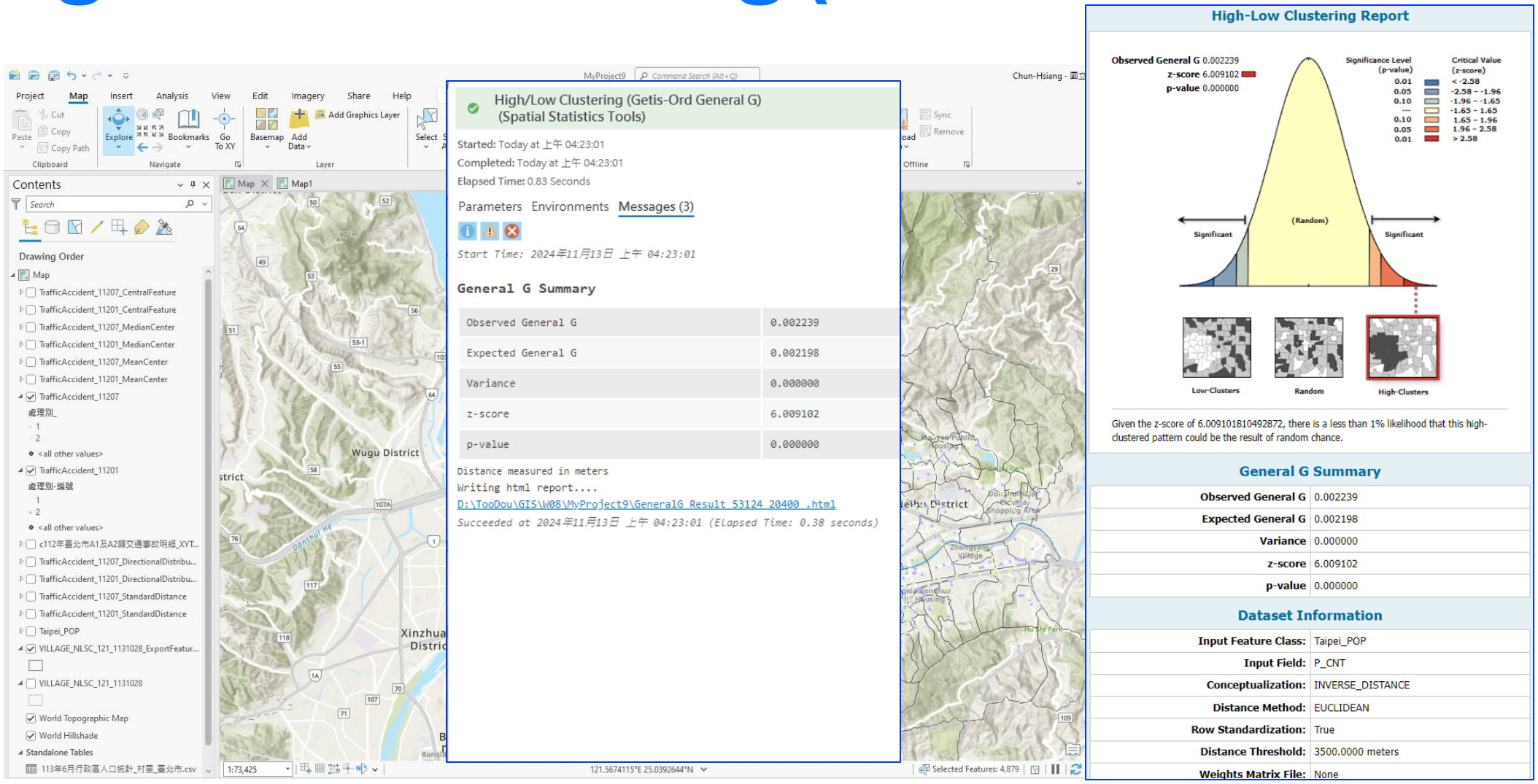
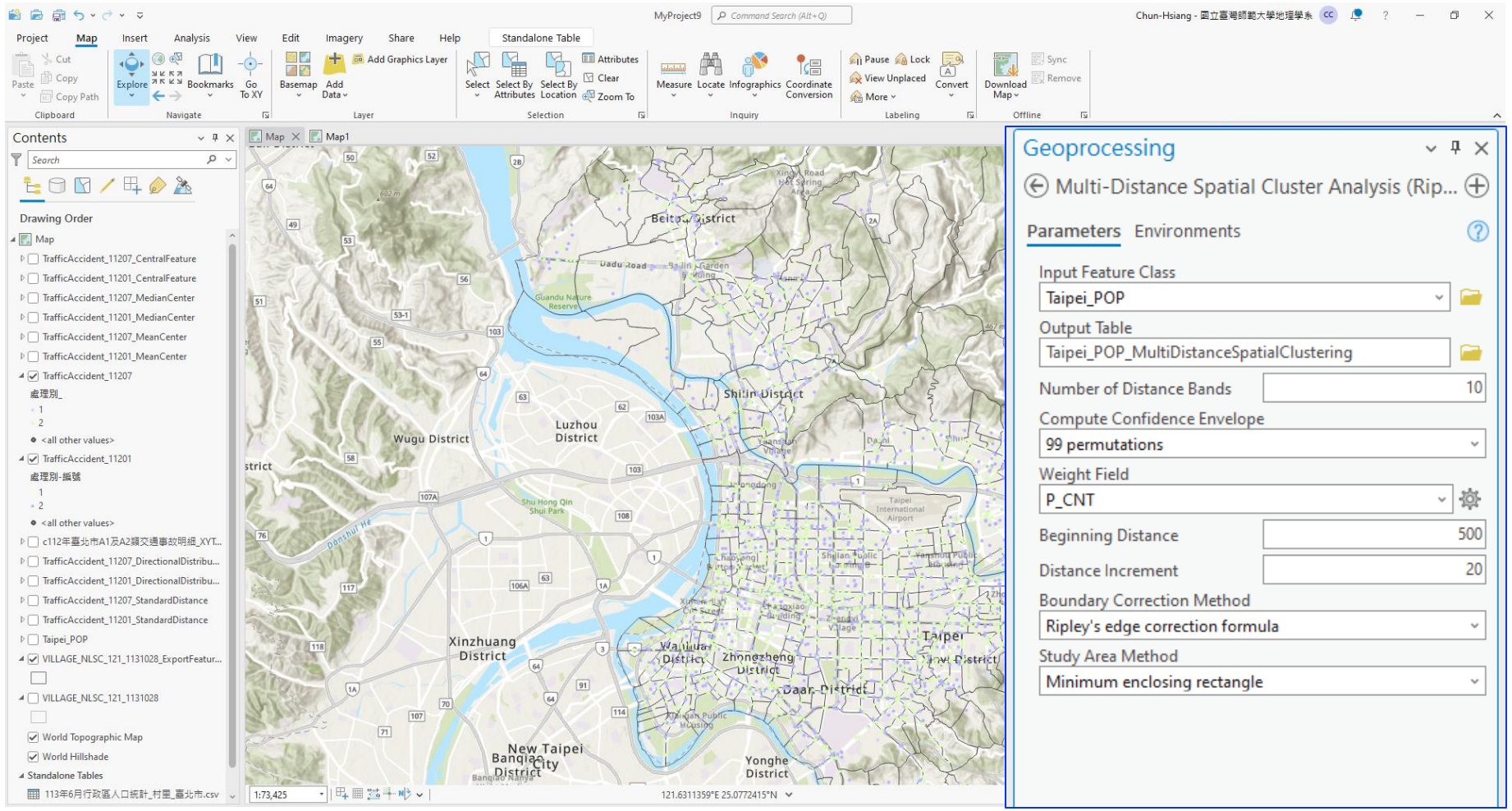
High/Low Clustering (Getis-Ord General G)



Repley's *k*-function



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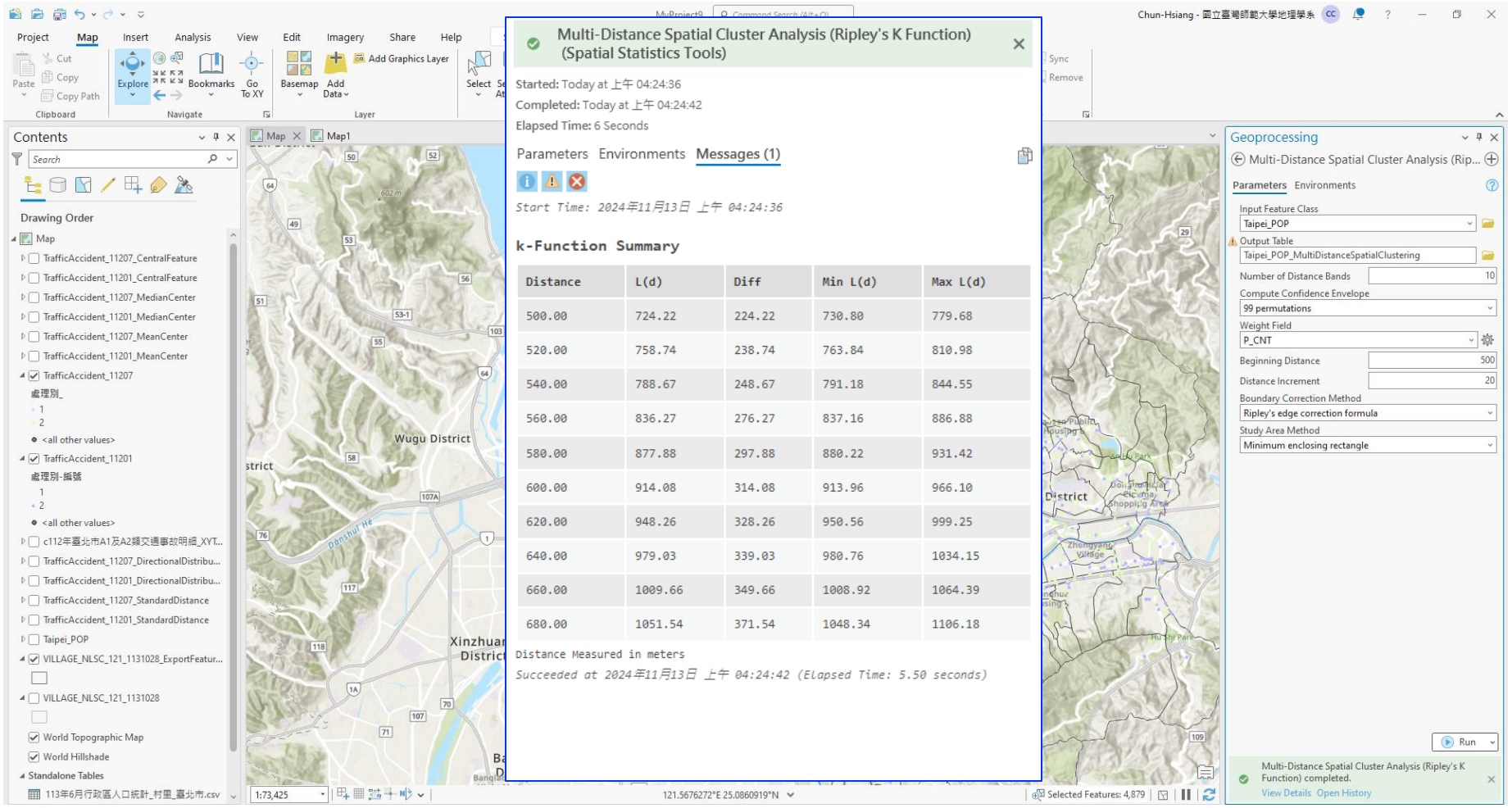
Repley's *k*-function



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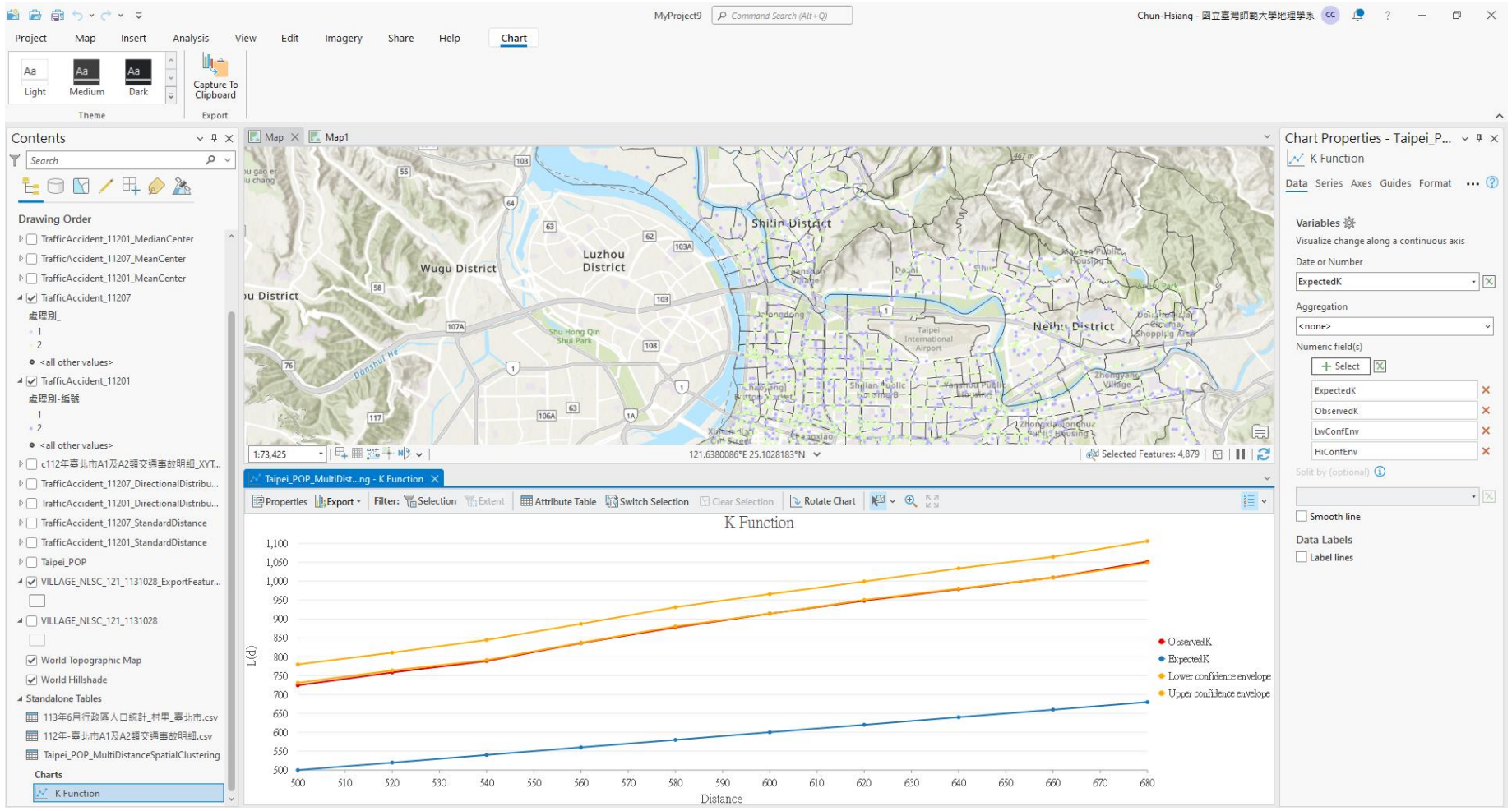
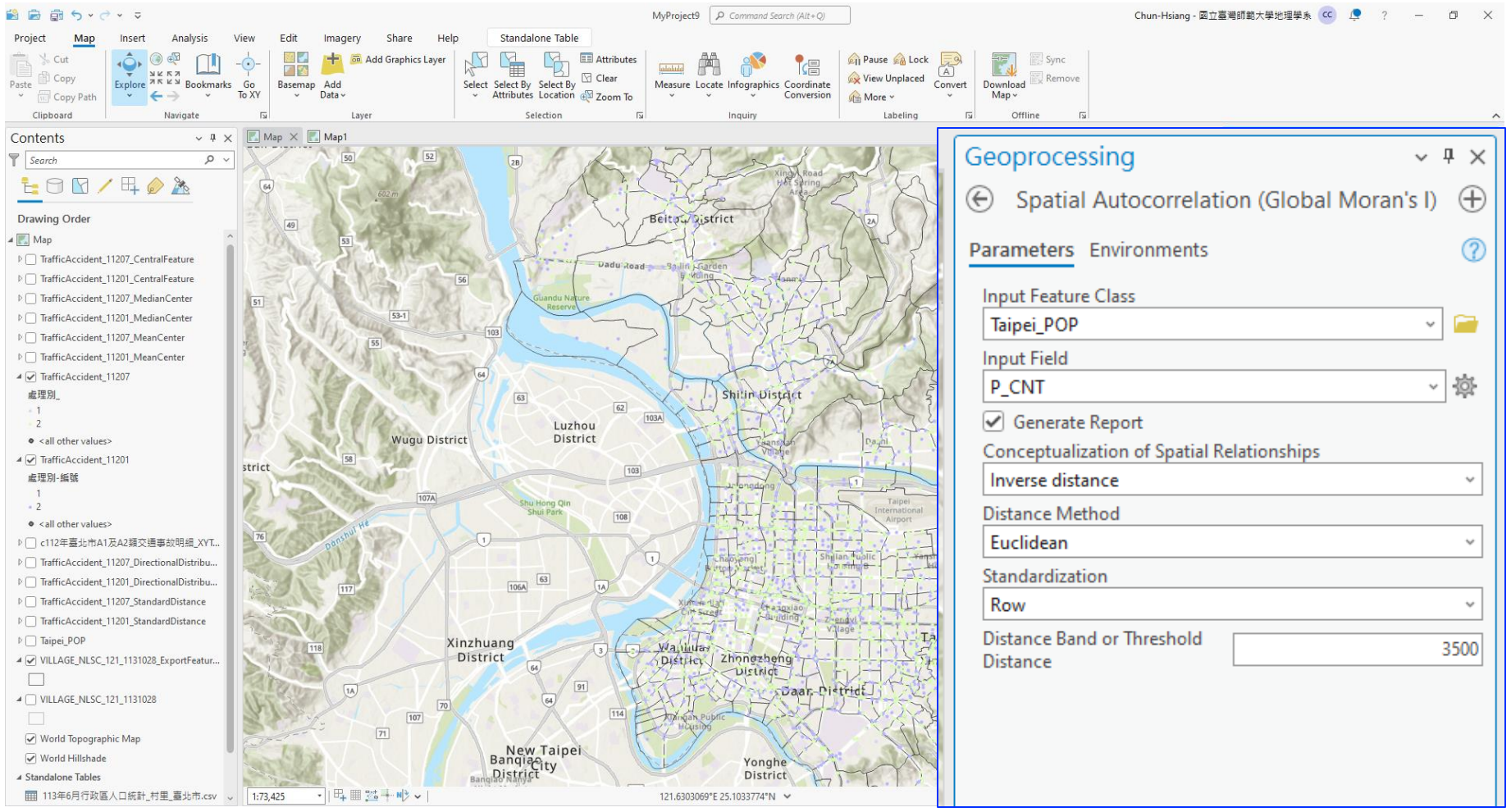
Repley's *k*-function



Spatial Autocorrelation (Global Moran's I)



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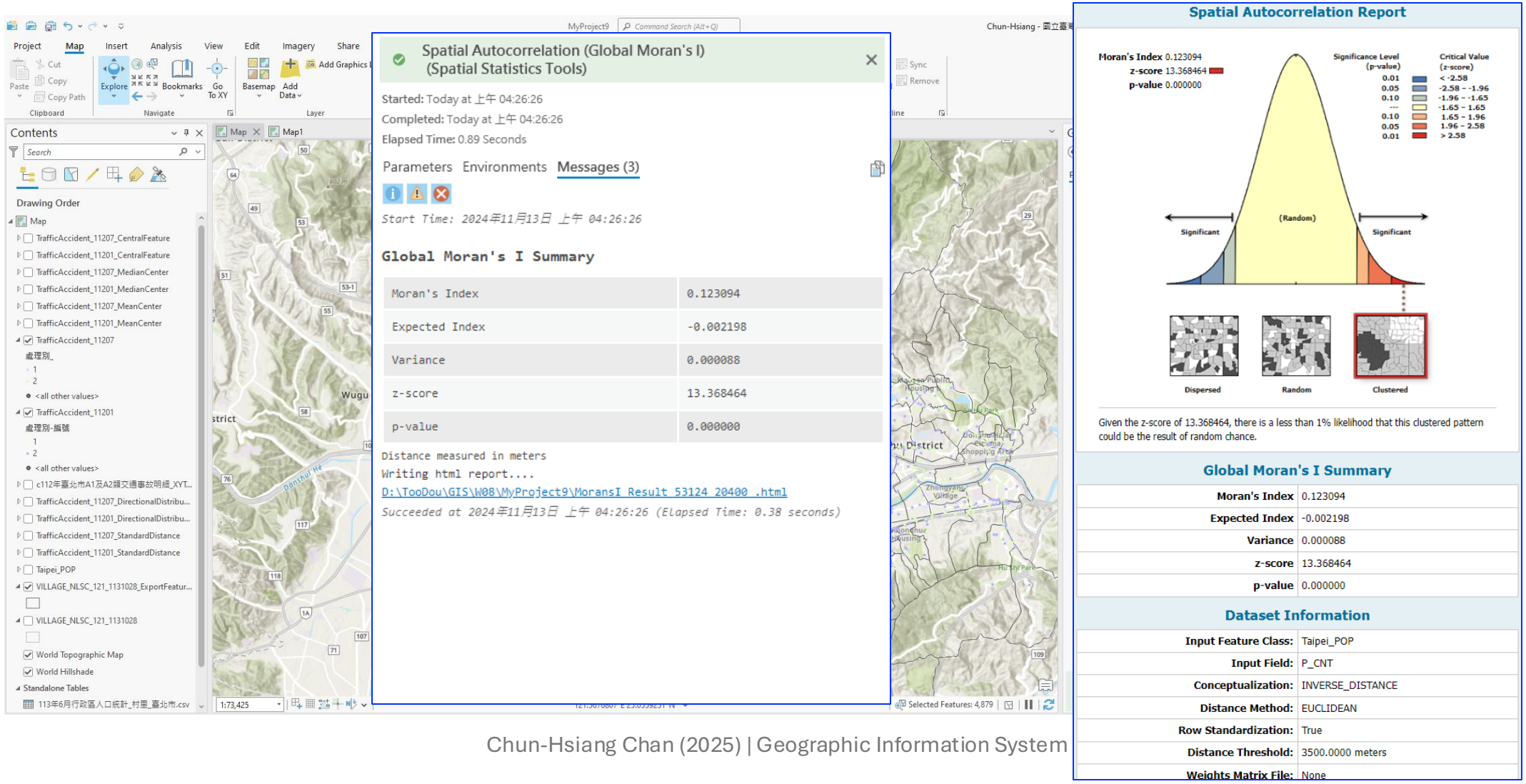
Spatial Autocorrelation (Global Moran's I)



The End

Thank you for your attention!

Email: chchan@ntnu.edu.tw
Web: toodou.github.io