Applying Machine Learning to your Analysis in ArcGIS Pro

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ArcGIS integrates with Machine Learning tools

R ArcGIS Bridge
(for ArcGIS Pro)

ArcGIS API for Python
ArcGIS includes Machine Learning Tools

- Classification
- Clustering
- Deep Learning
- Prediction
Machine Learning Tools in ArcGIS

Clustering
• Spatially Constrained Multivariate Clustering
• Multivariate Clustering
• Density-based Clustering
• Hot Spot Analysis
• Cluster and Outlier Analysis
• Space Time Pattern Mining

Classification
• Pixel & Object Based
• Image Segmentation
• Maximum Likelihood
• Random Trees
• Support Vector Machine

Prediction
• Empirical Bayesian Kriging
• Areal Interpolation
• EBK Regression Prediction
• Ordinary Least Squares Regression and Exploratory Regression
• Geographically Weighted Regression

Deep Learning
• Generate training samples
• Detect objects
• Classify pixels
Demo: LaGuardia Airport Vehicle Collisions
Understanding collision patterns over time

LGA undergoing $8B project to improve facilities and infrastructure (e.g., overhaul terminals, install AirTrain, reconstruct road network)
  • Part I: Replace Terminal B building
  • Part II: Redevelop & connect Terminals C & D to the airport
  • Flyover @ Exit 7/Grand Central Pkwy: redevelop bridge network, traffic light reduction
  • Recommended to arrive >2.5 hours prior to check-in due to construction-related delays

• Where are accidents occurring the most?
• How are clusters of accidents changing over time?
Demo: LaGuardia Airport Vehicle Collisions
Exploratory analysis (2012-2018) Density-based Clustering (HDBSCAN)

Cluster = 10 collisions
Cluster = 20 collisions
Cluster = 30 collisions
Demo: LaGuardia Airport Vehicle Collisions
Emerging Hot Spot Analysis
Top Takeaways from Dataiku’s EGG2018 AI Conference

- ML is powerful, but also resource and computationally intensive
- ML requires a team/network (data engineer + data scientist + SME)! ... or a “unicorn”
- Very few entities have effectively implemented ML at scale
  - ML code is actually a small part of the overall process (Data engineering, QA/QC)
  - Requires some level of policy/management framework
- Communicating value of ML investment is tricky!
  - Value derived over time
  - Can seem like a “black box”

- Focus on solving your problem, not on using the latest tech trend.
  (Keep doing what you’re doing. 😊️)
Resources

http://esriurl.com/spatialstats
(or search for “Esri Spatial Stats blog”)

- GeoDev Webinars (go.esri.com/geodev)
  - Integrating Deep Learning with ArcGIS using Python
  - Explore the Power of the ArcGIS API for Python
- Learn ArcGIS (learn.arcgis.com)
  - Model Water Quality Using Interpolation
  - Analyze Urban Heat Using Kriging
  - Predict Seagrass Habitats with Machine Learning
- Dev Labs (https://developers.arcgis.com/labs/)
- ArcGIS for Python API Sample Notebooks (https://developers.arcgis.com/python/)
- R ArcGIS Bridge (https://spatialstats.github.io/r-arcgis-bridge/)
That being said…we’re here to help you! 😊

YOU KUN-DU IT!

GOOD LUCK!