THE UNIVERSITY OF CHICAGO
DATA SCIENCE INSTITUTE

Flooding, erosion, and declining water quality, partly exacerbated by climate change, pose significant risks to northeastern Illinois. To address these challenges, the Chicago Metropolitan Agency for Planning (CMAP) is creating the region's first comprehensive stormwater infrastructure inventory. Supporting this initiative, teams from the Data Science Institute (DSI) have been developing a deep learning model to identify stormwater infrastructure from aerial images (Figure 1), aiming to make the inventory process more efficient.

This team refined the model by implementing automated tuning (Figure 2), improving the Intersection over Union—a measure of overlap between predicted and actual areas— by 15.8% in classifying the stormwater infrastructure. Significant progress was also made in integrating river and Digital Elevation Model(DEM) data, laying the groundwork for future performance improvements.

The improved model effectively identifies ponds and wetlands but continues to face challenges with structures like dry-bottom detention basins. Future work will focus on finalizing river and DEM data integration and broadening the model's capacity to detect a wider range of stormwater infrastructure. These efforts support CMAP's work in advancing stormwater management and preparing the region for growing climate challenges.

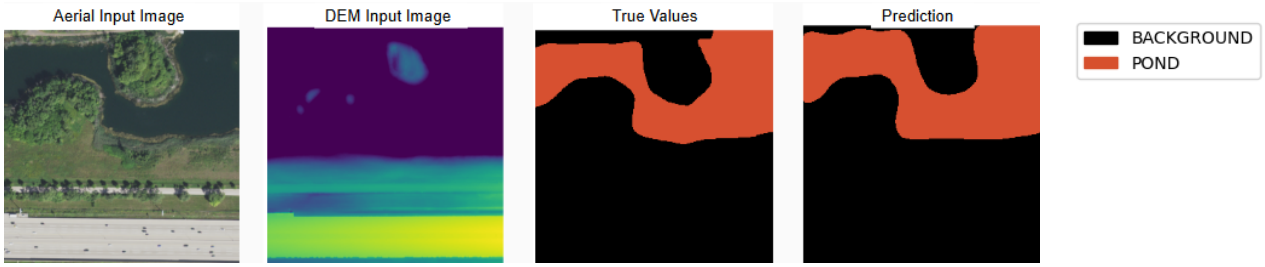

Figure 1: Example of model input and prediction. From left to right : (1) aerial input image, (2) DEM input image, (3) true basin types, and (4) predicted basin types, with labels for background and pond.

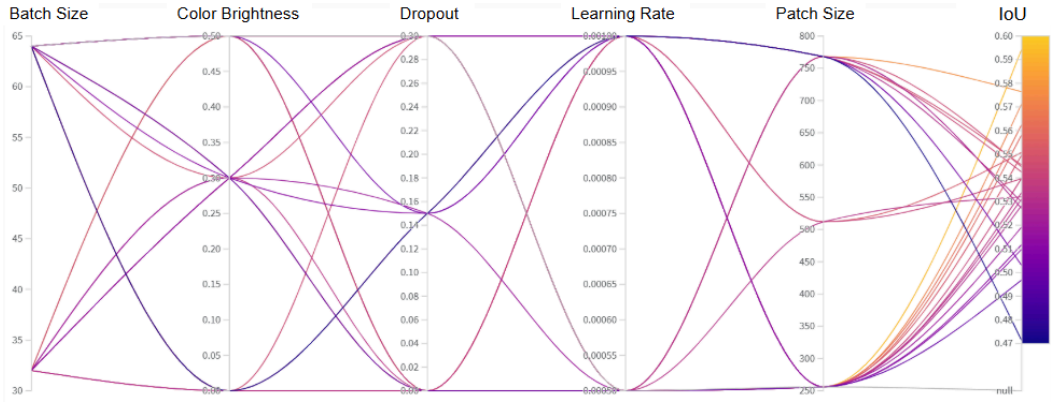

Figure 2: Results of tuning experiment showing how different model settings affect the model's performance. Each line represents a combination of settings tested, and the color indicates how well the model performed, with warmer colors representing better results and cooler colors representing worse results.