Mapping more, managing better: Expanding prairie conservation with Remote Sensing and Deep Learning

Hill prairies are unique, rare remnants of a once expansive prairie landscape and are crucial habitats for rare and endangered species. Land-use changes, urbanization, and invasive species have severely encroached on these prairies, yet comprehensive inventories to inform conservation remain scarce. Manual surveys, though useful, are time-consuming, expensive, and often impractical on large scales. To address this gap a Convolutional Neural Network (CNN) classification model was created for detecting remnant hill prairies in satellite imagery. Preliminary results show that this method achieves high overall accuracy yet struggles in balancing false positives and false negatives: refined CNNs tend to reduce over-classification but risk missing more prairie sites. Despite these trade-offs, our findings underscore the potential of deep-learning approaches to rapidly and repeatedly map hill prairies over wide areas. Future refinements—such as integrating additional environmental data layers, using dimensionality reduction techniques, and expanding the training dataset—could further enhance classification performance. Ultimately, these enhancements aim to support more efficient, data-driven approaches to prairie conservation and management.