Mapping fluvial geomorphology, hydromorphologic feature extraction and classification from high-resolution aerial imagery and artificial neural network

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The ability to rapidly and accurately assess hydromorphic features is crucial to monitoring and modelling change in evolving river ecosystems. Imperative to understanding these environments and their changing structures, is the evaluation of spatial and temporal variation in the progression of hydromorphic features, which ultimately characterizes a stream and its dynamic capability. Rivers are systems in dynamic equilibrium, maintaining balance in water flow and sediment transport. When river channels are altered under dynamic hydrologic conditions, the river readjusts itself with respect to dimension, profile, and hydromorphologic feature assemblage to reach a balance or equilibrium state. The ability to detect alteration in these hydromorphic feature assemblages is a powerful tool, giving insight to properly predict subsequent system changes, useful in determining correlations between near stream activity and river structure change. This can lead to better understanding of anthropogenic activity in the surrounding riparian area and its associated impacts on river systems, of recent interest and note are those of river system progressions in association with dam removal. Advanced techniques for image processing and computer vision, allow for the mapping and modelling of these systems in detail. The ubiquity of Unmanned Aerial Vehicles (UAVs) has made non-invasive river assessment accessible. Feature assemblages extracted from high-resolution aerial imagery can be correlated to fish species habitat and spawning locations, allowing for the quantitative and qualitative assessment of these river environments, useful in the conservation and management of natural waters.

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