

Nawaraj Shrestha

Title: Correction of photogrammetrically derived DTMs for hydrodynamic modeling using Object Oriented Analysis (OOA)

Level: MSc

Description of work:

Features such as buildings, groynes, dykes, dams and elevated roads play an important role in hydrodynamic modeling as they influence the direction, velocity and extent of water flow. These obstruction features are typically included in digital elevation models (DEM), especially when derived from photogrammetry, and plays key role in a water movement simulation environment. Both digital surface models (DSM) and digital terrain models (DTM) thus represent the surface in a way that is insufficiently accurate for hydrodynamic modeling, leading to erroneous simulation results. Methods used to derive terrain information from surface models are unable to incorporate features



relevant for hydrodynamic models. Filtering methods, based on priori assumption of Earth's surface, are designed for specific features and fail to differentiate the variability between and within features. Pixel-based methods, such as classification approaches, are unable to address high resolution data and complex natural situations such as houses surrounded by vegetation, shadow effect, dykes and groynes covered with vegetation produce spikes and pits in resultant DTM. While some studies have used segmentation and fuzzy logic for DTM derivation, methods to date remain insufficient in addressing the natural complexity of built-up areas in flood plains. Thus this research seeks an alternative method to address the problem of DTM derivation, using object oriented approach (OOA) in contrast to conventional morphological filtering and classification approaches. OOA is being used to identify and extract features based on the spectral, spatial, contextual and textural properties at different scale. These properties can be used to create ontology of features and subsequently remove from the DSM, thus creating a pseudo-DTM that retains flood-relevant hydrodynamic features. The research also aims at exploring the potentialities of OOA beyond scene interpretation in land use classification.

Biography: Nawaraj Shrestha received his MSc degree in Environmental Science from Tribhuvan University, Kirtipur, Nepal. His thesis is entitled as "GIS based Landslide Hazard Mapping of Triyuga Watershed, Eastern Nepal". Currently, he is doing MSc research in ITC focusing on DTM correction for hydrodynamic modeling using OOA.

