World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:19, No:01, 2025

TerraEnhance: High-Resolution Digital Elevation Model Generation using GANs

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Abstract : Digital Elevation Models (DEMs) are digital representations of the Earth's topography, which include information about the elevation, slope, aspect, and other terrain attributes. DEMs play a crucial role in various applications, including terrain analysis, urban planning, and environmental modeling. In this paper, TerraEnhance is proposed, a distinct approach for high-resolution DEM generation using Generative Adversarial Networks (GANs) combined with Real-ESRGANs. By learning from a dataset of low-resolution DEMs, the GANs are trained to upscale the data by 10 times, resulting in significantly enhanced DEMs with improved resolution and finer details. The integration of Real-ESRGANs further enhances visual quality, leading to more accurate representations of the terrain. A post-processing layer is introduced, employing high-pass filtering to refine the generated DEMs, preserving important details while reducing noise and artifacts. The results demonstrate that TerraEnhance outperforms existing methods, producing high-fidelity DEMs with intricate terrain features and exceptional accuracy. These advancements make TerraEnhance suitable for various applications, such as terrain analysis and precise environmental modeling.

Keywords : DEM, ESRGAN, image upscaling, super resolution, computer vision
Conference Title : ICMLC 2025 : International Conference on Machine Learning and Cybernetics
Conference Location : Bengaluru, India
Conference Dates : January 30-31, 2025