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Rethinking Amortized Neural Representations for High-Resolution Terrain Elevation Data

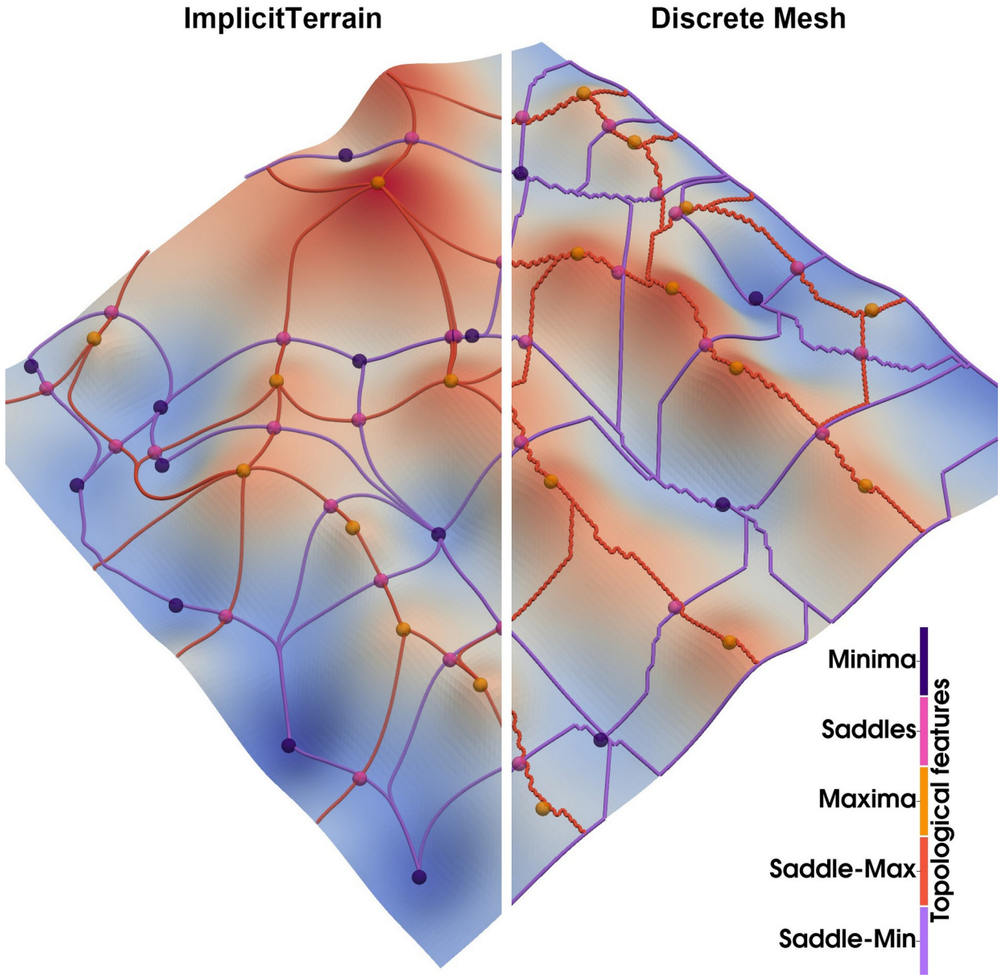
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Poster R-110

ImplicitTerrain: INRs for terrain modeling and analysis

Our prior work, @CVPR Workshops 2024



f(x, y) = elevation

Continuous coordinate queries

Evaluate elevation at arbitrary locations

Flexible sampling

Decode the same model at different resolutions

Analytic derivatives

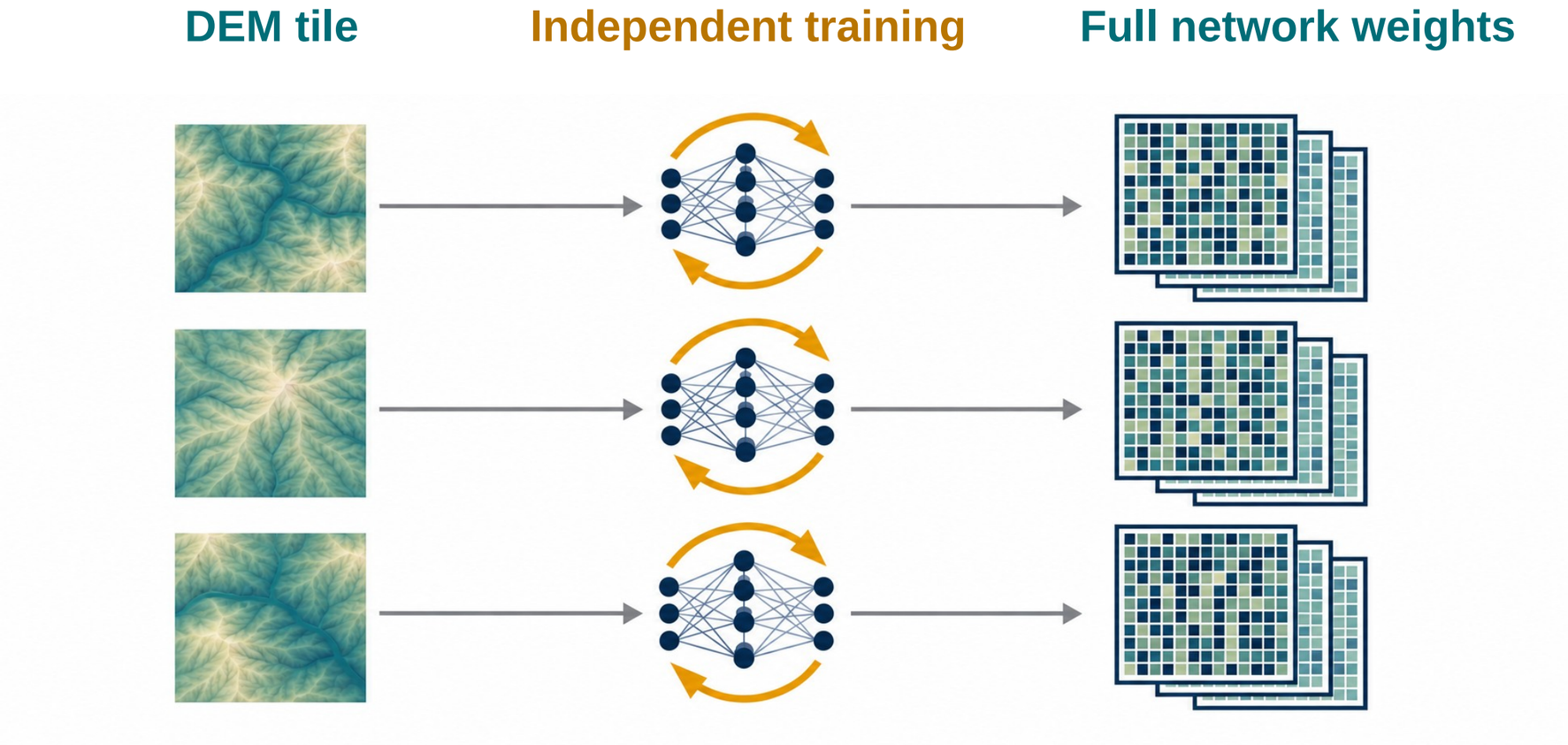
Compute slope, aspect and curvature without back-propagation

Terrain data analysis

Extract critical features and topological structure

Per-instance fitting costs time and storage

Finer terrain detail requires more model parameters in each stored network, separately

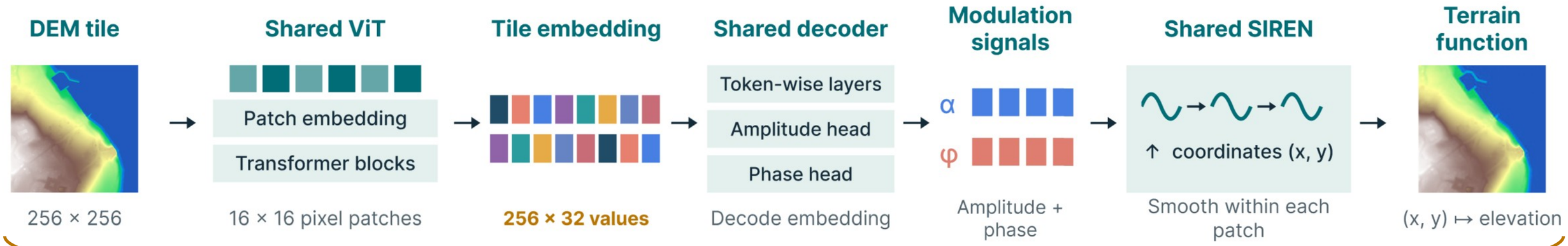


N tiles: N x GPU time + N x model storage

Amortized conversion with a terrain-aware decoder

Benchmark: TransINR, Functa, and HUVR. → Our terrain data adaptation: HUVR+SIREN.

Inference: DEM to embedding | Decoding: embedding to terrain



End-to-end training of shared models on our curated dataset; store one embedding per tile.

~12 ms
Inference time

+2.83 dB
PSNR over HUVR, no larger tile payload

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