StyleCity: Large-Scale 3D Urban Scenes Stylization

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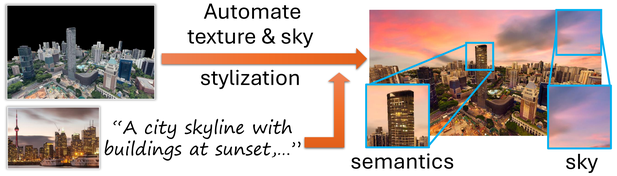
Motivation and Problem

Motivation & Challenges of Urban Stylization

- Time-consuming manual customization of texture material and lighting setups.
- Large-scale urban virtual scene in size.
- Complex semantics in urban scene, e.g., buildings, windows, etc.
- Style-aligned sky background synthesis.

Problem Definition

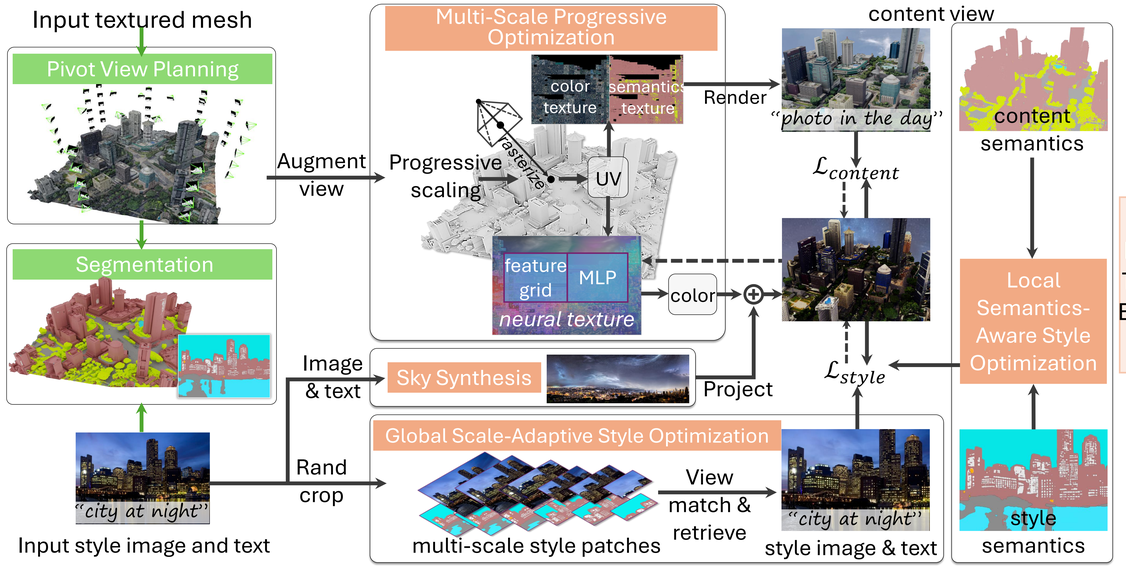
Taking a textured urban mesh, image and text references, we aim to stylize the texture of a large-scale urban scene in a semantics-aware manner and generates a harmonic omnidirectional sky background.



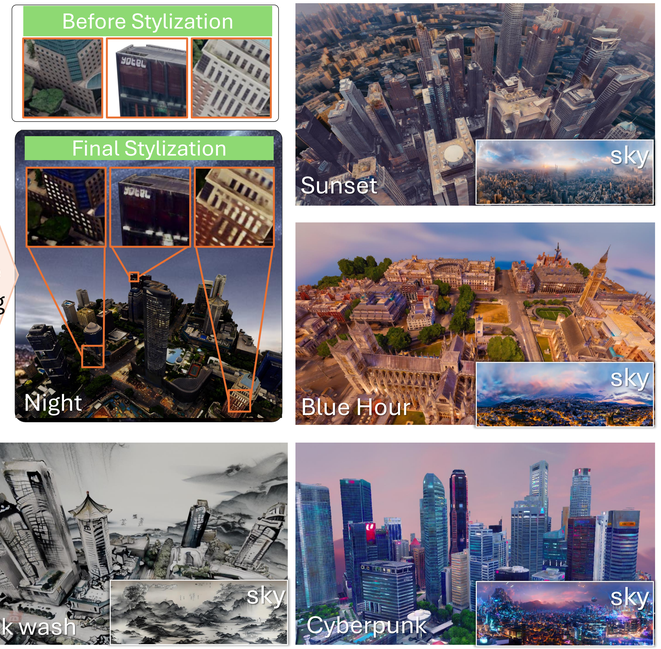
Highlights and Contributions

- First text-and-image driven automatic urban-scale mesh texture stylization system, StyleCity.
- Multi-scale progressive optimization for large-scale scene.
- Semantics-aware style transfer.
- Scale-adaptive style matching.
- Style-aligned panoramic sky synthesis.
- No illumination/material required.

Methodology and Results

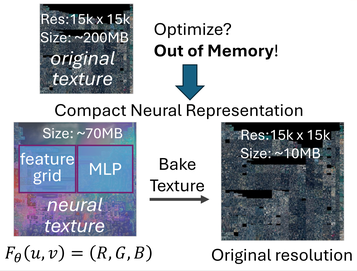


Neural Texture Backing

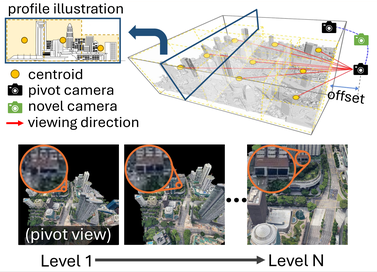


Taking style image and text references, StyleCity optimizes neural texture field in a semantics-aware fashion with progressively scaled training views and synthesized omnidirectional sky.

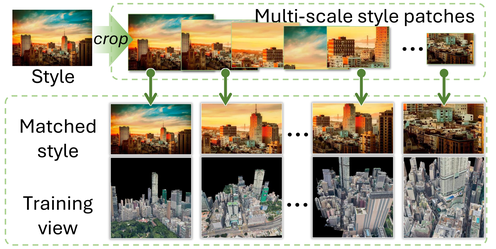
Neural Texture Field



Multi-Scale Progressive Optimization



Scale-Adaptive Style Structure Matching



Style-Aligned Omnidirectional Sky Synthesis