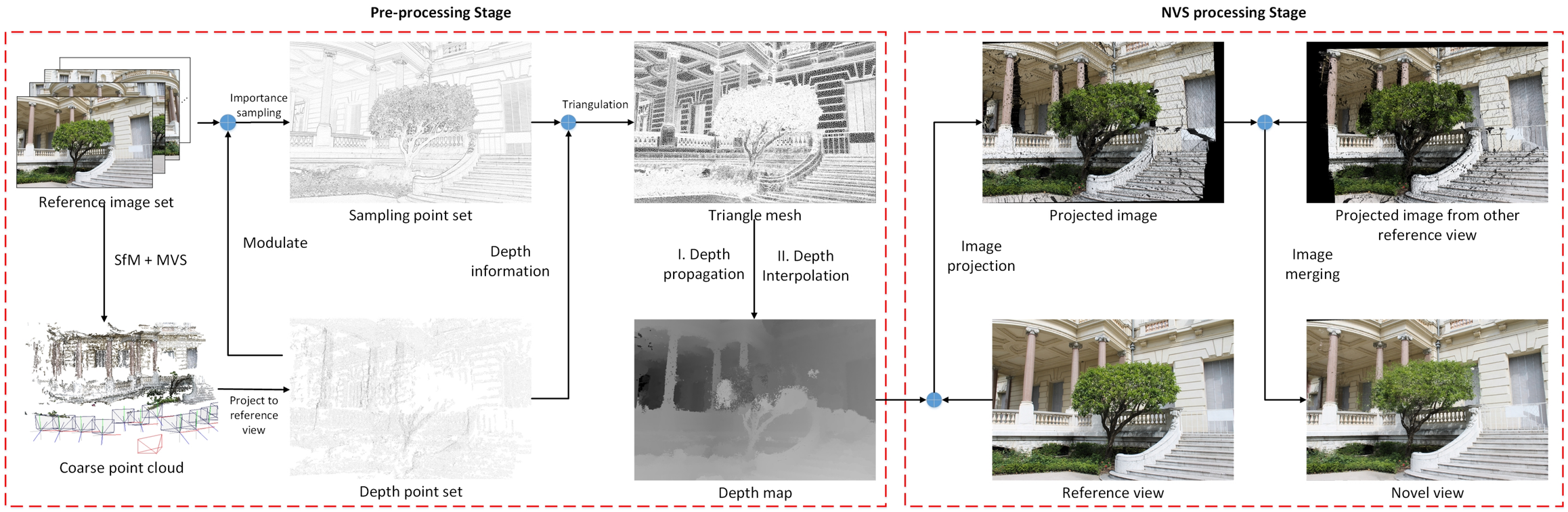
Novel View Synthesis Using Feature-Preserving Depth Map Resampling

Duo Chen, Jie Feng and Bingfeng Zhou

Institute of Computer Science and Technology, Peking University, Beijing, P. R. China



Abstract

In this paper, we present a new method for synthesizing images of a 3D scene at novel viewpoints, based on a set of reference images taken in a casual manner.

Method

A. 3D Reconstruction

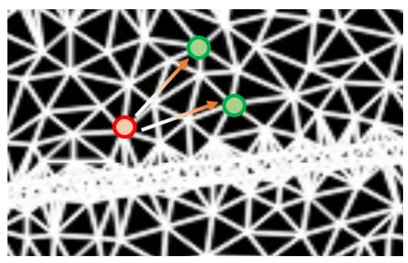
- Using SfM & MVS to reconstruct point clouds
- Sparse and Irregular
- Projected to depth point set

B. Importance Sampling and Triangulation

- Sampling point set preserving edge features
- Triangle mesh

C. Depth Propagation

- Propagating depth based on:
  - Euclidean distance
  - Color similarity
  - Image boundaries



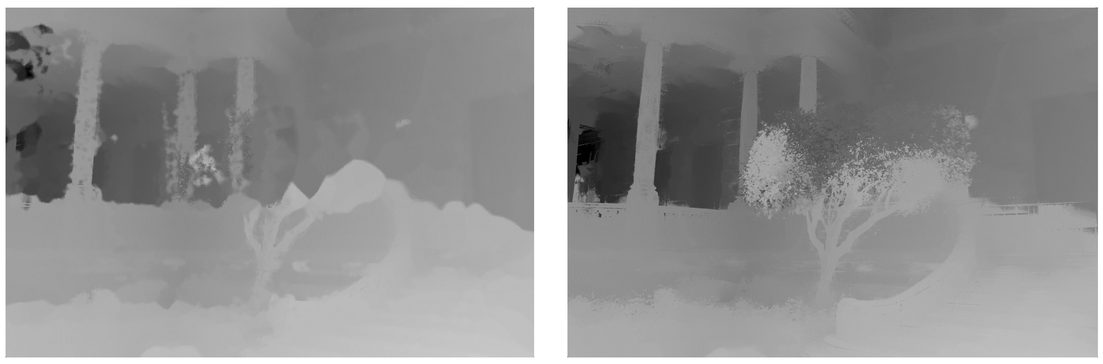
$$\mathcal{D}(P_1,P_2)=\{k_1[(r_1-r_2)^2+(g_1-g_2)^2+(b_1-b_2)^2]$$
$$+k_2[(u_1-u_2)^2+(v_1-v_2)^2]\}^{\frac{1}{2}}+C(P_1,P_2)$$

$$C(P_1,P_2)=\underset{\Gamma}{argmin}\sum_{P_i\in\Gamma}g(P_i)$$

D. Image Projection and Merging

Experimental Results

- Depth maps generated using different parameters.
  $k_2 = 0.5k_1$ (left), $k_2 = 10k_1$ (right)



- Comparing novel view (left) to ground truth (right)

Contact us:
chenduo@pku.edu.cn
feng_jie@pku.edu.cn
cczbf@pku.edu.cn

Demo Video

Group Homepage