Proxy Clouds for RGB-D Stream Processing: A Preview

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Abstract

Modern consumer depth cameras are widely used for 3D capture in indoor environments, for applications such as modeling, robotics or gaming. Nevertheless, their use is limited by their low resolution, with frames often corrupted with noise, missing data and temporal inconsistencies. In order to cope with all these issues, we present *Proxy Clouds*, a multiplanar superstructure for real-time processing of RGB-D data. By generating a single set of planar proxies from raw RGB-D data and updating it through time, several processing primitives can be applied to improve the quality of the RGB-D stream or lighten further operations. Applications of *Proxy Clouds* include noise and temporal flickering removal, hole filling, resampling, color processing and compression.
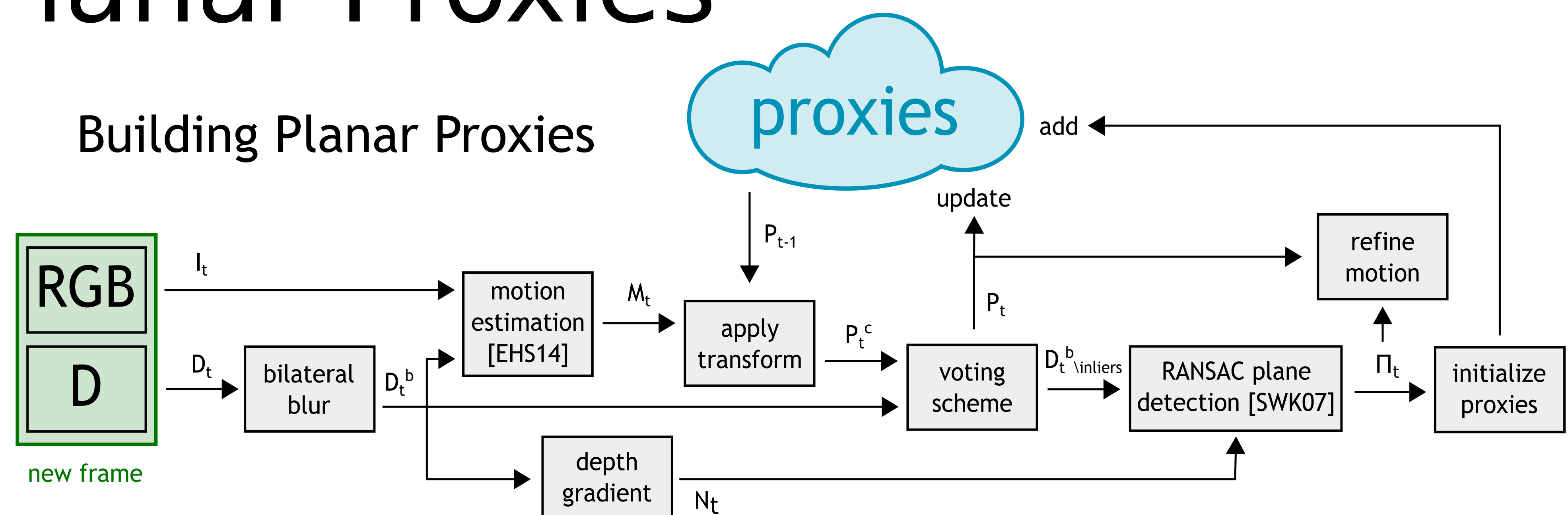
Proxy Clouds Workflow
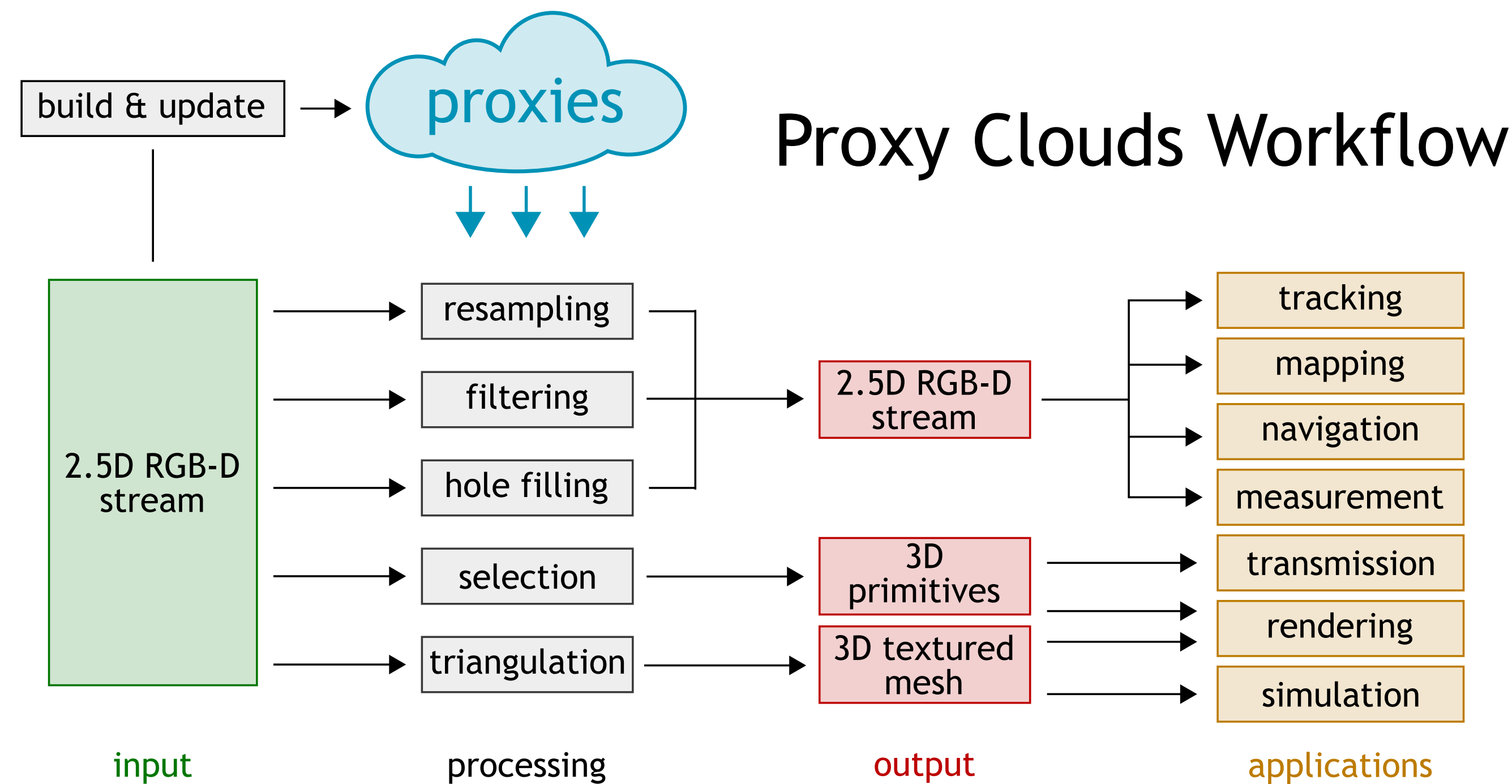
Overview

- Analyze and structure RGB-D streams to improve them on the fly
- Real time embedded constraints with limited memory

- Lightweight multiplanar superstructure of rich statistics
- Stable through time

- Priors to apply several processing primitives to the RGB-D frames

Planar Proxies

Planar Proxy Model

Building Planar Proxies
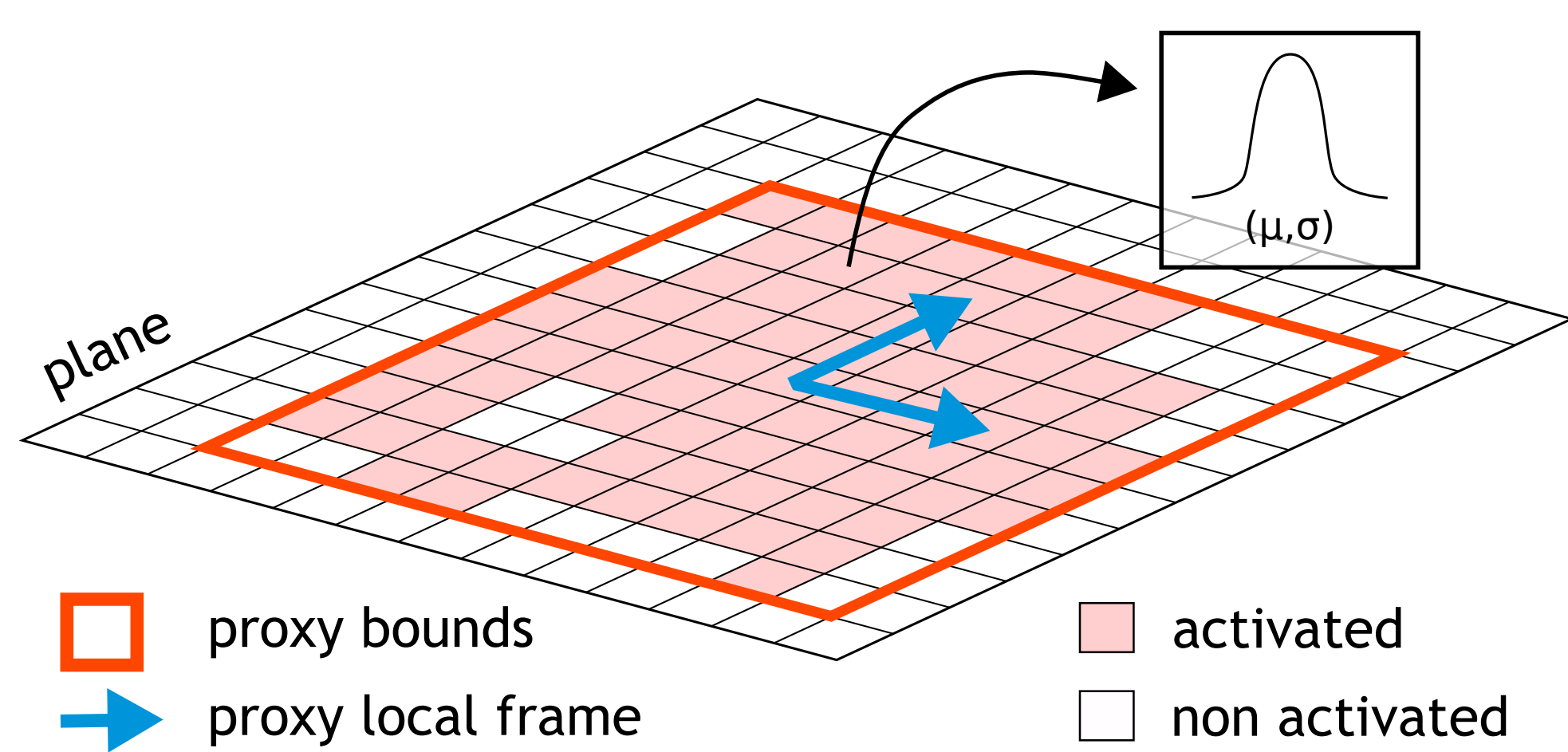
RGB-D Stream Processing

Our model represents the underlying structure of planar data and can be used as a prior to apply different types of processing to RGB-D frames:
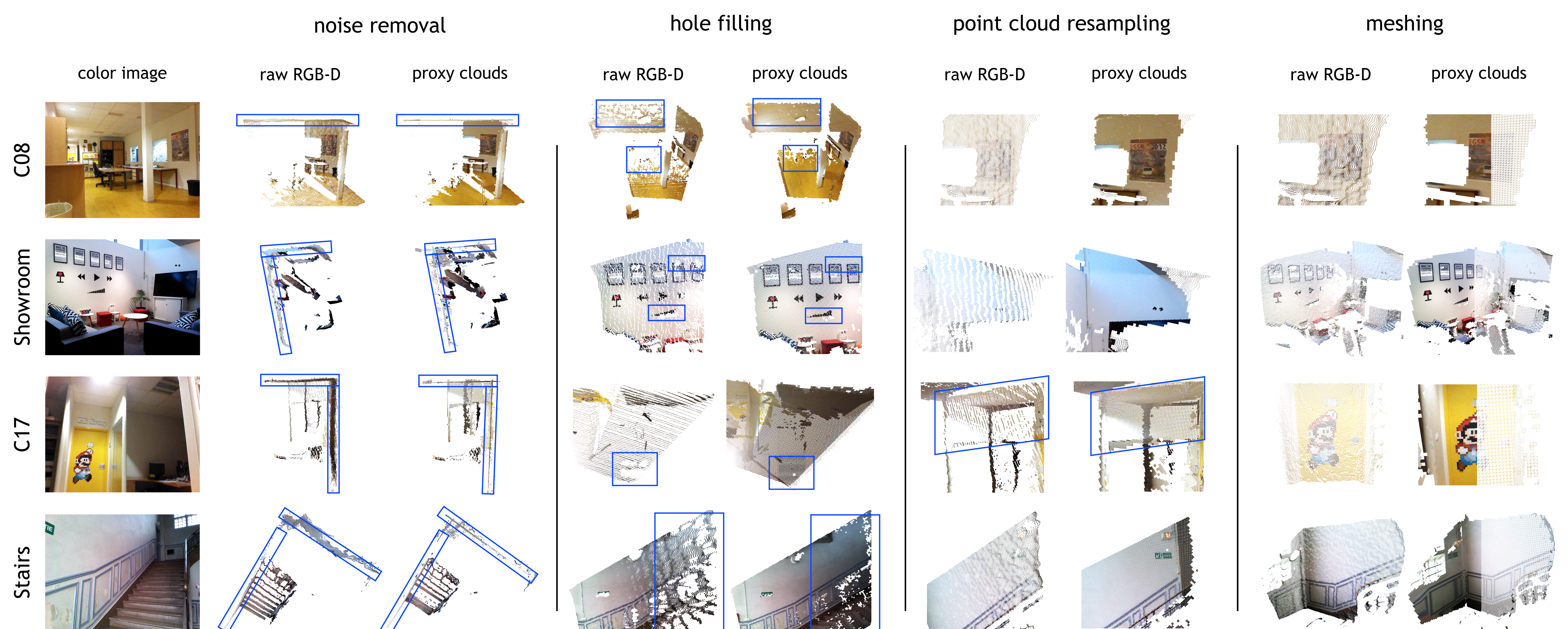
noise removal   temporal flickering reduction   hole filling in the missing data   stream resampling   data compression

	noise removal		hole filling		point cloud resampling		meshing	
	color image	raw RGB-D	proxy clouds	raw RGB-D	proxy clouds	raw RGB-D	proxy clouds	raw RGB-D	proxy clouds

[EHS14] Endres F., Hess J., Sturm J., Cremers D. and Burgard W. *3D Mapping With an RGB-D Camera*. IEEE Transactions on Robotics 30, 1 (February 2014), 177-187.
[SWK07] Schnabel R., Wahl R. and Klein R. *Efficient RANSAC for Point-Cloud Shape Detection*. Computer Graphics Forum 26, 2 (June 2007), 214-226.