# Supplementary Material: Pixelwise View Selection for Unstructured Multi-View Stereo

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## 1 Algorithm

The algorithm for computing depths and normals according to Section 4.6.

**Function**: *Coordinate Descent*
**Input**: Images $\boldsymbol{X}$
**Output**: Depths $\boldsymbol{\theta}$, Normals $\boldsymbol{N}$

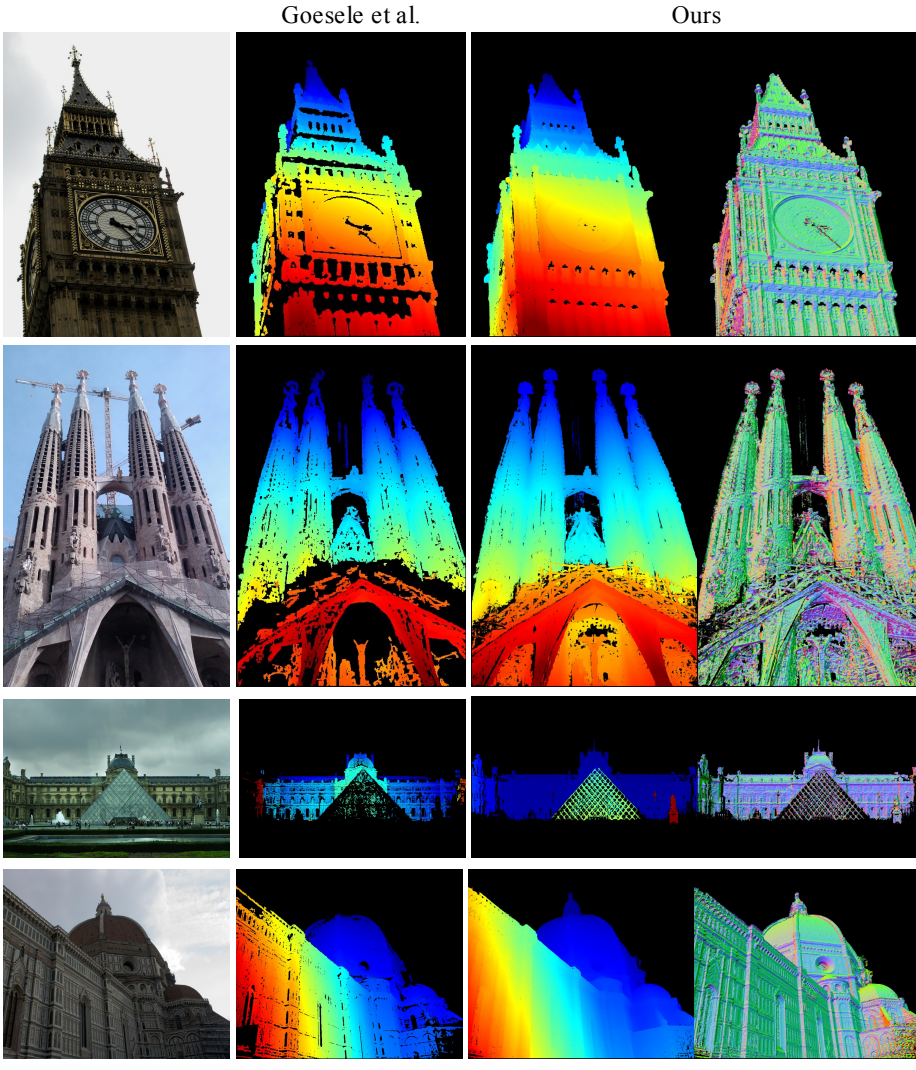
**For** $m = 1$ to $M$
  Set $X^{\text{ref}} = X^m$
  Set $X^{\text{src}} = \boldsymbol{X} \setminus \{X^m\}$
  **For** $i = 1$ to $I_1$
    *Sweep* with Eq. (6)
**For** $i = 1$ to $I_2$
  **For** $m = 1$ to $M$
    Set $X^{\text{ref}} = X^m$
    Set $X^{\text{src}} = \boldsymbol{X} \setminus \{X^m\}$
    *Sweep* with Eq. (11)

**Function**: *Sweep*
**Input**: Images $X^{\text{ref}}$, $\boldsymbol{X}^{\text{src}}$
**Output**: Depths $\boldsymbol{\theta}^{\text{ref}}$, Normals $\boldsymbol{N}^{\text{ref}}$

| | Eq. |
|---|---|
| **For** $r = 1$ to 4 | |
| Rotate reference image by 90° | |
| **For** $l = L$ to 1 | |
| **For** $m = 1$ to $M$ | |
| Compute backward message $\overleftarrow{m}_l^m$ | (14) |
| **For** $l = 1$ to $L$ | |
| **For** $m = 1$ to $M$ | |
| Compute forward message $\overrightarrow{m}_l^m$ | (13) |
| Compute $q(Z_l^m)$ | (12) |
| PatchMatch propagation/sampling | (7) |
| Estimate $(\theta_l^*, \boldsymbol{n}_l^*)$ over $q_l(\theta_l, \boldsymbol{n}_l)$ | (6/11) |
| **For** $m = 1$ to $M$ | |
| Recompute forward message $\overrightarrow{m}_l^m$ | (13) |

## 2 Comparison

This section compares our results against Goesele *et al.* [43] on Internet photo collections [5]. From left to right: reference image, depth map by Goesele *et al.*, our depth and normal maps. From top to bottom: Big Ben, England; Sagrada Familia, Spain; Louvre, France; Florence Cathedral, Italy.



## 3 Point Clouds

Examples of fused point clouds for reconstructed Internet photo datasets produced by Heinly *et al.* [5]. From top left to bottom right: Milan Cathedral, Italy; Piazza dei Miracoli, Italy; Reichstag, Germany; Temple in Kyoto, Japan; St. Vitus Cathedral, Czech Republic; Piazza San Marco, Italy; St. Paul's Cathedral, England; Peter's Dome, Vatican; Pantheon, Italy; Sagrada Familia (front), Spain; Sagrada Familia (back), Spain; British Museum, England; Florence Cathedral, Italy; Sistine Chapel, Vatican; Piazza della Signora, Italy; Piazza Public, Italy.