Using Locally Corresponding CAD Models for Dense 3D Reconstructions from a Single Image

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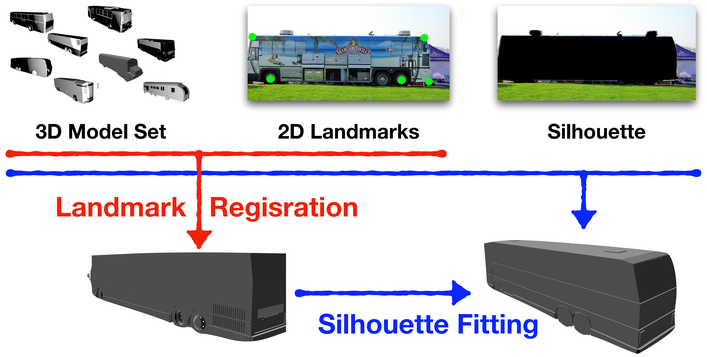
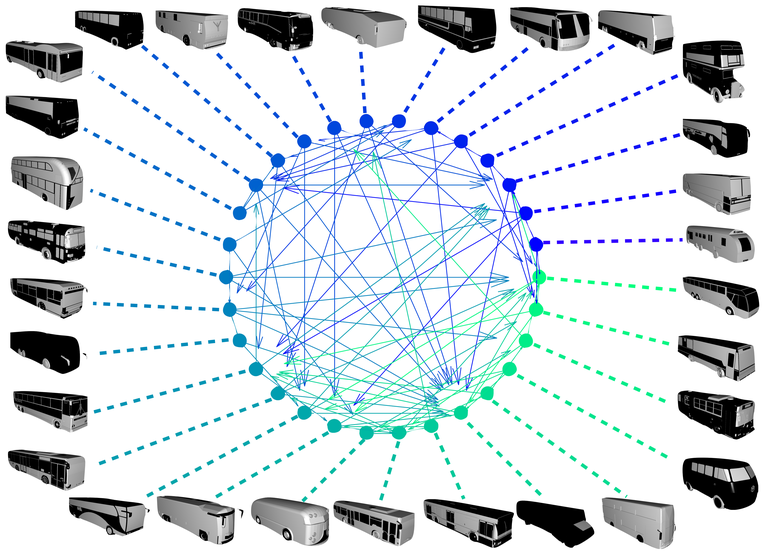
Framework



Local Dense Correspondence Graph



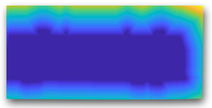
Deformation via Dense Correspondence

Landmark Registration

$$\min \frac{1}{2}\Big\| s\mathbf{R}\,[\,\cdots\,]\begin{bmatrix} c_1 \\ \vdots \\ c_N \end{bmatrix} + \mathbf{t} - \Big\|_2^2$$

$$\text{s.t.} \quad \mathbf{R}\mathbf{R}^T = \mathbf{I}_2, \quad \|\mathbf{c}\|_0 = 1$$

Silhouette Fitting


Chamfer Distance

Trivial Solution

$$E(\mathbf{R},\mathbf{t},\omega) = \frac{\gamma}{2}\sum \omega_i^2$$

$$+\mu \sum \mathcal{C}\Big(s\mathbf{R} \quad + t\Big)$$

$$+\frac{1}{2}\sum \Big\| s\mathbf{R} \quad + \mathbf{t} - \Big\|_2^2$$

Results