Opacity Optimization for 3D Line Fields

Errata

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Dear Colleagues,

Unfortunately, a few typing errors slipped into our paper. The implementation is correct, thus the results in the paper are all valid and reproducible.

The first typing error concerns the energy. For consistency, it should be divided by two. In addition, the adjacency term that eventually leads to the Laplacian matrix needs to consider the degree of each element, hence the division by two. The corrected energy is (cf. Sec. 3):

$$E = \frac{p}{2} \sum_{i=1}^{n} (\alpha_i - 1)^2 \tag{1}$$

$$= \frac{q}{2} \sum_{i=1}^{n} \sum_{j=1}^{n} (\alpha_i (1 - g_i)^\lambda h_{ij} g_j)^2 \tag{2}$$

$$= \frac{r}{2} \sum_{i=1}^{n} \sum_{j=1}^{n} (\alpha_i (1 - g_i)^\lambda h_{ji} g_j)^2 \tag{3}$$

$$= \frac{s}{2} \sum_{i=1}^{n} \sum_{j=1}^{n} \frac{a_{ij}}{2} (\alpha_i - \alpha_j)^2 \tag{4}$$

with *bounded* variables $0 \leq \alpha_i \leq 1$.

The second typing error occurred in the reformulation of the energy into matrix notation, namely into the standard quadratic programming problem form:

$$\text{minimize} \quad E = \frac{1}{2} \mathbf{x}^T \mathbf{Q} \mathbf{x} + \mathbf{c}^T \mathbf{x} + \text{const}$$

$$\text{subject to} \quad 0 \leq \mathbf{x}_i \leq 1$$

with $\mathbf{x} = (\alpha_1, ..., \alpha_n)^T$ being the vector of unknown opacities. The term for the removal of background clutter exhibited a transposition mistake. The correct form is (cf. Sec. 4.4):

$$\mathbf{Q} = p \cdot \mathbf{I} + q \cdot \mathbf{W}\mathbf{W}^T + r \cdot \mathbf{V}\mathbf{V}^T + s \cdot \mathbf{D}^T\mathbf{D}$$

$$\mathbf{c} = (-p, ..., -p)^T$$

with $\quad \mathbf{W} = (\mathbf{I} - \mathbf{G})^\lambda \mathbf{H}\mathbf{G} \quad$ and $\quad \mathbf{V} = (\mathbf{I} - \mathbf{G})^\lambda \mathbf{H}^T \mathbf{G}$.