given

- $p_i \in \mathbb{R}^3$:points on lines
- $d_i \in \mathbb{R}^3$:unit directions along lines

$$k_i = (p_i - (p_i \cdot d_i) d_i)$$

$$a_i = (1, 0, 0) - d_{i,1} d_i$$

$$b_i = (0, 1, 0) - d_{i,2} d_i$$

$$c_i = (0, 0, 1) - d_{i,3} d_i$$

$$M = \begin{bmatrix} \sum_i (a_{i,1} - d_{i,1}(d_i \cdot a_i)) & \sum_i (a_{i,2} - d_{i,2}(d_i \cdot a_i)) & \sum_i (a_{i,3} - d_{i,3}(d_i \cdot a_i)) \\ \sum_i (b_{i,1} - d_{i,1}(d_i \cdot b_i)) & \sum_i (b_{i,2} - d_{i,2}(d_i \cdot b_i)) & \sum_i (b_{i,3} - d_{i,3}(d_i \cdot b_i)) \\ \sum_i (c_{i,1} - d_{i,1}(d_i \cdot c_i)) & \sum_i (c_{i,2} - d_{i,2}(d_i \cdot c_i)) & \sum_i (c_{i,3} - d_{i,3}(d_i \cdot c_i)) \end{bmatrix}$$

$$r = \begin{bmatrix} \sum_i (k_i \cdot a_i) \\ \sum_i (k_i \cdot b_i) \\ \sum_i (k_i \cdot c_i) \end{bmatrix}$$

$$q = M^{-1} r$$