Corrections and Errata

R. I. Hartley and A. Zisserman, *Multiple View Geometry in Computer Vision*, Second Edition, Cambridge University Press, ISBN: 0521540518, 2004.

Page 71, following Equation (3.9)

the matrix $\mathtt{L}^*$ transforms as $\mathtt{L}^{*\prime} = \mathtt{H}^{-\mathsf{T}}\mathtt{L}\mathtt{H}^{-1}$.

should be

the matrix $\mathtt{L}^*$ transforms as $\mathtt{L}^{*\prime} = \mathtt{H}^{-\mathsf{T}}\mathtt{L}^*\mathtt{H}^{-1}$.

Page 103, Error in both images

The normalization factor

$$\left(\frac{1}{2\pi\sigma^2}\right)$$

should be

$$\left(\frac{1}{2\pi\sigma^2}\right)^2$$

Page 156, Equation (6.6)

The matrix

$$\begin{bmatrix} \mathtt{R} & -\mathtt{R}\widetilde{\mathbf{C}} \\ 0 & 1 \end{bmatrix}$$

should be

$$\begin{bmatrix} \mathtt{R} & -\mathtt{R}\widetilde{\mathbf{C}} \\ \mathbf{0}^{\mathsf{T}} & 1 \end{bmatrix}$$

Page 222, Algorithm 8.1, item (iii)

Represent the four points $\mathbf{b}_2, \tilde{\mathbf{t}}_1, \mathbf{t}_2$ and $\mathbf{v}$ on the image line $\mathbf{l}_1$

should be

Represent the four points $\mathbf{b}_2, \tilde{\mathbf{t}}_1, \mathbf{t}_2$ and $\mathbf{v}$ on the image line $\mathbf{l}_2$

Page 234, (i) Homography from a world plane

$$[\mathbf{r}_1, \mathbf{r}_2, \mathbf{t}] = \pm \mathtt{K}^{-1}\mathtt{H}/\|\mathtt{K}^{-1}\mathtt{H}\|.$$

Note that there is a two-fold ambiguity.

should be

$$[\mathbf{r}_1, \mathbf{r}_2, \mathbf{t}] = \pm \mathtt{K}^{-1}\mathtt{H}.$$

(it is equality only up to scale). Note that there is a two-fold sign ambiguity. However, this ambiguity can be resolved by the requirement that the visible points must have positive depth. See section 6.2.3, page 162.

Page 250, Example 9.7

and from $\mathbf{x} = \mathtt{P}'\mathbf{X} = \mathtt{K}'[\mathtt{R} \mid \mathbf{t}]\mathbf{X}$

should be

and from $\mathbf{x}' = \mathtt{P}'\mathbf{X} = \mathtt{K}'[\mathtt{R} \mid \mathbf{t}]\mathbf{X}$

Page 367, top line

Consequently $\mathtt{M}$ has a 2-dimensional null-space should be

Consequently $\mathtt{M}$ has a 2-dimensional left null-space

Page 377, in Table 15.2

$$\mathtt{P} = [\mathtt{I} \mid \mathbf{0}], \quad \mathtt{P}' = [a_j^i], \quad \mathtt{P}'' = [b_j^i]$$

should be

$$\mathtt{P} = [\mathtt{I} \mid \mathbf{0}], \quad \mathtt{P}' = [a_i^j], \quad \mathtt{P}'' = [b_i^k]$$

where the upper index of a_i^j and b_i^k is the row index

Page 416, number of linearly independent trilinear relations

In the paragraph starting at line 8, the number of linearly independent trilinear relations is discussed. The discussion is too superficial, and the conclusions are wrong. See the clarification note for details.

Page 503, Equation (20.1)

$$\mathtt{P} =$$

should be

$$\mathtt{P}\mathbf{X} =$$

Page 540, Definition 22.7, item (ii)

The fundamental matrices $\mathtt{F}_{\mathtt{Q}'\mathtt{Q}}$ and $\mathtt{F}_{\mathtt{Q}'\mathtt{Q}}$ corresponding to the two camera matrix pairs $(\mathtt{P}, \mathtt{P}')$ and $(\mathtt{Q}, \mathtt{Q}')$ are different.

should be

The fundamental matrices $\mathtt{F}_{\mathtt{P}'\mathtt{P}}$ and $\mathtt{F}_{\mathtt{Q}'\mathtt{Q}}$ corresponding to the two camera matrix pairs $(\mathtt{P}, \mathtt{P}')$ and $(\mathtt{Q}, \mathtt{Q}')$ are different.

Page 580, three lines after equation (A4.3)

$$(\|\mathbf{x}\|, 0, 0, \ldots, 0)^{\mathsf{T}}$$

should be

$$(\pm\|\mathbf{x}\|, 0, 0, \ldots, 0)^{\mathsf{T}}$$

Page 580, Equation (A4.4)

$$\mathtt{H}_{\mathbf{v}}\mathbf{a} = (\mathtt{I} - 2\mathbf{v}\mathbf{v}^{\mathsf{T}}/\mathbf{v}^{\mathsf{T}}\mathbf{v})\mathbf{a} = \mathbf{a} - 2\mathbf{v}(\mathbf{v}^{\mathsf{T}}\mathbf{a})/\mathbf{v}\mathbf{v}^{\mathsf{T}}$$

should be

$$\mathtt{H}_{\mathbf{v}}\mathbf{a} = (\mathtt{I} - 2\mathbf{v}\mathbf{v}^{\mathsf{T}}/\mathbf{v}^{\mathsf{T}}\mathbf{v})\mathbf{a} = \mathbf{a} - 2\mathbf{v}(\mathbf{v}^{\mathsf{T}}\mathbf{a})/\mathbf{v}^{\mathsf{T}}\mathbf{v}$$

Page 585, Section A4.3.3, second sentence.

A unit quaternion . . . may be written in the form $\mathbf{q} = (\mathbf{v}\sin(\theta/2), \cos(\theta/2))^{\mathsf{T}}$

should be

A unit quaternion . . . may be written in the form $\mathbf{q} = \left(\mathbf{v}^{\mathsf{T}}\sin(\theta/2), \cos(\theta/2)\right)^{\mathsf{T}}$.

A similar correction applies three lines later (sentence starting “To check this,”).

Further down

$$\mathbf{t} \leftrightarrow \mathbf{q} = (\text{sinc}(\|\mathbf{t}\|/2)\mathbf{t},\ \cos(\|\mathbf{t}\|/2))^{\mathsf{T}}$$

should be

$$\begin{aligned}\mathbf{t} \leftrightarrow \mathbf{q} &= (\sin(\|\mathbf{t}\|/2)\mathbf{t}^{\mathsf{T}}/\|\mathbf{t}\|,\ \cos(\|\mathbf{t}\|/2))^{\mathsf{T}} \\ &= (\text{sinc}(\|\mathbf{t}\|/2)\mathbf{t}^{\mathsf{T}}/2,\ \cos(\|\mathbf{t}\|/2))^{\mathsf{T}}\end{aligned}$$

The formulation using sinc is to be preferred since sinc is well-defined at zero.

Page 589, Deficient-rank systems. End of the first paragraph

This family of solutions is appropriately solved using the SVD as follows:

should be

This family of solutions is appropriately solved using algorithm A5.2.

Page 596, Algorithm A5.7, item (v)

Minimize $\|\mathtt{A}''\mathbf{x}'\|$ subject to $\|\mathbf{x}''\| = 1$

should be

Minimize $\|\mathtt{A}''\mathbf{x}''\|$ subject to $\|\mathbf{x}''\| = 1$

Page 608, Algorithm A6.3, and Page 613, Algorithm A6.4

The symbol δ_{ij} appearing in the formula for $\Sigma_{\mathbf{b}_i\mathbf{b}_j}$ is simply the Dirac delta, equal to 1 if $i = j$, and 0, otherwise.

Page 625, line 4

$$(\text{sinc}(\|\mathbf{v}\|/2)\mathbf{v}^{\mathsf{T}},\ \cos(\|\mathbf{v}\|/2))^{\mathsf{T}}$$

should be

$$(\text{sinc}(\|\mathbf{v}\|/2)\mathbf{v}^{\mathsf{T}}/2,\ \cos(\|\mathbf{v}\|/2))^{\mathsf{T}}$$

Page 625, last line, item (ii)

$$f(\mathbf{y}) = (\text{sinc}(\|\mathbf{y}\|/2)\mathbf{y}^{\mathsf{T}}, \cos(\|\mathbf{y}\|)/2)^{\mathsf{T}}$$

should be

$$f(\mathbf{y}) = (\text{sinc}(\|\mathbf{y}\|/2)\mathbf{y}^{\mathsf{T}}/2, \cos(\|\mathbf{y}\|)/2)^{\mathsf{T}}$$

Page 626, line 6

The composite map $\mathbf{y} \mapsto \mathtt{H}_{\mathbf{v}(\mathbf{x})} f(\mathbf{y})$

should be

The composite map $\mathbf{y} \mapsto \pm\mathtt{H}_{\mathbf{v}(\mathbf{x})} f(\mathbf{y})$

Here either $\mathtt{H}_{\mathbf{v}(\mathbf{x})} f(\mathbf{y})$ or $-\mathtt{H}_{\mathbf{v}(\mathbf{x})} f(\mathbf{y})$ is chosen according to which one maps $\mathbf{x}$ to $(0, \ldots, 0, 1)$.

With thanks to ...

Helmer Aslaksen, Jean-Charles Bazin, Niclas Borlin, Chris Engels, Paulo Gotardo, Charles Karney, Jae-Hak Kim, Holger Kirschner, Gus Lott, Ben Ochoa, Johan Öhman, Tony Scoleri, Sinisa Segvic, and Mads Jeppe Tarp-Johansen.

Last update November 2012