Errata and improvements:
Bigun J. ”Vision with Direction”, Springer, 2006

Sep. 9, 2011: Total 30
The current text
<—
The replacement text

%%%%%%%%%%%%%% Page 56, Table before Ex. 3.7

$$A_2 \qquad A_3 \qquad A_2$$

<—

$$A_2 \qquad A_3 \qquad A_4$$

%%%%%%%%%%%%%% Page 63, Eq. (5.7)

$$\frac{1}{i(m-n)\omega_1}[\exp(i(m-n)\omega_1 T) - \exp(i0)] = 0$$

<—

$$\frac{1}{i(m-n)\omega_1}[\exp(i(m-n)\pi) - \exp(-i(m-n)\pi)] = 0$$

%%%%%%%%%%%%%% Page 215, bottom

Notice that $e(\theta)$ is a norm (in the sense of $\mathcal{L}^2$), and from this it follows that when $e(\theta)$...
<—
Notice that $e(\theta)$ is a norm (in the sense of $\mathcal{L}^2$), and from this it follows, because of the *nullness* property of norms Eq. (3.17), that when $e(\theta)$...

%%%%%%%%%%%%%% Page 233, eq. (11.101)

$$= 2\pi\sigma^2$$

<—

$$= 2\pi\sigma^{-2}$$

The typo affects equations (11.116)-(11.118) of a proof where the theorem is used. However, because it concerns a multiplicative constant, and the theorem is duly applied (including the typo), the conclusion, (11.119), is not affected. Nevertheless, the corrections are given as below.

%%%%%%%%%%%%%% Page 242, eq. (11.116)

$$=$$

<—–

$$= \sigma_1^{-4}$$

%%%%%%%%%%%%%% Page 242, eq. (11.117)
The replacement applies (only) the first occurence of "$=$" in the equation:

$$=$$

<—–

$$= \sigma_1^{-4}$$

%%%%%%%%%%%%%% Page 243, eq. (11.118)
The replacement applies only the last row of the equation:

$$= (\sigma_1^2 + \sigma_2^2)$$

<—–

$$= (\sigma_1^2 + \sigma_2^2)^{-1}$$

%%%%%%%%%%%%%% Page 259
and the third element will be equal to the speed : v

<——
and the third element will be equal to the speed v in the image plane:

%%%%%%%%%%%%%% Page 259
will then equal to $\mathbf{a}$:
<——
will then equal to $\mathbf{a}$:

%%%%%%%%%%%%%% Page 259
and the third element will be equal to the speed : v
<——
and the third element will be equal to the speed v in the image plane:

%%%%%%%%%%%%%% Page 259

$$\mathbf{v} = -v\mathbf{a} = -\frac{k_t}{k_x^2 + k_y^2}(k_x, k_y)^T$$

<——

$$\mathbf{v} = v\mathbf{a} = -\frac{k_t}{k_x^2 + k_y^2}(k_x, k_y)^T$$

%%%%%%%%%%%%%% Page 262
When the line sets translate with a common velocity vector $\mathbf{v}$ so that a point at
<——
When the line sets translate with a common velocity vector $\mathbf{v}$, a point at

%%%%%%%%%%%%%% Page 267

$$\mathbf{s}^* = s + \delta t[\mathbf{A}_0\mathbf{s} + \mathbf{v}_0] \qquad \Rightarrow \qquad f(x, y, t) = g(s + \delta t[\mathbf{A}_0\mathbf{s} + \mathbf{v}_0])$$

<——

$$\mathbf{s}^* = \mathbf{s} + \delta t[\mathbf{A}_0\mathbf{s} + \mathbf{v}_0] \qquad \Rightarrow \qquad f(x, y, t) = g(\mathbf{s} + \delta t[\mathbf{A}_0\mathbf{s} + \mathbf{v}_0])$$

%%%%%%%%%%%%%% Page 270, eq. (12.81)
the spatio–temporal image of such moving particles,x where f is the gray intensity.

<——
the spatio–temporal image of such moving particles, where f is the gray intensity.

%%%%%%%%%%%%%% Page 271
The solution exists if the matrix
<——
That is, the existence of an inverse of the matrix

%%%%%%%%%%%%%% Page 271 after "(12.103)" add
+ is crucial for the solution.

%%%%%%%%%%%%%% Page 281 first line
where $(\overrightarrow{xOP})_C = (X, Y, Z)^T$ and
<——
where $(\overrightarrow{OP})_C = (X, Y, Z)^T$ and

%%%%%%%%%%%%%% Page 288 Eqs. (13.49) and (13.50) (the x, and y...)

$$XM_{11}+YM_{12}+ZM_{13}+M_{14}-x(XM_{31}+YM_{32}+ZM_{33}+M_{34})=0$$
$$XM_{21}+YM_{22}+ZM_{23}+M_{24}-y(XM_{31}+YM_{32}+ZM_{33}+M_{34})=0$$

<——

$$XM_{11}+YM_{12}+ZM_{13}+M_{14}-c(XM_{31}+YM_{32}+ZM_{33}+M_{34})=0$$
$$XM_{21}+YM_{22}+ZM_{23}+M_{24}-r(XM_{31}+YM_{32}+ZM_{33}+M_{34})=0$$

%%%%%%%%%%%%%% Page 291 the M_{11}, M_{12}, M_{13} in the equation of r_0, the c_x, and c_y

$$(M_{11}, M_{12}, M_{13}) \begin{pmatrix} M_{31} \\ M_{32} \\ M_{33} \end{pmatrix} = c_0$$
$$.\,(M_{11}, M_{12}, M_{13}) \begin{pmatrix} M_{31} \\ M_{32} \\ M_{33} \end{pmatrix} = r_0$$
$$M_{11}^2 + M_{12}^2 + M_{13}^2 = f_x^2 + c_x^2$$
$$.M_{21}^2 + M_{22}^2 + M_{23}^2 = f_y^2 + c_y^2.$$

<—

$$(M_{11}, M_{12}, M_{13}) \begin{pmatrix} M_{31} \\ M_{32} \\ M_{33} \end{pmatrix} = c_0$$

$$(M_{21}, M_{22}, M_{23}) \begin{pmatrix} M_{31} \\ M_{32} \\ M_{33} \end{pmatrix} = r_0$$

$$M_{11}^2 + M_{12}^2 + M_{13}^2 = f_x^2 + c_0^2$$
$$M_{21}^2 + M_{22}^2 + M_{23}^2 = f_y^2 + r_0^2$$

%%%%%%%%%%%%%% Page 293 Fig. 13.7, Marked Digital Image Origins, as shown

□

%%%%%%%%%%%%%% Page 295 Eq. (13.73), last equality

$$(\overrightarrow{O^L P})_{LC} = \mathbf{M}_E^L (\overrightarrow{O^W P})_{WH} = \mathbf{M}_E^L \mathbf{p}$$

<—

$$(\overrightarrow{O^L P})_{LC} = \mathbf{M}_E^L (\overrightarrow{O^W P})_{WH} = \mathbf{M}_E^L \mathbf{p} = [\mathbf{R}^L, \mathbf{t}^L]\mathbf{p}$$

%%%%%%%%%%%%%% Page 295 Eq. (13.7)

$$\tilde{\mathbf{p}} = (\overrightarrow{O^L P})_{LCH} = \begin{bmatrix} (\overrightarrow{O^L P})_{LC} : \\ 1 \end{bmatrix}$$

<—

$$\tilde{\mathbf{p}} = (\overrightarrow{O^L P})_{LCH} = \begin{bmatrix} (\overrightarrow{O^L P})_{LC} \\ 1 \end{bmatrix}$$

%%%%%%%%%%%%%% Page 297 before the lemma
Eq. (13.72). We summarize our findings as the following two lemmas.
<—
Eqs. (13.72) and (13.85). We summarize our findings as the following two lemmas.

%%%%%%%%%%%%%% Page 299 before Eq.(13.92)
fitted plane, normal whose now represents the sought position
<—
fitted plane, whose normal now represents the sought position

%%%%%%%%%%%%%% Page 299, right after (13.119) insert
where $\mathbf{E} = \mathbf{TR}$.

%%%%%%%%%%%%%% Page 304 Eqs. (13.114)-(13.116),

$$(\overrightarrow{O'^L P'^L})_{LD} = \mathbf{M}_I^L (\overrightarrow{O'^L P'^L})_L$$

where $\mathbf{M}_I^L$ is the matrix encoding the intrinsic parameters of the left camera. Similarly, we obtain

$$(\overrightarrow{O'^R P'^R})_{RD} = \mathbf{M}_I^R (\overrightarrow{O'^R P'^R})_R$$

The epipolar equation (13.112) can then be denoted as

$$(\overrightarrow{O'^R P'^R})_{RD}^T \mathbf{F} (\overrightarrow{O'^L P'^L})_{LD} = 0,$$

<—–

$$(\overrightarrow{C^L P'^L})_{LD} = \mathbf{M}_I^L (\overrightarrow{C^L P'^L})_L$$

where $\mathbf{M}_I^L$ is the matrix encoding the intrinsic parameters of the left camera. Similarly, we obtain

$$(\overrightarrow{C^R P'^R})_{RD} = \mathbf{M}_I^R (\overrightarrow{C^R P'^R})_R$$

The epipolar equation (13.112) can then be denoted as

$$(\overrightarrow{C^R P'^R})_{RD}^T \mathbf{F} (\overrightarrow{C^L P'^L})_{LD} = 0,$$

%%%%%%%%%%%%%% Page 305 the lines 4 and 5,

$(\overrightarrow{O'^L P'^L})_{LD}$ is known, then by substituting it in Eq. (13.116) one obtains the search line on which the corresponding unknown point $(\overrightarrow{O'^R P'^R})$ must lie. <—–

$(\overrightarrow{C^L P'^L})_{LD}$ is known, then by substituting it in Eq. (13.116) one obtains the search line on which the corresponding unknown point $(\overrightarrow{C^R P'^R})$ must lie.

%%%%%%%%%%%%%% Page 305 Eq. (13.121),

$$\begin{aligned} 0 &= (\mathbf{p}^R)^T \mathbf{F}\ \mathbf{p}^L \\ &= c^R c^L F_{11} + c^R r^L F_{12} + c^R F_{13} + \\ &\quad + r^R c^L F_{21} + r^R r^L F_{22} + r^R F_{23} + \\ &\quad + \quad c^L F_{31} + \quad r^L F_{32} + \quad F_{33} = 0 \end{aligned}$$

<—–

$$\begin{aligned}0 &= (\mathbf{p}^R)^T \mathbf{F}\, \mathbf{p}^L = (c^R, r^R, 1)\mathbf{F}(c^L, r^L, 1)^T \\ &= c^R c^L F_{11} + c^R r^L F_{12} + c^R F_{13} + \\ &\quad + r^R c^L F_{21} + r^R r^L F_{22} + r^R F_{23} + \\ &\quad + \quad c^L F_{31} + \quad r^L F_{32} + \quad F_{33} = 0\end{aligned}$$

%%%%%%%%%%%%%% p. 307 begining of Paragraph 1.

Naturally, the epipolar line represented by $(\overrightarrow{O'^L E^L})_{LD}$ is given by the last row of $\mathbf{V}$, whereas $(\overrightarrow{O'^R E^R})_{RD}$ is given by the last row of $\mathbf{U}$.

<——

Naturally, the epipolar line represented by $(\overrightarrow{O'^L E^L})_{LD}$, Eq. (13.120), is given by the least (significant) eigenvector of $\mathbf{F}^T\mathbf{F}$, whereas $(\overrightarrow{O'^R E^R})_{RD}$ is given by the least (significant) eigenvector of $\mathbf{F}\mathbf{F}^T$.

%%%%%%%%%%%%%% Page 332 Eq. (15.19), Expression 2, f_K

$$\mathbf{S} = \frac{1}{K}\sum_k \mathbf{f}_k \mathbf{f}_k^T = \frac{1}{K}[\mathbf{f}_1, \cdots, f_K] \begin{bmatrix} \mathbf{f}_1^T \\ \vdots \\ \mathbf{f}_K^T \end{bmatrix} = \frac{1}{K}\mathbf{O}\mathbf{O}^T$$

<——

$$\mathbf{S} = \frac{1}{K}\sum_k \mathbf{f}_k \mathbf{f}_k^T = \frac{1}{K}[\mathbf{f}_1, \cdots, \mathbf{f}_K] \begin{bmatrix} \mathbf{f}_1^T \\ \vdots \\ \mathbf{f}_K^T \end{bmatrix} = \frac{1}{K}\mathbf{O}\mathbf{O}^T$$

%%%%%%%%%%%%%% Page 333 Eq. (15.21), Expression of $\tilde{\mathbf{O}}$

$$\tilde{\mathbf{O}} = [\tilde{\mathbf{f}}_1, \cdots, \tilde{\mathbf{f}}_K], \quad \mathbf{O} = [\mathbf{f}_1, \cdots, \mathbf{f}_K], \quad \mathbf{B}_N = [\boldsymbol{\psi}_1, \cdots, \boldsymbol{\psi}_N]$$

<—-

$$\tilde{\mathbf{O}} = [\tilde{\mathbf{f}}_1, \cdots, \tilde{\mathbf{f}}_N], \quad \mathbf{O} = [\mathbf{f}_1, \cdots, \mathbf{f}_K], \quad \mathbf{B}_N = [\boldsymbol{\psi}_1, \cdots, \boldsymbol{\psi}_N]$$

%%%%%%%%%%%%%% Page 334 Eq. (15.27), Expression of $\tilde{\mathbf{O}}$
where the eigenvalues are sorted as $\lambda_{(1)} \geq \cdots \geq \lambda_{(M)}$. The new coordinates are given by

$$\tilde{\mathbf{O}}^T = \mathbf{O}^T \mathbf{B}_N, \quad \text{with} \quad \tilde{\mathbf{O}} = [\tilde{\mathbf{f}}_1, \cdots, \tilde{\mathbf{f}}_N].$$

<—-
where the eigenvectors are ordered according to their sorted eigenvalues as $\lambda_{(1)} \geq \cdots \geq \lambda_{(M)}$. The new coordinates are given by

$$\tilde{\mathbf{O}}^H = \mathbf{O}^H \mathbf{B}_N, \quad \text{with} \quad \tilde{\mathbf{O}} = [\tilde{\mathbf{f}}_1, \cdots, \tilde{\mathbf{f}}_K].$$

%%%%%%%%%%%%%% Page 338 the Paragraph before Eq. (15.38)
the problems of vision can be effectively modeled¿ as
<—–
the problems of vision can be effectively modeled as