Errata of *An Invitation to 3-D Vision*

Yi Ma, Stefano Soatto, Jana Košecká, Shankar Sastry

July 23, 2012

Typos are listed below in the order in which they appear in the book. If you find additional typos in the book, please report to "`yima@uiuc.edu`," and your help will be greatly appreciated. We hope that these typos will be corrected in the paper edition.

Page 90, on line 4, "... $\underline{\arg\min}$ ..." should be "... $\underline{\arg\max}$ ..."

Page 101, in the equation after (4.46) and before (4.47), the two "$\underline{f[x]}$" should be "$\underline{f[k]}$."

Page 102, in equation (4.49), "$\underline{f[x]}$" should be "$\underline{f[k]}$."

Page 118, on line 15, "... is less $\underline{\text{then}}$ eight ..." should be "... is less $\underline{\text{than}}$ eight ..."

Page 119, in the proof of Theorem 5.19, the last equation of the page should be corrected as:

$$\underline{\text{trace}(P\Sigma Q^T\Sigma_\lambda) = \sigma\left(\lambda_1(p_{11}q_{11} + p_{12}q_{12}) + \lambda_2(p_{21}q_{21} + p_{22}q_{22}) + \lambda_3(p_{31}q_{31} + p_{32}q_{32})\right).}$$

This correction does not affect the theorem at all. The rest of proof now should be: From the above expression we have $\text{trace}(P\Sigma Q^T\Sigma_\lambda)$ is

$$\leq\ \sigma\left(\sum_{i=1}^{3}\lambda_i(p_{i1}^2 + q_{i1}^2 + p_{i2}^2 + q_{i2}^2)/2\right) = \sigma\left(\sum_{i=1}^{3}\lambda_i - \sum_{i=1}^{3}\lambda_i(p_{i3}^2 + q_{i3}^2)/2\right).$$

Since $\sum_{i=1}^{3}(p_{i3}^2 + q_{i3}^2)/2 = 1$ and $\lambda_1 \geq \lambda_2 \geq \lambda_3$, we have

$$\sum_{i=1}^{3}\lambda_i(p_{i3}^2 + q_{i3}^2)/2 \geq \lambda_3$$

where the equality holds only when $(p_{33}^2 + q_{33}^2)/2 = 1$. This forces the third column of both P and Q to be simultaneously e_3 or $-e_3$. So $\text{trace}(P\Sigma Q^T\Sigma_\lambda)$ is maximized when $p_{ij} = q_{ij}, i = 1, 2, 3, j = 1, 2$ and $P(:, 3) = Q(:, 3) = \pm e_3$. Obviously $P = Q = I$ is one solution. This implies $U_1 = U, V_1 = V$. The rest of the proof follows as before.

Page 130, in Figure 5.8, the black defects in the figure should not be there.

Page 130, in Figure 5.9, "$\underline{x_1}$" on the right hand side of the figure should be "$\underline{x_2}$" that represents the second image of the point p.

Page 139, in step 2 of Algorithm 5.2, "Compute the $\underline{\text{eigenvalues}}$ ..." should be "Compute the $\underline{\text{singular values}}$ ..."

Page 143, in equation 5.50, on the right side of the equation $\frac{\dot{\lambda}}{\lambda}\dot{x}$ should be $\frac{\dot{\lambda}}{\lambda}x$.

Page 166, at the end of line 12, "... the unknwns are " should be "... the unknowns are".

Page 174, on line 18, "$\langle u, v \rangle_S = v^T S v$" should be "$\langle u, v \rangle_S = u^T S v$."

Page 337, in the first paragraph, "Although constraints ..." should be "The constraints ..."

Page 347, in the last sentence of the first paragraph, the definition of $H_0 = R_0 + \frac{1}{d} T_0 N^T$ should be replaced as $H_0 \doteq [R_0(1), R_0(2), T_0]$ where $R_0(1), R_0(2)$ are the first two columns of R_0.

Page 348, in the sentence above equation (10.13), similar to the previous typo, the matrix "$H_0 = R_0 + \frac{1}{d} T_0 N^T$" should be replaced as "$H_0 \doteq [R_0(1), R_0(2), T_0]$" where $R_0(1), R_0(2)$ are the first two columns of R_0.

Page 354, in the second paragraph, "..., we assume that R is of the form $R = e^{j\widehat{\omega}\theta}$ ..." should be "$R = e^{\widehat{\omega}\theta}$," without the imaginary unit j in the exponent.

Page 354, in the equation, the second column of the matrix, "$\mathrm{Re}(v_2)\sin(\alpha) + \mathrm{Im}(v_2)\cos(\alpha)$" should be "$\mathrm{Re}(v_2)\cos(\alpha) - \mathrm{Im}(v_2)\sin(\alpha)$."

Page 355, line 6 from the end: "and T as the x-axis." A prime is missing on T and it should be "and T' as the x-axis."

Page 367, in the table 10.2, the matrix $H_0 : R_0 + \frac{1}{d} T_0 N^T$ should be replaced by the matrix $H_0 : [R_0(1), R_0(2), T_0]$.

Page 369, in Exercise 10.8, subproblem 1, "..., i.e. $R' = e^{j\widehat{\omega}}$, ..." should be "$R' = e^{\widehat{\omega}}$," again without the imaginary unit j in the exponent.

Page 492, the reference [Faugeras and Lustman, 1988] should be in the International Journal of Pattern Recognition in Artificial Intelligence, not PAMI.

Page 500, the reference [Plamer, 1999] should be by "S. E. Palmer," not "S. E. Plamer."