Stereo calibration in OpenCV

Data structures are: `CvCamera` and `CvStereoCameraq`
Defined in `/usr/include/opencv/cvaux.h`
The function used to understand the calibration file is `SaveCameraParams()` from file `/usr/src/debug/opencv-1.0.0/cvaux/src/cvcalibfilter.cpp`

Calibration file cameras.txt:

```
2

1024.0000000000  768.0000000000 1326.3033447266    0.0000000000  535.7369384766
   0.0000000000 1325.8737792969  365.6853332520    0.0000000000    0.0000000000
   1.0000000000   -0.2039835602    0.1206635684   -0.0025506185    0.0019137006
   0.9959881902   -0.0280513112    0.0849746168   -0.0389356464   -0.9908443093
   0.1292734593    0.0805703178   -0.1320633739   -0.9879613519 -328.9529418945
  36.0187339783 1378.4147949219

1024.0000000000  768.0000000000 1323.1350097656    0.0000000000  610.5260009766
   0.0000000000 1317.4230957031  333.6928710938    0.0000000000    0.0000000000
   1.0000000000   -0.1292870939   -0.0738551393   -0.0012181003    0.0096604973
   0.9732932448   -0.2022656649    0.1085764170   -0.2118310034   -0.9735853672
   0.0852007940    0.0884752125   -0.1059252098   -0.9904301763 -426.6532592773
 126.2498397827 1361.8890380859

 -60.7329750061  -95.7486801147 1067.1297607422    5.9503664970 1022.7186279297
 790.6403808594 -105.6950454712  764.5604248047
 -90.2963409424    7.2448134422 1034.1735839844  -82.4483566284 1131.7287597656
 685.6887207031   11.8106098175  867.5054931641
   1.2017411725   -0.0589985506  -60.7329750060    0.0998748237    1.1234795817
 -95.7486801146    0.0000940024    0.0000042972    1.0000000000
   1.2177429285    0.1328555856  -90.2963409424   -0.0971281792    1.1130670402
   7.2448134422    0.0001156747   -0.0000081429    1.0000000000
```

L1: nb of cams
L2: Cam1 (Left) parameters
- width x height
- intrinsinc camera parameters (3x3 matrix, [f_u 0 u_0; 0 f_v v_0; 0 0 1])
- distortion coefficients (2 coefs for radial, 2 for tangential [k_1 k_2 p_1 p_2])
- rotation matrix (3x3 matrix)
- transition vector (3x1 vector)

L3: Cam2 (Right) parameters
- width x height
- intrinsinc camera parameters (3x3 matrix, [f_u 0 u_0; 0 f_v v_0; 0 0 1])
- distortion coefficients (2 coefs for radial, 2 for tangential [k_1 k_2 p_1 p_2])
- rotation matrix (3x3 matrix)
- transition vector (3x1 vector)

L4: Coordinates of destination quadrangle after epipolar geometry rectification (C1, 4*(x,y))
L5: Coordinates of destination quadrangle after epipolar geometry rectification (C2, 4*(x,y))
L6: Coefficients for transformation, inverse rectification matrix (C1, 3x3 matrix)
L7: Coefficients for transformation, inverse rectification matrix (C2, 3x3 matrix)

Note:
The destination quadrangle refers to the corners of the undistorded and rectified image ((0,0) ; (w,0) ; (w,h) ; (0;h)).
The coordinates of L4 and L5 are the coordinates of the rectified image's corners in the original (distorded and unrectified) image's frame.

Camera projection matrix:

$$P=\begin{bmatrix} f_u & 0 & u_0 \\ 0 & f_v & v_0 \\ 0 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} R & T \end{bmatrix}$$

Distortion formula:
u,v is the undistorted point
u0,v0 is the principal point
fu,fv are the focal lengths
k1,K2 are radial distortion coefficients
p1,p2 are tangential distortion coefficients

$$x=\frac{u - u_0}{f_u} \qquad y=\frac{v - v_0}{f_v}$$

$$r_2=x^2 + y^2 \qquad r_4=r_2^2$$

$$c_{dist}=1 + k_1 \cdot r_2 + k_2 \cdot r_4 \qquad x_r=x \cdot c_{dist} \qquad y_r=y \cdot c_{dist}$$

$$a_1=2 \cdot x \cdot y \qquad a_2=r_2 + 2 \cdot x^2 \qquad a_3=r_2 + 2 \cdot y^2$$

$$d_x=a_1 \cdot p_1 + a_2 \cdot p_2 \qquad d_y=a_3 \cdot p_1 + a_1 \cdot p_2$$

$$x_d=x_r + d_x \qquad y_d=y_r + d_y$$

$$u_d=x_d \cdot f_u + u_0 \qquad v_d=x_d \cdot f_v + v_0$$

Formula to go from undistorded and rectified pixel coordinates (u_r, v_r) to undistorded and unrectified coordinates (u, v):

$$w=rect[2][0] \cdot u_r + rect[2][1] \cdot v_r + rect[2][2]$$

$$u=\frac{rect[0][0] \cdot u_r + rect[0][1] \cdot v_r + rect[0][2]}{w}$$

$$v=\frac{rect[1][0] \cdot u_r + rect[1][1] \cdot v_r + rect[1][2]}{w}$$

Rectified projection matrix:

$$P_r=rect \cdot P$$