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% Intrinsic and Extrinsic Camera Parameters
%
% This script file can be directly executed under Matlab to recover the
% camera intrinsic and extrinsic parameters.
% IMPORTANT: This file contains neither the structure of the calibration
% objects nor the image coordinates of the calibration points.
%           All those complementary variables are saved in the complete
% matlab data file Calib_Results.mat.
% For more information regarding the calibration model visit
% http://www.vision.caltech.edu/bouguetj/calib\_doc/

%-- Focal length:
fc = [ 1465.757474554883600 ; 1457.402140593278100 ];

%-- Principal point:
cc = [ 984.461621360877420 ; 552.451390384972800 ];

%-- Skew coefficient:
alpha_c = 0.0000000000000000;

%-- Distortion coefficients:
kc = [ 0.014612236375303 ; 0.028401223072216 ; -0.003365882203774 ; ...
       0.000782273655815 ; 0.0000000000000000 ];

%-- Focal length uncertainty:
fc_error = [ 4.381633097548710 ; 4.325015986403185 ];

%-- Principal point uncertainty:
cc_error = [ 5.596179705904434 ; 4.372004465344061 ];

%-- Skew coefficient uncertainty:
alpha_c_error = 0.0000000000000000;

%-- Distortion coefficients uncertainty:
kc_error = [ 0.011523877593091 ; 0.059663485150096 ; 0.001003656326247 ; ...
             0.001399652634250 ; 0.0000000000000000 ];

%-- Image size:
nx = 1920;
ny = 1080;

%-- Various other variables (may be ignored if you do not use the
% Matlab Calibration Toolbox):
%-- Those variables are used to control which intrinsic parameters
% should be optimized

n_ima = 27; % Number of calibration images
est_fc = [ 1 ; 1 ]; % Estimation indicator of the two focal variables
est_aspect_ratio = 1; % Estimation indicator of the aspect ratio fc(2)/fc(1)
center_optim = 1; % Estimation indicator of the principal point
est_alpha = 0; % Estimation indicator of the skew coefficient
% Estimation indicator of the distortion coefficients
est_dist = [ 1 ; 1 ; 1 ; 1 ; 0 ];

%-- Extrinsic parameters:
%-- The rotation (omc_kk) and the translation (Tc_kk)

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% vectors for every calibration image and their uncertainties

%-- Image #1:

```
omc_1 = [ 2.217381e+00 ; 2.127725e+00 ; -3.546981e-01 ];  
Tc_1   = [ -1.196360e+02 ; -8.122854e+01 ; 4.151356e+02 ];  
omc_error_1 = [ 2.893951e-03 ; 3.415952e-03 ; 7.032084e-03 ];  
Tc_error_1  = [ 1.592998e+00 ; 1.251145e+00 ; 1.397375e+00 ];
```

%-- Image #2:

```
omc_2 = [ 2.141047e+00 ; 2.127049e+00 ; -6.266029e-01 ];  
Tc_2   = [ -5.027920e+01 ; -1.016662e+02 ; 5.035543e+02 ];  
omc_error_2 = [ 2.980127e-03 ; 3.463614e-03 ; 7.169127e-03 ];  
Tc_error_2  = [ 1.942652e+00 ; 1.502589e+00 ; 1.534351e+00 ];
```

%-- Image #3:

```
omc_3 = [ 2.128780e+00 ; 2.239639e+00 ; -2.950058e-01 ];  
Tc_3   = [ -1.040858e+02 ; -1.260490e+02 ; 6.061448e+02 ];  
omc_error_3 = [ 4.392796e-03 ; 5.264673e-03 ; 1.037824e-02 ];  
Tc_error_3  = [ 2.336011e+00 ; 1.820693e+00 ; 2.016872e+00 ];
```

%-- Image #4:

```
omc_4 = [ 2.175922e+00 ; 2.183784e+00 ; -1.889158e-01 ];  
Tc_4   = [ -1.217660e+02 ; -8.666442e+01 ; 3.400920e+02 ];  
omc_error_4 = [ 2.608605e-03 ; 3.164193e-03 ; 6.330359e-03 ];  
Tc_error_4  = [ 1.313197e+00 ; 1.031630e+00 ; 1.223513e+00 ];
```

%-- Image #5:

```
omc_5 = [ 1.606014e+00 ; 2.461937e+00 ; -7.863645e-01 ];  
Tc_5   = [ -6.785092e+01 ; -1.275436e+02 ; 4.806674e+02 ];  
omc_error_5 = [ 1.887824e-03 ; 3.845927e-03 ; 5.982527e-03 ];  
Tc_error_5  = [ 1.855856e+00 ; 1.448520e+00 ; 1.451915e+00 ];
```

%-- Image #6:

```
omc_6 = [ -1.502451e+00 ; -2.599423e+00 ; 7.428499e-01 ];  
Tc_6   = [ -2.335813e+01 ; -1.538727e+02 ; 6.088418e+02 ];  
omc_error_6 = [ 3.725958e-03 ; 3.828480e-03 ; 6.790942e-03 ];  
Tc_error_6  = [ 2.355812e+00 ; 1.832820e+00 ; 1.865070e+00 ];
```

%-- Image #7:

```
omc_7 = [ 2.240680e+00 ; 2.097087e+00 ; -2.639643e-01 ];  
Tc_7   = [ -1.201841e+02 ; -7.873336e+01 ; 4.511668e+02 ];  
omc_error_7 = [ 3.556346e-03 ; 3.842302e-03 ; 8.050391e-03 ];  
Tc_error_7  = [ 1.731135e+00 ; 1.358984e+00 ; 1.530801e+00 ];
```

%-- Image #8:

```
omc_8 = [ -1.919356e+00 ; -2.188765e+00 ; 1.331598e-01 ];  
Tc_8   = [ -5.151171e+01 ; -6.298458e+01 ; 5.434395e+02 ];  
omc_error_8 = [ 4.166358e-03 ; 5.701500e-03 ; 9.718333e-03 ];  
Tc_error_8  = [ 2.075409e+00 ; 1.631228e+00 ; 1.849512e+00 ];
```

%-- Image #9:

```
omc_9 = [ -1.939389e+00 ; -2.101871e+00 ; 6.917473e-02 ];  
Tc_9   = [ -7.062690e+01 ; -9.579143e+01 ; 4.676949e+02 ];  
omc_error_9 = [ 3.628769e-03 ; 4.393511e-03 ; 7.887063e-03 ];  
Tc_error_9  = [ 1.797193e+00 ; 1.405496e+00 ; 1.587654e+00 ];
```

%-- Image #10:

```
omc_10 = [ 2.089082e+00 ; 2.184436e+00 ; -1.030913e-01 ];  
Tc_10   = [ -7.040070e+01 ; -8.447812e+01 ; 3.851613e+02 ];  
omc_error_10 = [ 3.194480e-03 ; 3.411773e-03 ; 7.049182e-03 ];  
Tc_error_10  = [ 1.486036e+00 ; 1.153239e+00 ; 1.311667e+00 ];
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%-- Image #11:
omc_11 = [ -2.140962e+00 ; -2.139162e+00 ; 7.682513e-02 ];
Tc_11 = [ -6.025111e+01 ; -6.304408e+01 ; 4.274958e+02 ];
omc_error_11 = [ 3.761568e-03 ; 4.417491e-03 ; 8.612685e-03 ];
Tc_error_11 = [ 1.642342e+00 ; 1.287334e+00 ; 1.458320e+00 ];

%-- Image #12:
omc_12 = [ -1.836352e+00 ; -2.376002e+00 ; 3.768868e-01 ];
Tc_12 = [ -3.619338e+01 ; -1.187487e+02 ; 6.404012e+02 ];
omc_error_12 = [ 4.741391e-03 ; 5.930297e-03 ; 1.112378e-02 ];
Tc_error_12 = [ 2.461902e+00 ; 1.916697e+00 ; 2.058761e+00 ];

%-- Image #13:
omc_13 = [ 2.062866e+00 ; 2.341004e+00 ; -3.659577e-01 ];
Tc_13 = [ -8.629077e+01 ; -8.557770e+01 ; 6.230044e+02 ];
omc_error_13 = [ 5.034938e-03 ; 5.673743e-03 ; 1.138411e-02 ];
Tc_error_13 = [ 2.382998e+00 ; 1.869706e+00 ; 2.026898e+00 ];

%-- Image #14:
omc_14 = [ -2.106761e+00 ; -2.184729e+00 ; 3.404423e-01 ];
Tc_14 = [ -8.834061e+01 ; -8.779341e+01 ; 4.061891e+02 ];
omc_error_14 = [ 3.331390e-03 ; 3.128802e-03 ; 6.912831e-03 ];
Tc_error_14 = [ 1.558569e+00 ; 1.214777e+00 ; 1.334860e+00 ];

%-- Image #15:
omc_15 = [ 1.874027e+00 ; 2.207288e+00 ; -7.199680e-01 ];
Tc_15 = [ -1.068217e+02 ; -1.225279e+02 ; 4.603490e+02 ];
omc_error_15 = [ 2.002646e-03 ; 3.634021e-03 ; 5.999640e-03 ];
Tc_error_15 = [ 1.785147e+00 ; 1.394994e+00 ; 1.449171e+00 ];

%-- Image #16:
omc_16 = [ -1.957080e+00 ; -2.016839e+00 ; -6.863056e-02 ];
Tc_16 = [ -1.082697e+02 ; -8.458730e+01 ; 4.406259e+02 ];
omc_error_16 = [ 3.221934e-03 ; 3.744844e-03 ; 6.891196e-03 ];
Tc_error_16 = [ 1.693352e+00 ; 1.332652e+00 ; 1.541180e+00 ];

%-- Image #17:
omc_17 = [ -1.826815e+00 ; -2.300399e+00 ; 3.414917e-01 ];
Tc_17 = [ -7.339747e+01 ; -1.111823e+02 ; 4.379035e+02 ];
omc_error_17 = [ 3.184175e-03 ; 3.654842e-03 ; 6.769655e-03 ];
Tc_error_17 = [ 1.683827e+00 ; 1.311704e+00 ; 1.427741e+00 ];

%-- Image #18:
omc_18 = [ 2.165837e+00 ; 2.208638e+00 ; -8.557430e-02 ];
Tc_18 = [ -1.105036e+02 ; -8.487271e+01 ; 3.326578e+02 ];
omc_error_18 = [ 2.778283e-03 ; 3.137409e-03 ; 6.400241e-03 ];
Tc_error_18 = [ 1.289053e+00 ; 1.010617e+00 ; 1.185165e+00 ];

%-- Image #19:
omc_19 = [ -2.165090e+00 ; -2.225277e+00 ; 1.583389e-01 ];
Tc_19 = [ -8.144123e+01 ; -1.140361e+02 ; 6.098672e+02 ];
omc_error_19 = [ 6.498244e-03 ; 6.412186e-03 ; 1.419403e-02 ];
Tc_error_19 = [ 2.346139e+00 ; 1.827846e+00 ; 2.129333e+00 ];

%-- Image #20:
omc_20 = [ -2.201811e+00 ; -2.209893e+00 ; -1.249030e-01 ];
Tc_20 = [ -1.308987e+02 ; -5.648756e+01 ; 5.258946e+02 ];
omc_error_20 = [ 5.809376e-03 ; 5.838699e-03 ; 1.261572e-02 ];
Tc_error_20 = [ 2.024147e+00 ; 1.604874e+00 ; 2.001575e+00 ];

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%-- Image #21:
omc_21 = [ 1.670704e+00 ; 1.774852e+00 ; -6.131726e-01 ];
Tc_21  = [ -1.062747e+02 ; -8.679470e+01 ; 4.177791e+02 ];
omc_error_21 = [ 2.253578e-03 ; 3.383864e-03 ; 4.711023e-03 ];
Tc_error_21  = [ 1.604375e+00 ; 1.262643e+00 ; 1.309090e+00 ];

%-- Image #22:
omc_22 = [ 1.571481e+00 ; 1.621853e+00 ; -8.639186e-01 ];
Tc_22  = [ -1.043808e+02 ; -4.834455e+01 ; 3.997797e+02 ];
omc_error_22 = [ 2.361868e-03 ; 3.349770e-03 ; 4.317338e-03 ];
Tc_error_22  = [ 1.526646e+00 ; 1.211137e+00 ; 1.143479e+00 ];

%-- Image #23:
omc_23 = [ 1.644251e+00 ; 1.661079e+00 ; -6.108240e-01 ];
Tc_23  = [ -7.352835e+01 ; -8.091121e+01 ; 4.019785e+02 ];
omc_error_23 = [ 2.467379e-03 ; 3.289905e-03 ; 4.415655e-03 ];
Tc_error_23  = [ 1.542390e+00 ; 1.202506e+00 ; 1.226964e+00 ];

%-- Image #24:
omc_24 = [ 1.790685e+00 ; 1.773067e+00 ; -3.588352e-01 ];
Tc_24  = [ -9.602637e+01 ; -9.192933e+01 ; 3.875324e+02 ];
omc_error_24 = [ 2.377675e-03 ; 3.224774e-03 ; 4.831647e-03 ];
Tc_error_24  = [ 1.490910e+00 ; 1.163177e+00 ; 1.288516e+00 ];

%-- Image #25:
omc_25 = [ -2.079182e+00 ; -1.908843e+00 ; 7.872285e-01 ];
Tc_25  = [ -8.797202e+01 ; -5.341411e+01 ; 4.353577e+02 ];
omc_error_25 = [ 3.424505e-03 ; 2.419583e-03 ; 5.526537e-03 ];
Tc_error_25  = [ 1.661250e+00 ; 1.303104e+00 ; 1.222265e+00 ];

%-- Image #26:
omc_26 = [ -2.004838e+00 ; -1.778521e+00 ; 6.744807e-01 ];
Tc_26  = [ -5.167457e+01 ; -6.186029e+01 ; 4.846911e+02 ];
omc_error_26 = [ 3.297582e-03 ; 2.698299e-03 ; 5.657830e-03 ];
Tc_error_26  = [ 1.850472e+00 ; 1.441739e+00 ; 1.332774e+00 ];

%-- Image #27:
omc_27 = [ -1.834439e+00 ; -2.024098e+00 ; 3.835311e-01 ];
Tc_27  = [ -1.857379e+01 ; -8.645682e+01 ; 4.880777e+02 ];
omc_error_27 = [ 3.166774e-03 ; 3.908599e-03 ; 6.634576e-03 ];
Tc_error_27  = [ 1.868073e+00 ; 1.452712e+00 ; 1.502941e+00 ];

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