R =

0.9659 0 0.2588

0 1.0000 0

-0.2588 0 0.9659

R1 =

0.9962 0 0.0872

0 1.0000 0

-0.0872 0 0.9962

actual

This (x1, x2, x3) is just image formation in the 3 cameras

x1 =

1.0e+03 \*

0.4875 0.7502 1.1134 1.1174 0.8410 1.2667 0.8489

0.5822 0.8470 0.5048 1.0405 0.4140 0.7576 1.2162

0.0010 0.0010 0.0010 0.0010 0.0010 0.0010 0.0010

x2 =

1.0e+03 \*

0.6591 0.9239 1.2906 1.2956 1.0160 1.4395 1.0266

0.5822 0.8470 0.5048 1.0405 0.4140 0.7576 1.2162

0.0010 0.0010 0.0010 0.0010 0.0010 0.0010 0.0010

x3 =

1.0e+03 \*

0.5357 0.8263 1.2993 1.3049 0.9360 1.5317 0.9455

0.6195 0.9245 0.5989 1.2217 0.4746 0.9224 1.3407

0.0010 0.0010 0.0010 0.0010 0.0010 0.0010 0.0010

no\_matches =

7

f1 =

Figure (2) with properties:

Number: 2

Name: ''

Color: [0.9400 0.9400 0.9400]

Position: [440 378 560 420]

Units: 'pixels'

Show all properties

f1 =

Figure (3) with properties:

Number: 3

Name: ''

Color: [0.9400 0.9400 0.9400]

Position: [440 378 560 420]

Units: 'pixels'

Show all properties

Ka =

351.7870 0 315.9000

0 351.7870 238.9660

0 0 1.0000

Fmat =

-0.0000 -0.0000 0.0000

0.0000 0.0000 -0.7069

-0.0000 0.7069 -0.0000

E =

-0.0000 -0.0000 0.0000

0.0000 0.0000 -248.6611

-0.0000 248.6611 -0.0000

P1 =

1 0 0 0

0 1 0 0

0 0 1 0

P2 =

1.0000 0.0000 0.0000 1.0000

-0.0000 1.0000 0.0000 0.0000

-0.0000 -0.0000 1.0000 0.0000

P3 =

0.9962 -0.0000 0.0872 0.4082

0.0000 1.0000 0.0000 0.8165

-0.0872 -0.0000 0.9962 0.4082

f1 =

Figure (4) with properties:

Number: 4

Name: ''

Color: [0.9400 0.9400 0.9400]

Position: [440 378 560 420]

Units: 'pixels'

Show all properties

f1 =

Figure (5) with properties:

Number: 5

Name: ''

Color: [0.9400 0.9400 0.9400]

Position: [440 378 560 420]

Units: 'pixels'

Show all properties

Xout =

1.0000 2.5000 4.5000 4.5000 3.0000 5.5000 3.0000

2.0000 3.5000 1.5000 4.5000 1.0000 3.0000 5.5000

2.0500 2.0250 1.9850 1.9750 2.0100 2.0350 1.9800

1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

Xout1 =

3.2660 8.1650 14.6969 14.6969 9.7980 17.9629 9.7980

6.5320 11.4310 4.8990 14.6969 3.2660 9.7980 17.9629

6.6953 6.6136 6.4830 6.4503 6.5646 6.6463 6.4667

1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

sc =

3.2660

3.2660

3.2660

This is a critical moment. What we have is P1, P2, P3 where P2, P3 come from the Essential Matrix computed between C1, C2 and C1, C3. Where C’s are the cameras

The main thing is the translation vector that comprises P2 and P3 come as it does from decomposition of E is in two different scales. The question is how does one compute this scale.

The main point is the reconstructed points, Xout and Xout1 are the same. We use that to compute the scale. Xout coming from P1,P2 by the method of DLT whereas Xout1 comes from P1,P3. But they represent the same points. Hence the scale between these two reconstructions is 3.26 above

P5 =

0.9962 -0.0000 0.0872 -0.8712

0.0000 1.0000 0.0000 0.2500

-0.0872 -0.0000 0.9962 0.2122

We now make P2 as the current camera frame and hence [I 0] and assign it to P4. Whereas P5 is P3 with respect to P2. However we have T32 in the same scale as T12. We triangulate P4, P5 (which is essentially P2, P3 with P2 as the origin) and get it in the same frame as P1

Xoutg =

1.0000 2.5000 4.5000 4.5000 3.0000 5.5000 3.0000

2.0000 3.5000 1.5000 4.5000 1.0000 3.0000 5.5000

2.0500 2.0250 1.9850 1.9750 2.0100 2.0350 1.9800

1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

X = [2 4 4.1;

5 7 4.05;

9 3 3.97;

9 9 3.95;

6 2 4.02;

11 6 4.07;

6 11 3.96;

];

If you see the first point in GT is [2 4 4.1] and in the triangulated points is [1 2 2.05], which is exactly at half the scale. Or one unit in the triangulated points is 2 units in GT.

**In Oct 2023**

Xoutg =

1.0000 0.5000 -0.1000 1.0000 0.1500 0.1000 0.6250 0.5250 1.0500

2.0000 0.0000 0.0000 0.0000 1.0000 2.0000 0.0000 0.0000 0.5500

2.0000 1.5000 2.5000 7.5000 3.0000 3.5000 3.2500 5.0000 4.1250

1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

Whereas GT X is

X = [

2, 4, 4;

1, 0, 3;

-0.2, 0, 5;

2, 0, 15;

0.3, 2, 6;

0.2, 4, 7;

1.25, 0, 6.5;

1.05, 0, 10;

2.1, 1.1, 8.25;

];

The reconstruction still is thus a scaled version of the original GT X, scaled by 0.5. Or one unit in the triangulated points is 2 units in GT.

**Back to 2021 from here**

f1 =

Figure (6) with properties:

Number: 6

Name: ''

Color: [0.9400 0.9400 0.9400]

Position: [440 378 560 420]

Units: 'pixels'

Show all properties

Rotg =

1.0000 0.0000 0.0000

-0.0000 1.0000 -0.0000

-0.0000 0.0000 1.0000

Transg =

1.0000

-0.0000

-0.0000

Rg =

1 0 0

0 1 0

0 0 1

Tg =

2

0

0

Rotg1 =

0.9962 -0.0000 0.0872

0.0000 1.0000 0.0000

-0.0872 -0.0000 0.9962

Transg1 =

0.1250

0.2500

0.1250

R1g =

0.9962 0 0.0872

0 1.0000 0

-0.0872 0 0.9962

T1g =

0.2500

0.5000

0.2500

>> After PnP resection we find Transg1 scales T1g by the same amount Transg scales Tg. Hence the reconstruction and trajectory differs just by ONE SCALING TRANSFORM