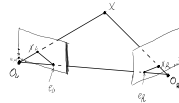


• You should also calibrate the camera



From equation 1.5, the camera camera, you need a 3D point in the world  
 coordinates  
 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

Fundamental matrix  $F = [R|t]$  =  $\begin{bmatrix} R_{11} & R_{12} & R_{13} & t_1 \\ R_{21} & R_{22} & R_{23} & t_2 \\ R_{31} & R_{32} & R_{33} & t_3 \end{bmatrix}$

• mapping from a point in the image to the other image

if  $A^T = A$ , then  $A$  is called symmetric,  $\text{rank}(A) \leq 2$

$\begin{bmatrix} 3 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$  is symmetric  $B = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$  is symmetric  $B^T = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$  is symmetric

Singular - unusual not common  
 "black" and "red" is symmetric - not symmetric

• Singular correlation - non-invertible matrix

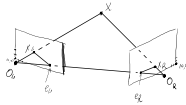
• You know the pos of  $X_L$  and  $X_R$  in my world  
 • How to transform from my camera to global world?

If  $(x_L, y_L)$  located in the left bottom corner

If  $P_L$  is a point on the left image plane

Two - transform camera to world so  $T_{w, X_L}$  is projection in 3D space

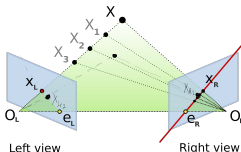
How projection world to image plane  
 so  $P_L$   $T_{w, X_L}$  - world in a plane



• Is there a way to find  $e_c$  of plane in the world - the geometric algebra?

• How to find  $e_c$ ? it's a point of intersection of a line with a plane.  
 • How to represent a line?  
 • Line -  $Ax + By + Cz + D = 0$   
 • Line -  $(x_1, y_1, z_1) + t(x_2, y_2, z_2)$  line  
 • Line -  $(x_1, y_1, z_1) + t(x_2, y_2, z_2)$  line  
 • Line -  $(x_1, y_1, z_1) + t(x_2, y_2, z_2)$  line

position of this is a point



Left view

Right view