2D to 3D conversion

COL780:Project presentation

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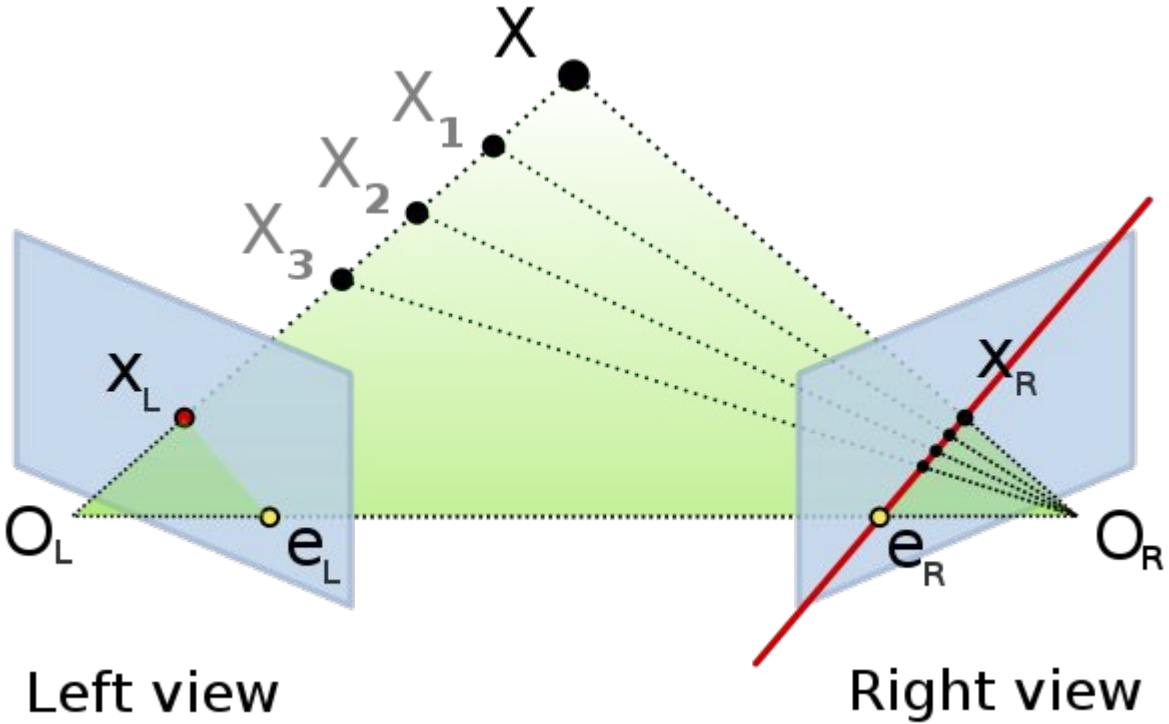
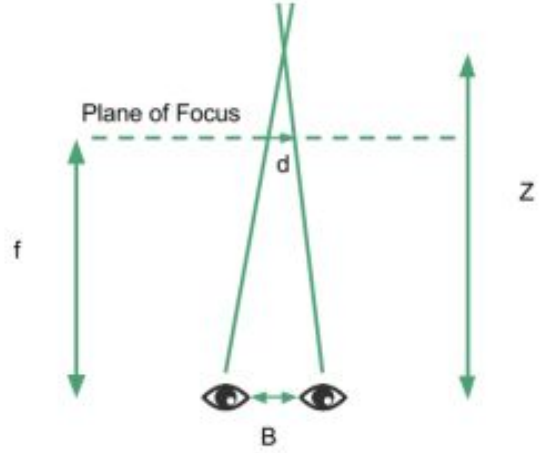
Basic Problem : Triangulation

Triangulation is not easy

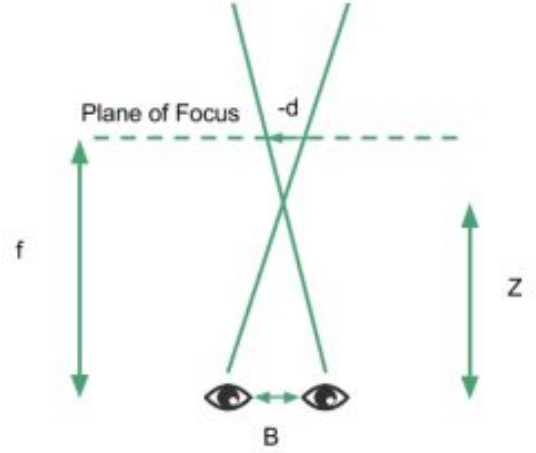


Depth map required ?

Disparity is different for different depths



Object further than imaginary screen plane



Object nearer than imaginary screen plane

Depth map required ?

Disparity calculation requires depth map:

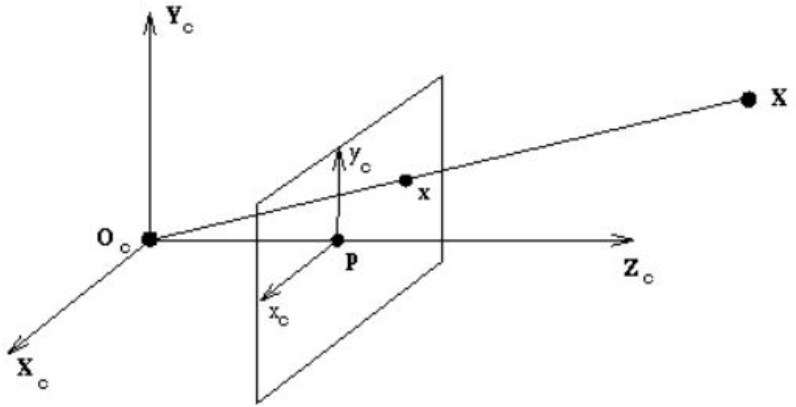
$$D = \frac{B(Z - f)}{Z}$$

$$O_{i,j} = \sum_{d} I^{d}_{i,j} D^{d}_{i,j}$$

$$O_{i,j+D_{ij}} = I_{i,j}.$$

$$L = |O - Y|$$

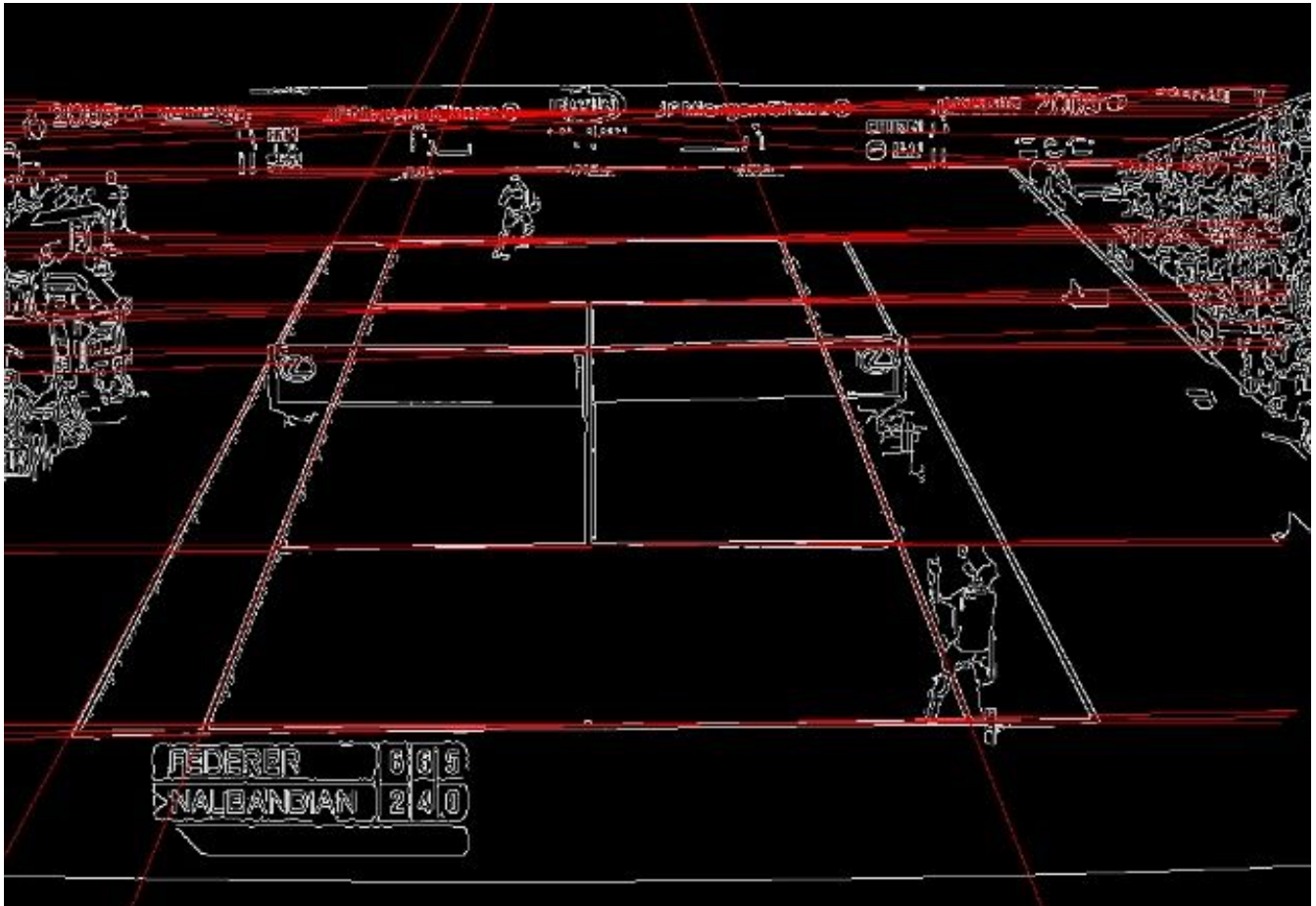
Basic Problem : Camera Calibration



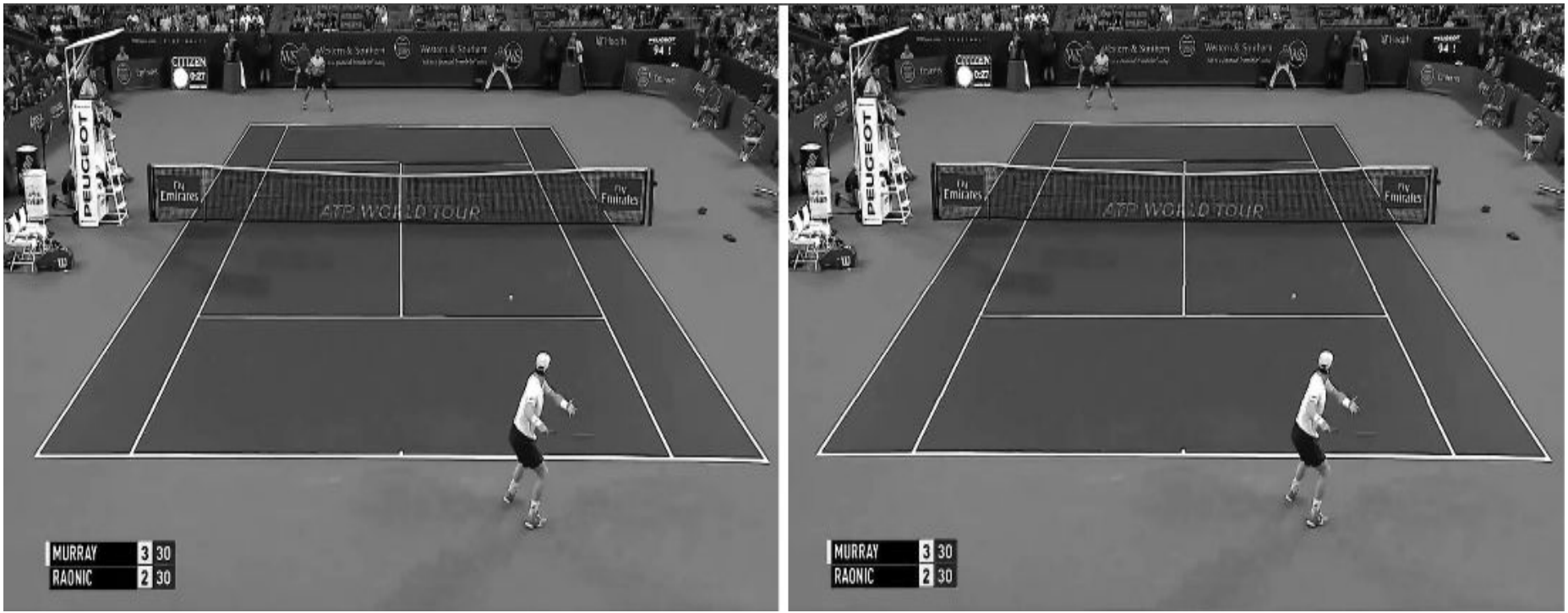
$$\begin{bmatrix} x_c \\ y_c \\ f \end{bmatrix} = k \begin{bmatrix} X_c \\ Y_c \\ Z_c \end{bmatrix} \quad \text{or} \quad \begin{bmatrix} x_c \\ y_c \\ f \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} X_c \\ Y_c \\ Z_c \\ 1 \end{bmatrix}$$

$$k = f / Z_c$$

Basic Problem : Camera Calibration



Implementation1 : Approximate 3D



Western & Southern
Western & Southern
Health
PEUGEOT
94
CITIZEN
0:27
Emirates
PEUGEOT
Fly Emirates
ATP WORLD TOUR
Fly Emirates
MURRAY 3 3 30
RAONIC 2 2 30

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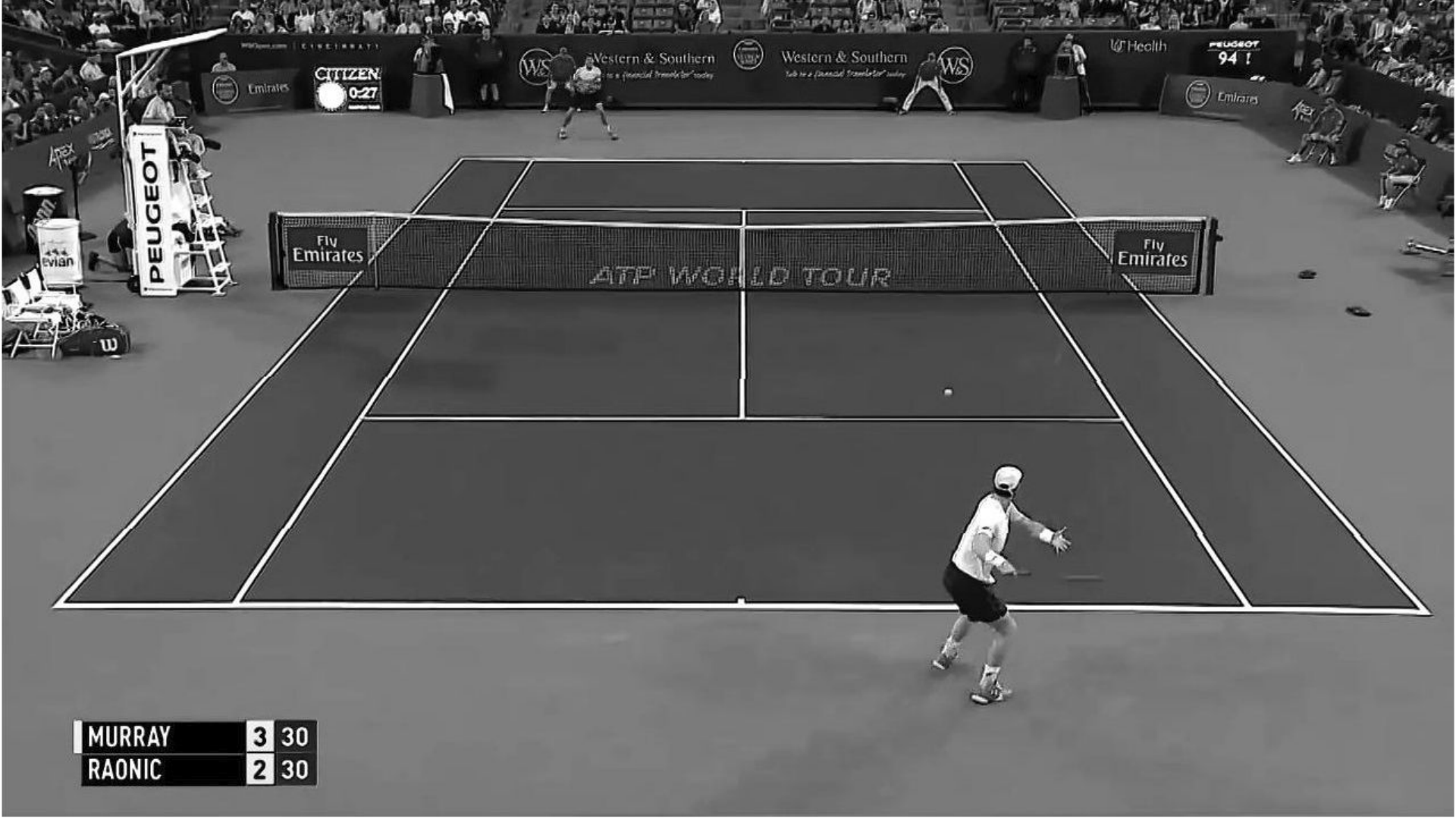
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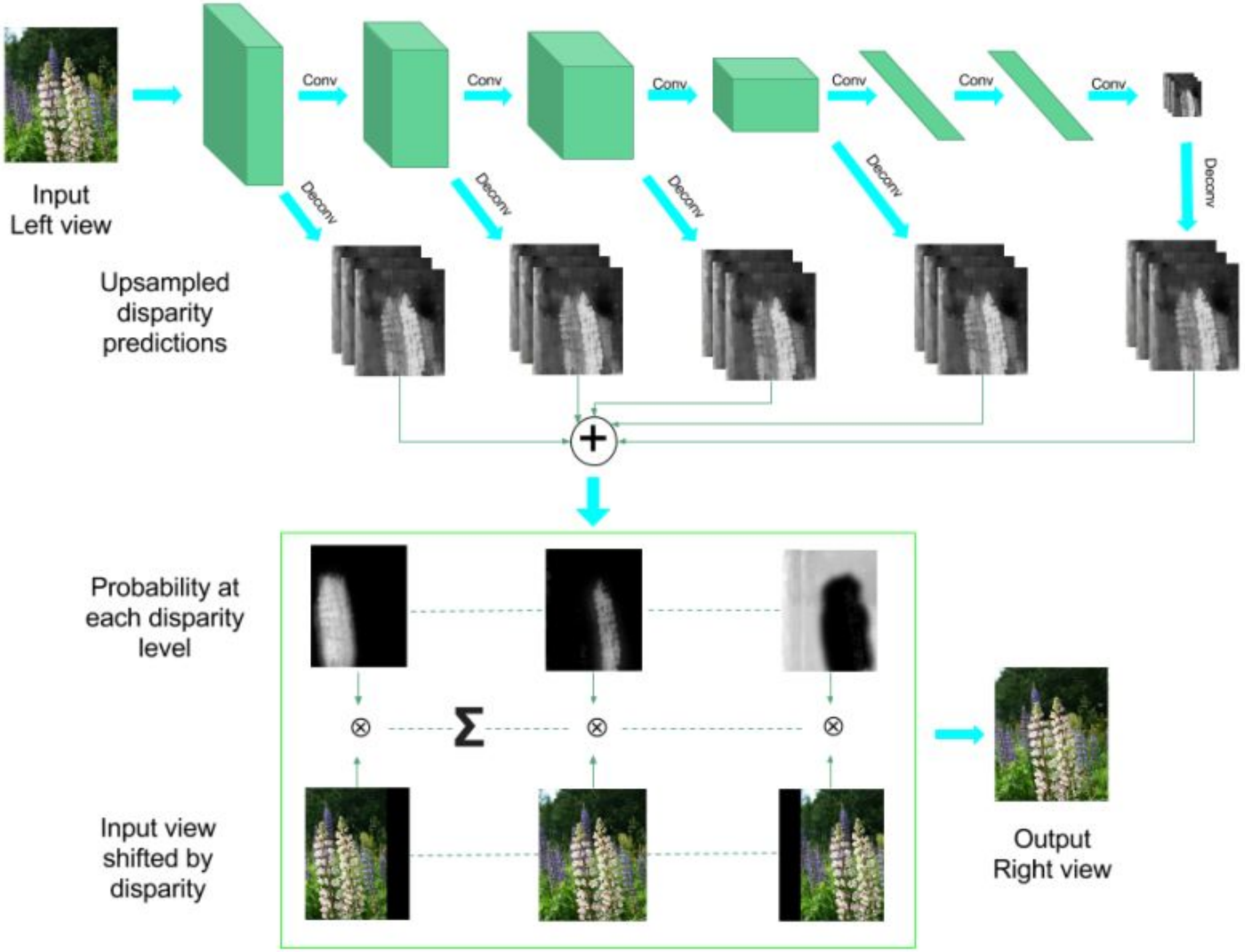
Input
Left view
Conv
Conv
Conv
Conv
Conv
Conv
Deconv
Deconv
Deconv
Deconv
Deconv
Upsampled
disparity
predictions
Probability at
each disparity
level
Input view
shifted by
disparity
Output
Right view

Why DNN’s ?

Required for understanding the basic structure of the objects in the image

Possibly the approach used by humans for depth estimation using single eye

Learns directly on the sterio pair instead of depth maps

Learning on depth maps does not work as not enough data

Cannot use direct regression from left to right image

Plenty of data available in form of 3D movies.

Thank You