CVSN
Sampad Kumar Kar
MCS202215

Assignment-1

Codes for 1, 2 in Jupyter Notebook.

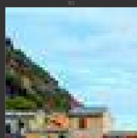
1 (a) h, w, c = 315, 474, 3

size = 315 × 474

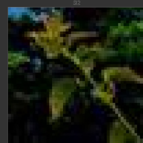
channels = 3

(b) subimg1 subimg2

S1



S2

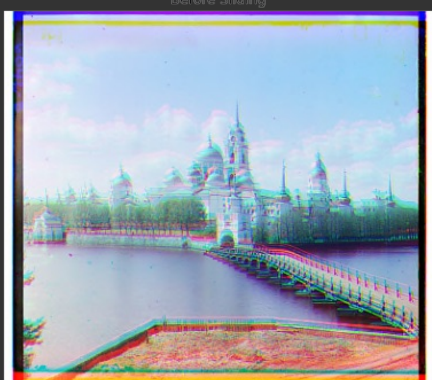


SSD = 781484

2 Befor Sliding After Sliding

(a)

Before Sliding

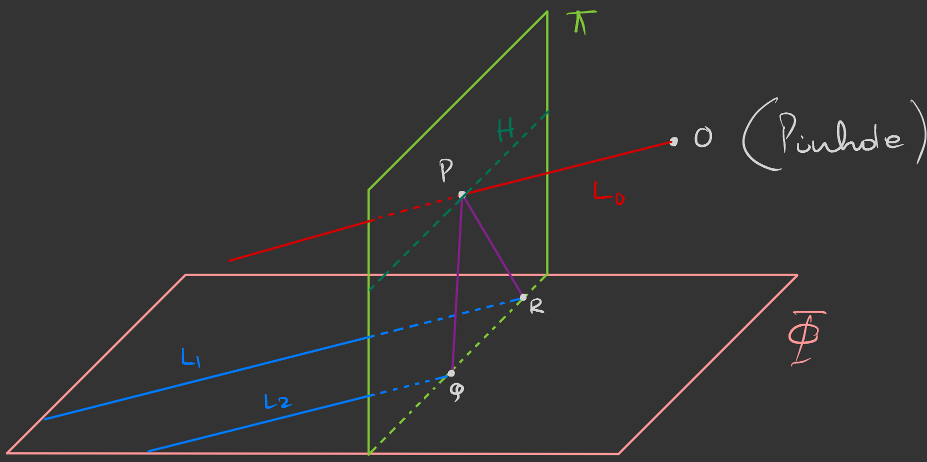


After Sliding

(b) Sliding window: 10

Best Blue vs Green SSD: 12843952
Best Red vs Green SSD: 12527203
Total Best SSD : 25371155

③



Firstly, we show the existence of "Vanishing Point", i.e. collection of parallel lines always converge at the same point in the Image Plane.

Let 'Φ' be the plane containing our parallel lines L_1 and L_2. Let 'π' be the image plane and 'O' be the 'pinhole'.

Now, construct a line parallel to L_1 and L_2 but passing through the pinhole 'O'. Let this line intersect 'π' at 'P'. This line OP is parallel to both L_1 and L_2.

Notice, PQ and PR are the intersection of the plane containing (OP, L_1) and (OP, L_2) respectively with the image plane 'π'.

Also PQ and PR in the image plane are projection of L_1 and L_2 in the image plane.

Hence, this point 'P' is called the "Vanishing Point" associated with the family of straight lines parallel to OP.

This proves that collection of parallel lines always converge at the same point in the image plane 'π'.

Now, we will show that parallel lines in the same plane '$\overline{\Phi}$' will converge on the Horizon line 'H', which is the intersection of the image plane with the plane parallel to '$\overline{\Phi}$' and passing through the pinhole 'O'.

Let us call this plane parallel to '$\overline{\Phi}$' and passing through the pinhole as "$\overline{\Phi}$"

Notice that 'H' is parallel to ϕR

Now, as before consider two pair of parallel lines, say L_1' and L_2' on Φ.

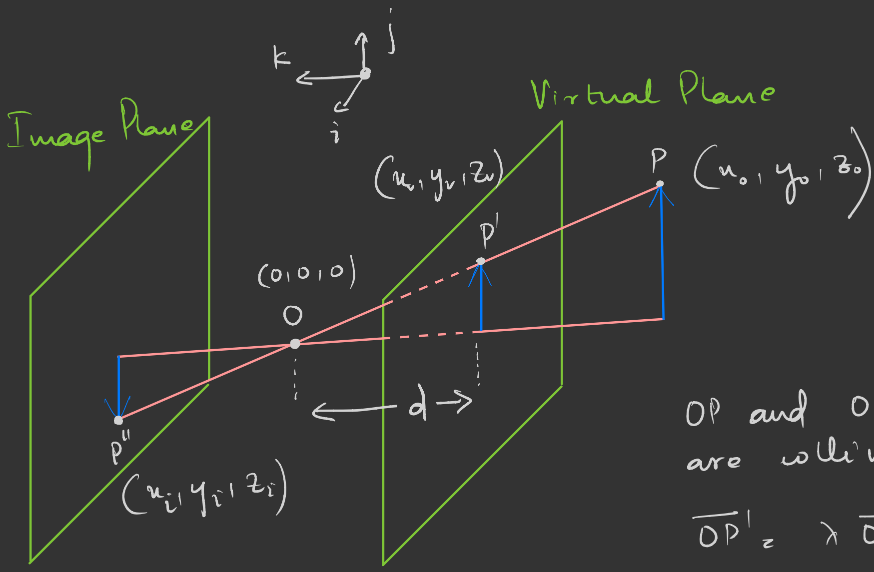
Now, as seen above we can find the vanishing point 'P'' by drawing a line OP' parallel to L_1' and L_2'.

Clearly P, P' lie on 'H' because OP, OP' lie on Φ'.

By this construction P, P' lie on 'H' because OP, OP' lie on Φ' (which is the plane parallel to Φ, passing through 'O').

This proves the existence of horizon line 'H' as we considered the vanishing point P and P' of 2 pair of parallel lines in the plane 'Φ'.

④



OP and OP' are collinear

$$\overline{OP'} = \lambda\, \overline{OP}$$

In co-ordinates →

$$x_v = \lambda x_o$$

$$y_v = \lambda y_o$$

$$z_v = \lambda z_o \qquad \text{But } z_v = -d$$

$$\lambda = \frac{x_v}{x_o} = \frac{y_v}{y_o} = \frac{z_v}{z_o} = \frac{-d}{z_o}$$

$$\Rightarrow \boxed{\begin{aligned} x_v &= -d\,\frac{x_o}{z_o} \\ y_v &= -d\,\frac{y_o}{z_o} \end{aligned}}$$

→ Perspective Equation projections for virtual image

⑤ My favourite illusions are :

→ The Healing Grid (by Ryota Kanai)

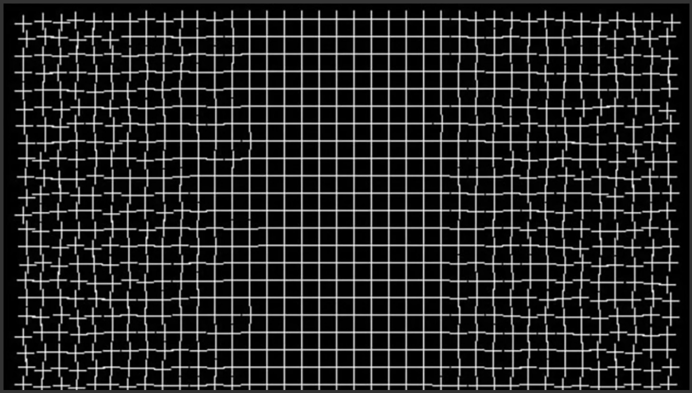
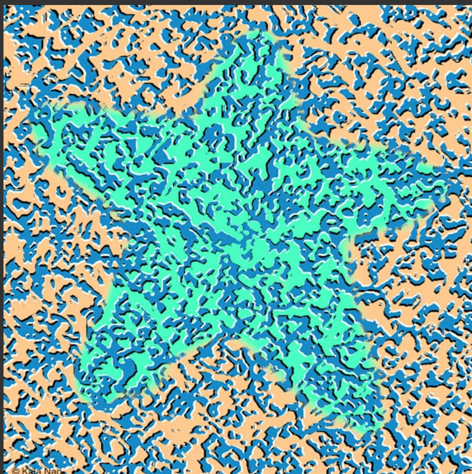


Image is regular at the center and irregular at the peripherals. If we stare at the center for an extended period, the regularity patterns at the center seems to spread around to the peripherals as well. This demonstrates the preference of brain toward regular patterns. The brain tries to limit the use of energy and resources required to process chaotic information by simplifying and imposing an order in the image.

→ The Floating Star (by Joseph Hartman)



The star in this image is static, but it appears to rotate. This is caused due to a phenomenon called "Peripheral Drift Illusion", because this happens due to our peripheral vision as a result of the overlaying pattern of regular random shapes to convey the sense of motion of a larger shape. As we look around the image, our eye movements simulates motion, which stimulates the motion sensitive neurons in our brain which hence percieves motion.