Phase I

Input: Image, f, u_0, v_0, a, b, c

$u = u_0 + fX/Z$
$v = v_0 + fY/Z$
where, $Z = aX + bY + c$

For 4 (X,Y), we can get (u,v)

cv2.getPerspectiveTransform takes source and destination pair of 4 points (rectangle) and gives transformation matrix M

Using this matrix M, cv2.warpPerspective performs transformation on image.

Phase II

Input: Image, c

$u = u_0 + fX/Z$
$v = v_0 + fY/Z$
where, $Z = aX + bY + d$

For 4 (X,Y), we can get (u,v)

cv2.getPerspectiveTransform takes source and destination pair of 4 points (rectangle) and gives transformation matrix M

Using this matrix M, cv2.warpPerspective performs transformation on image.

1) Z = c at vertical line center
   for X=W/2,
   c = aW/2 + bY + d for all Y
   So, b=0
   c = aW/2 + d
   a = (c-d)*2/W

   At vertical line X=W/2
   Y=0, v=0
   Y=H, v=H
   u = W/2
   Because, vertical line remains the same.

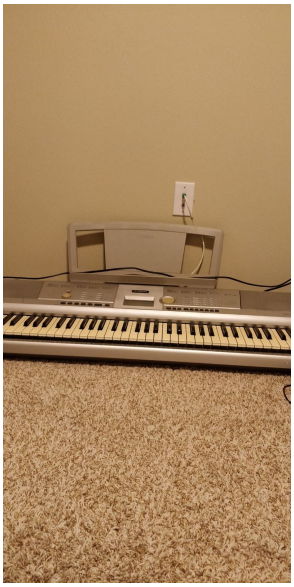
$W/2 = u_0 + fW/2c$
$u_0 = W/2(1-f/c)$

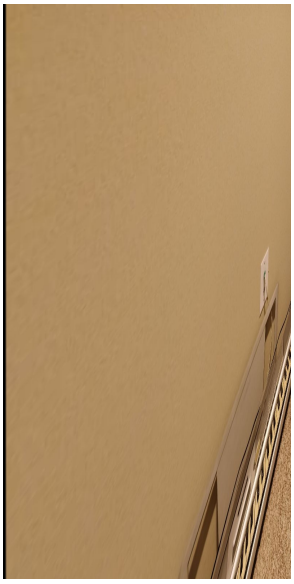
$0 = v_0 + f*0$
$v_0 = 0$

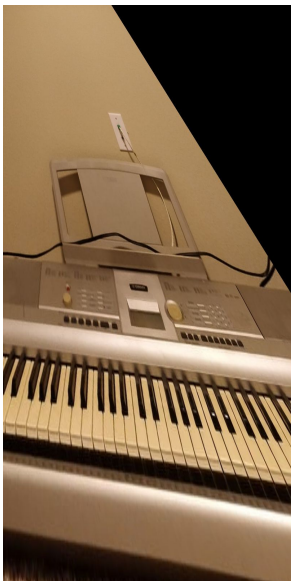
$H = v_0 + f*H/c$
$f = c$

2) Similarly,
Z=c at horizontal center line
$c = bH/2 + d$
$b = (c-d)*2/H$
a=0

At vertical line Y=H/2
We get
$u_0 = 0, v_0 = 0, f=c$


Input


Part 1


Part 2.1


Part 2.2