OpenCV

OpenCV

- OpenCV was started at Intel in 1999 by Gary Bradsky and the first release came out in 2000.

- Currently OpenCV supports a wide variety of programming languages like C++, Python, Java etc and is available on different platforms including Windows, Linux, OS X, Android, iOS.

Geometric Transformations

- **Scaling**

- **Translation**

- **rotation**

Scaling

- Scaling is just resizing of the image. OpenCV comes with a function cv2.resize() for this purpose. The size of the image can be specified manually, or you can specify the scaling factor. Different interpolation methods are used. Preferable interpolation methods are **cv2.INTER_AREA** for shrinking and **cv2.INTER_CUBIC** (slow) & **cv2.INTER_LINEAR** for zooming. By default, interpolation method used is **cv2.INTER_LINEAR** for all resizing purposes.

Translation

- Translation is the shifting of object's location. If you know the shift in (x,y) direction, let it be (t_x,t_y), you can create the transformation matrix M as follows:

$$M = \begin{bmatrix} 1 & 0 & t_x \\ 0 & 1 & t_y \end{bmatrix}$$

- You can take make it into a Numpy array of type np.float32 and pass it into cv2.warpAffine() function.

Rotation

- Rotation of an image for an angle theta is achieved by the transformation matrix of the form $M = \begin{bmatrix} cos\theta & -sin\theta \\ sin\theta & cos\theta \end{bmatrix}$

  - cv2.getRotationMatrix2D((cols/2,rows/2),90,1)

  - cv2.warpAffine(img,M,(cols,rows))

Edge detection(canny)

- Applies Gaussian blurring

- Finds intensity gradient of the image

- Applied non maximum suppression (removes pixels that are not edges)

- Hysteresis : applies thresholds (if pixels is within the upper and lower thresholds it is consider an edge)

Canny threshold 1, threshold 2

- Any gradient value larger than threshold2 is considered to be an edge. Any value below threshold1 considered not an edge.

Note

- The rest of the lab is in the "code".