

Perspective Transform

1. PreProcessing

- a. Convert to Gray
- b. Gaussian blur
- c. Adaptive Gaussian + INV
- d. Canny Edge
- e. Dilation
- f. Open operation

2. Setting control values:

```
::threshold=[100, 80, 50, 30]
::minLineLength=[200, 100, 80, 50]
::minLineGap=[1, 10, 15]
```

3. Find lines using *Probabilistic Hough Lines Transform* and make Perspective Transform

- Set *threshold*, *minLineLength*, *minLineGap* to the consecutive values in the list above:
::Initial args to cv.HoughLinesP: [*rho*=1, *theta*= $\pi/180$, *threshold*=100, *minLineLength*=200, *minLineGap*=1]
::Later it will change to consecutive values in step **2. Setting control values**
- Find lines by Probabilistic Hough Lines Transform
- Group lines by location in quarters of image.
- For lines in each quarter find the orientation, that is the clockwise deviation from horizontal.
- For each quarter, find the 100 most frequent angles.
- For angles in each quarter, do
 - {
 - Split angles to *vertical* and *horizontal*
 - Find power (=10) weighted average for *vertical* and *horizontal* with {key : values} as {angle : frequency}
 - If either *key* or *value* is None
 - {
 - ⇒ Set *minLineLength* to its *next value* and start over **step 3**
 - ⇒ If *minLineLength* has its *last value*, reset *minLineLength* and set *threshold* to its *next value* and start over **step 3**
 - ⇒ If *threshold* and *minLineLength* has its *last value*, reset *minLineLength* and *threshold*, and set *minLineGap* to its *next value* and start over **step 3**
 - ⇒ If *threshold* and *minLineLength* and *minLineGap* has its *last value*, proceed further
 - }
 - }
- As in each quarter, average *vertical* and *horizontal* angles are found do
 - {
 - Find weighted average of *horizontal* angle of first quarter and second quarter
 - Find weighted average of *horizontal* angle of third quarter and fourth quarter
 - Find weighted average of *vertical* angle of first quarter and second quarter

- Find weighted average of *vertical* angle of third quarter and fourth quarter
- }
- With the given angles from previous calculation, pass a *horizontal* and a *vertical* lines through points (0, 0) and (height, weight) coordinates.
- Find the intersection of the lines and fix the points.
 - If intersection points are out of image frame (height, weight) parallel transform the lines and initial (0, 0) (height, weight) points accordingly
- Having fixed the points, make **Perspective Transform**.