**Algorithm**

1. detect camera angle
2. main loop
   1. frame transformation
   2. detect page
   3. detect and create sketch on the output image
3. return the output image

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| **Function** | **input** | **output** | **description** | **Variables** | **called functions** |
| App | webcam driver number | PNG image | main app function, in this function we implement the algorithm by calling a variety of functions. this function gets the frames from the camera. | cap - video object  listofpoints - holdes points.  avgpoints  ret  frame  cropframe  markedframe  points  subframe | cv2.VideoCapture->cap   * cap.isOpened * cap.read * cap.release   cv2.imshow  cv2.waitKey  cv2.destroyAllWindows |
| MarkEdges | frame | converted black and white frame with marked edges | gets a frame convert it to black and white and mark the edges of the object's in the frame | frame  grayframe  bwframe  kernel | cv2.cvtColor  cv2.Canny  cv2.dilate |
| GetListsOfPoints | frame and list of points | modified list of point | gets black a white frame with marked edges and a list of points. adds points to the list | markedframe  listofpoints  lines  points  framesize | cv2.HoughLinesP  FilterPoints  AddToList |
| CheckList | list of points | boolean value | gets list of points and checks if there is an empty sub list, return true if not | listofpoints |  |
| PointsFromLines | list of points | four points | gets list of points and returns approximates line that passes true all the points | listsofpoints  lines | LineInterception |
| CheckPoints | frame and points | boolean value | checks if a point is in the frame scope | cropframe  points |  |
| PointsDistence | average points,  points and distance value | boolean value | gets average points, points and distance value. checks the distance of a point from the average/ if the distance is smaller than the distance value it returns true | avgpoints  points  dis |  |
| AvgPoints | two points | average points | gets two points and returns the average point | points1  points2 |  |
| FrameTransform | frame and points | modified frame | gets frame and points return the transformed frame | frame  points  frameheight  framewidth  pts1  pts2  dst  height  width | np.float32  cv2.getPerspectiveTransform  cv2.warpPerspective  cv2.getRotationMatrix2D  cv2.warpAffine  FixPoints |
| FilterPoints | points, frame size and line number | boolean value | gets points, frame size and line number. return true if the point is in a specific range | points  framesize  linenum  fp1  fp2 | FilterPoints1  FilterPoints2 |
| AddToList | list, points and line number | modified list | get list, points and line number. adds the points to list in the correct line number | lists  points  linenum |  |
| FixPoints | points and fix value | modified points | gets points and fix value, adds the fix value to the point | points  fix |  |
| FilterPoints1 | points, frame size and line number | boolean value | gets points, frame size and line number. return true if the point is in a specific range | points  framesize  linenum  height  width |  |
| FilterPoints2 | points, frame size and line number | boolean value | gets points, frame size and line number. return true if the point is in a specific range | points  framesize  linenum  height  width |  |
| CropFrame | frame | cropped frame |  | frame  height  width |  |