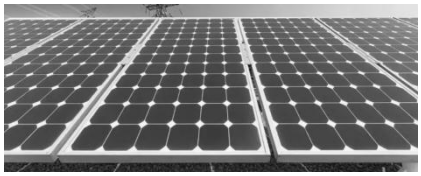
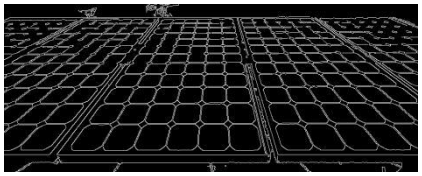
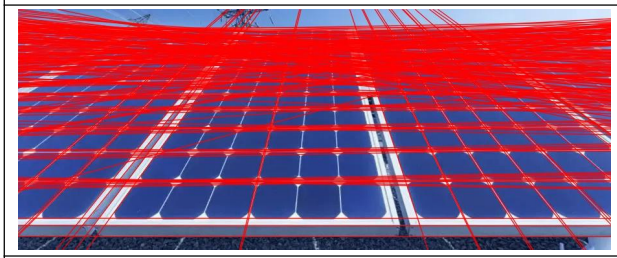
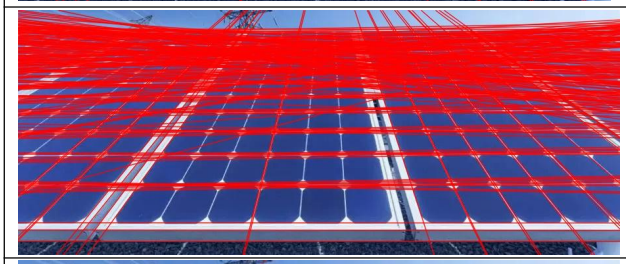
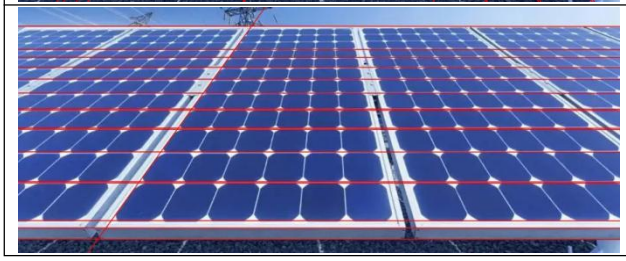
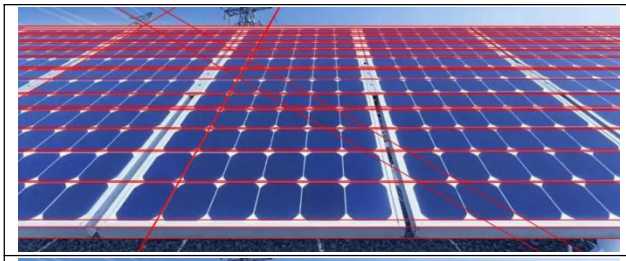
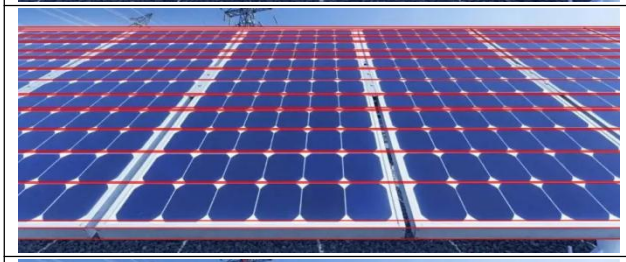
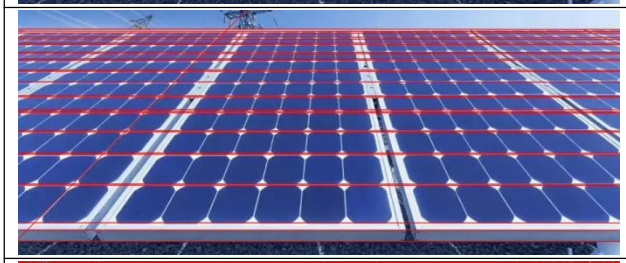
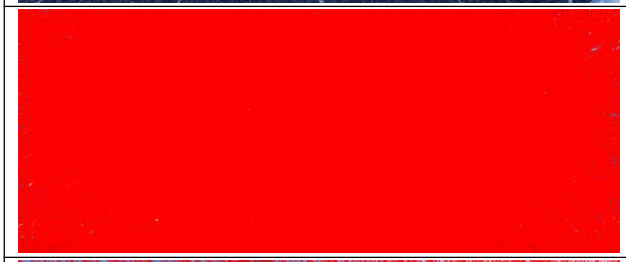
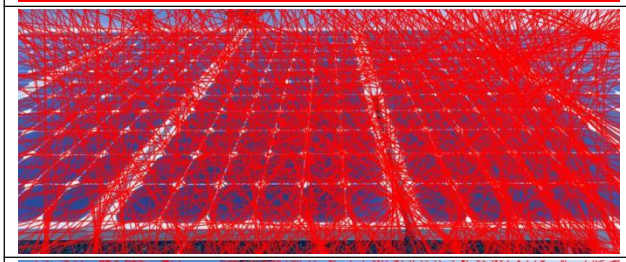
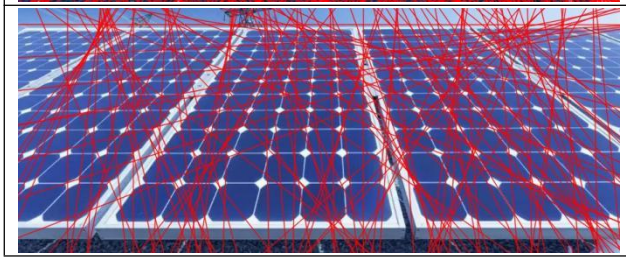
4. 找一张包含线条的图像，用霍夫变换进行线检测，并统计线条的数目。尝试不同的参数设置，并给出结果比较。

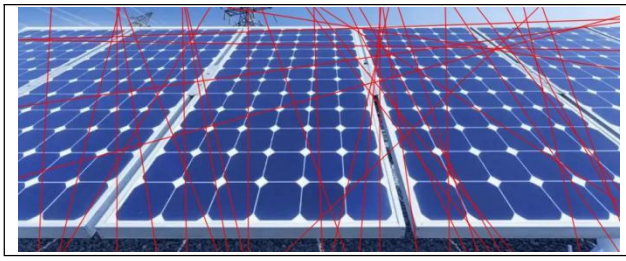
原图	灰度处理后的图片	Canny 处理后的图片
		

经过灰度处理后，我们使用 cv2.Canny(image, threshold1, threshold2, apertureSize, L2gradient)进行边缘检测。其中，较大的 threshold2 用于检测图像中明显的边缘，但一般情况下检测的效果不会那么完美，边缘检测出来是断断续续的。所以这时候用较小的 threshold1 用于将这些间断的边缘连接起来。在这次作业中，threshold1 和 threshold2 的值分别是 100 和 400。不同的 threshold 值会导致不同的边缘检测结果，进而导致不同的霍夫变换结果。

之后，我们使用 cv2.HoughLines(image, rho, theta, threshold[, lines[, srn[, stn[, min_theta[, max_theta]]]]]) 进行线检测，并将所以被检测的线绘在原图上。其中：rho 为生成极坐标时像素扫描步长，theta 为生成极坐标时候的角度步长，threshold 为一条线的最少点数。

霍夫变换后的图片	ρ(rho)	θ(theta)	threshold (min_points)	line
	1	1	100	206
	1	1	180	70
	1	1	250	17

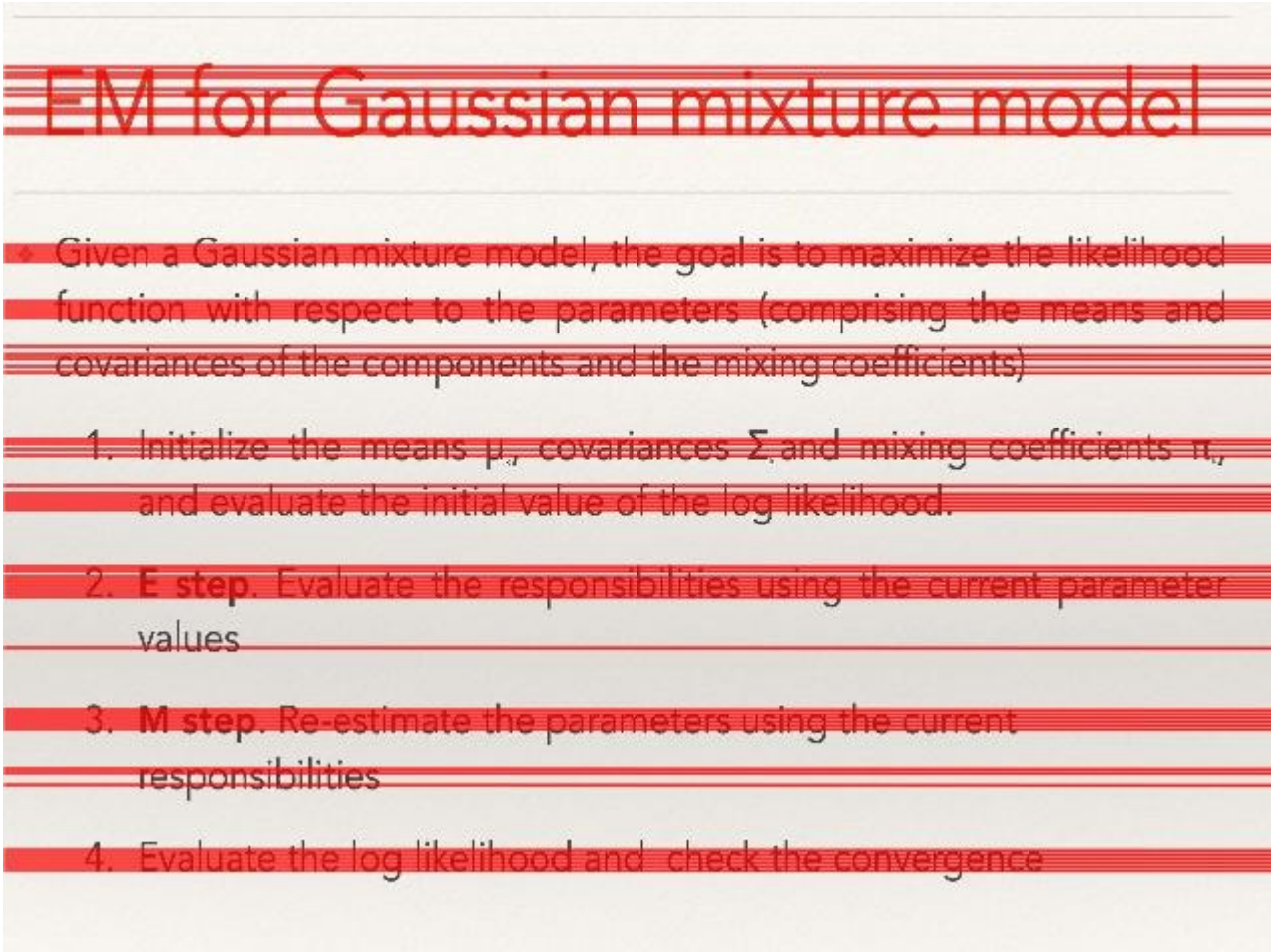
	1	30	100	32
	1	1	500	1
	1	10	180	28
	1	45	180	29
	5	1	180	3328
	20	1	180	534
	50	1	180	119

	100	1	180	34

当 threshold(min_points)越大，检测直线越少。θ越大，生成极坐标时候的角度步长越大，可能越来越多角度的直线无法检测。ρ越大，生成极坐标时像素扫描步长月大，检测直线越少。

5. 用线拟合的方式，对下图中的个文字行，插入删除线。

霍夫变换后输出图像:



最终输出图像：


EM for Gaussian mixture model
Given a Gaussian mixture model, the goal is to maximize the likelihood function with respect to the parameters (comprising the means and covariances of the components and the mixing coefficients)
1. Initialize the means μ_k, covariances Σ_k and mixing coefficients π_k, and evaluate the initial value of the log likelihood.
2. E step. Evaluate the responsibilities using the current parameter values
3. M step. Re-estimate the parameters using the current responsibilities
4. Evaluate the log likelihood and check the convergence