Evaluated the effectiveness of **hysteresis thresholding** and the non-linear **majority filter** to clean up the binary image produced in q3.m.

Experimented with different outputs as well as different window sizes. The results are presented below:

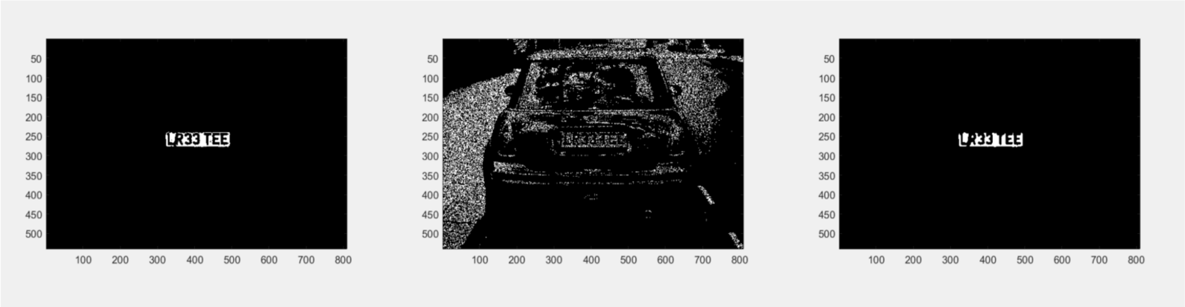
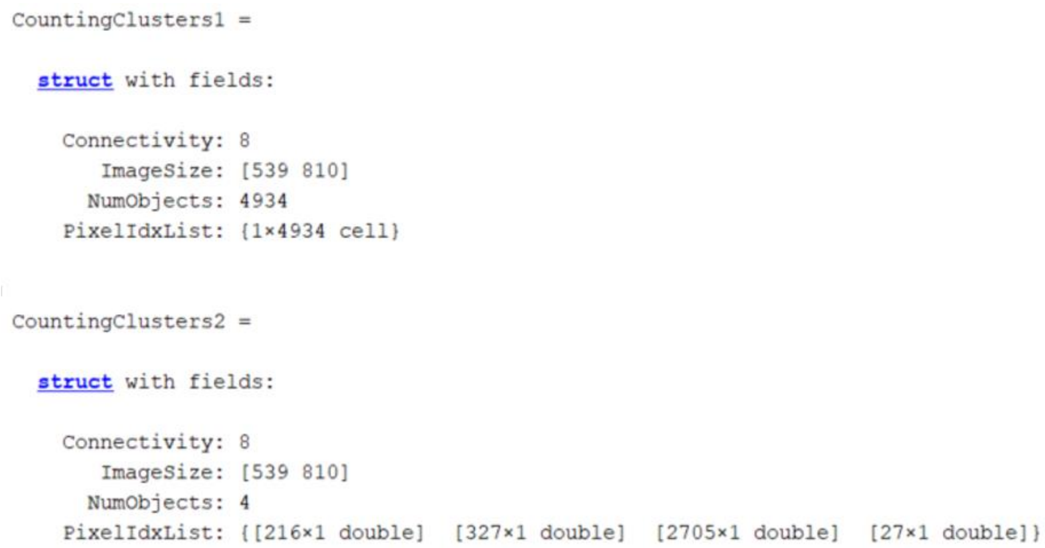


Fig 4.1 – Output for Q4.M



```
CountingClusters1 =

  struct with fields:

    Connectivity: 8
       ImageSize: [539 810]
      NumObjects: 4934
    PixelIdxList: {1×4934 cell}


CountingClusters2 =

  struct with fields:

    Connectivity: 8
       ImageSize: [539 810]
      NumObjects: 4
    PixelIdxList: {[216×1 double]  [327×1 double]  [2705×1 double]  [27×1 double]}
```

Fig 4.0 – Display Output for Q4.m

Hysteresis Thresholding

After many attempts experimenting with different threshold values, I have settled on the example shown in Fig4.2 and 4.3. Although, not the best-case scenario, it can be strongly argued that the image came back fairly clean, eliminating unwanted pixels, making it fairly optimal in terms of settings chosen. The method that helped me achieve the following shows that the user assigns a value of 0 to anything below the threshold, meanwhile 2 for values above and 1 for values in between accordingly. The loop then iterates through the Matrix to assign the same amount of rand number between 0 and 1 that was previously set as 2. The number of clusters is 4999.

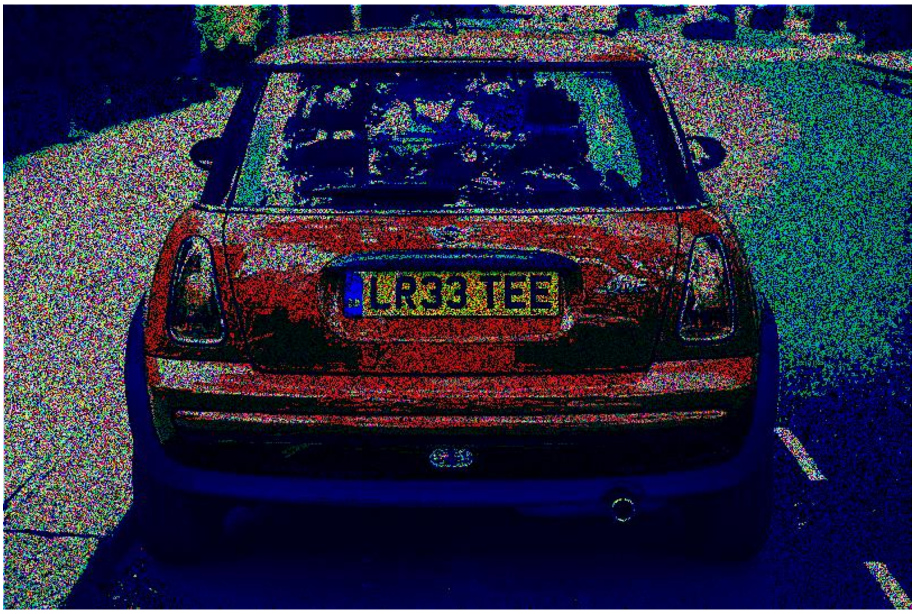


Fig 4.2 – Colour - Hysteresis Thresholding

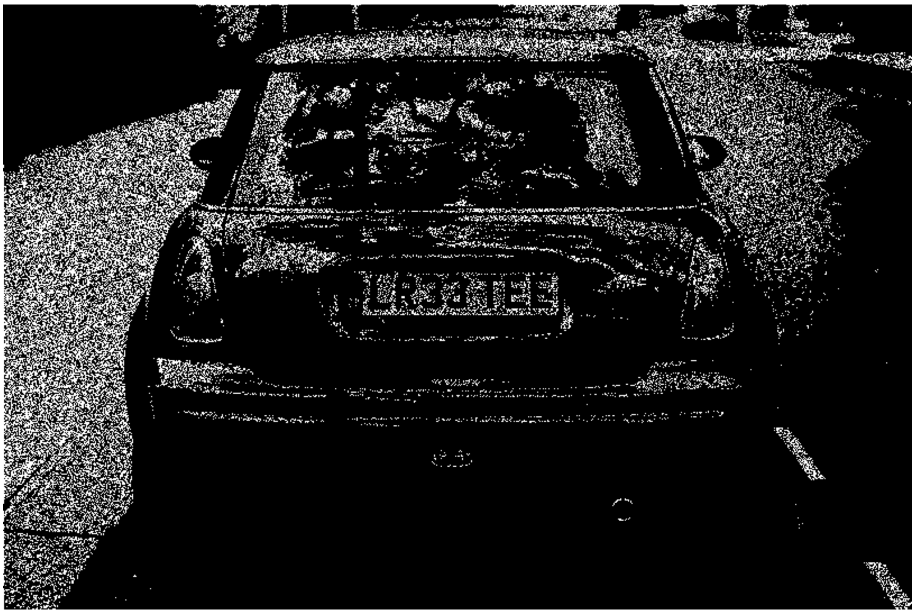


Fig 4.3 – Binary - Hysteresis Thresholding

Majority Filter

On the other hand, Majority Filter which could be seen below in Fig 4.4, removed large blobs that I was experiencing earlier which improved the clarity although it also removed some important pixels which resulted in cutting from the plate surround as well as crossed slightly over the letter R thus not perfect neither. The vast improvement came from getting rid of unwanted grain amount and making the letters more readable. The method was achieved by creating a loop to iterate though the image while inserting a sliding window through the pixels. This is an effective method! Total number of clusters 4 – 216, 327, 2705 and 27 pixels.

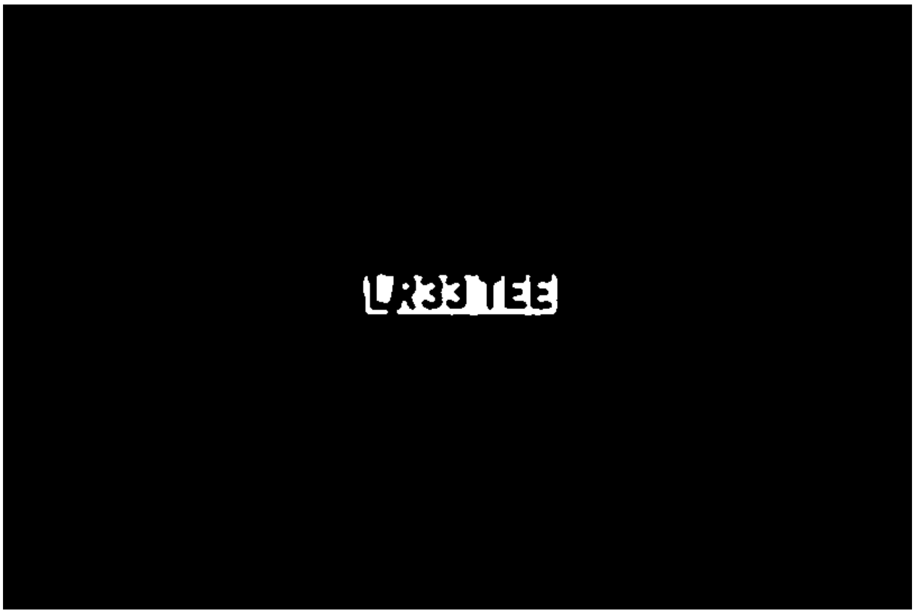


Fig 4.4 – Majority Filter