License Plate Recognition

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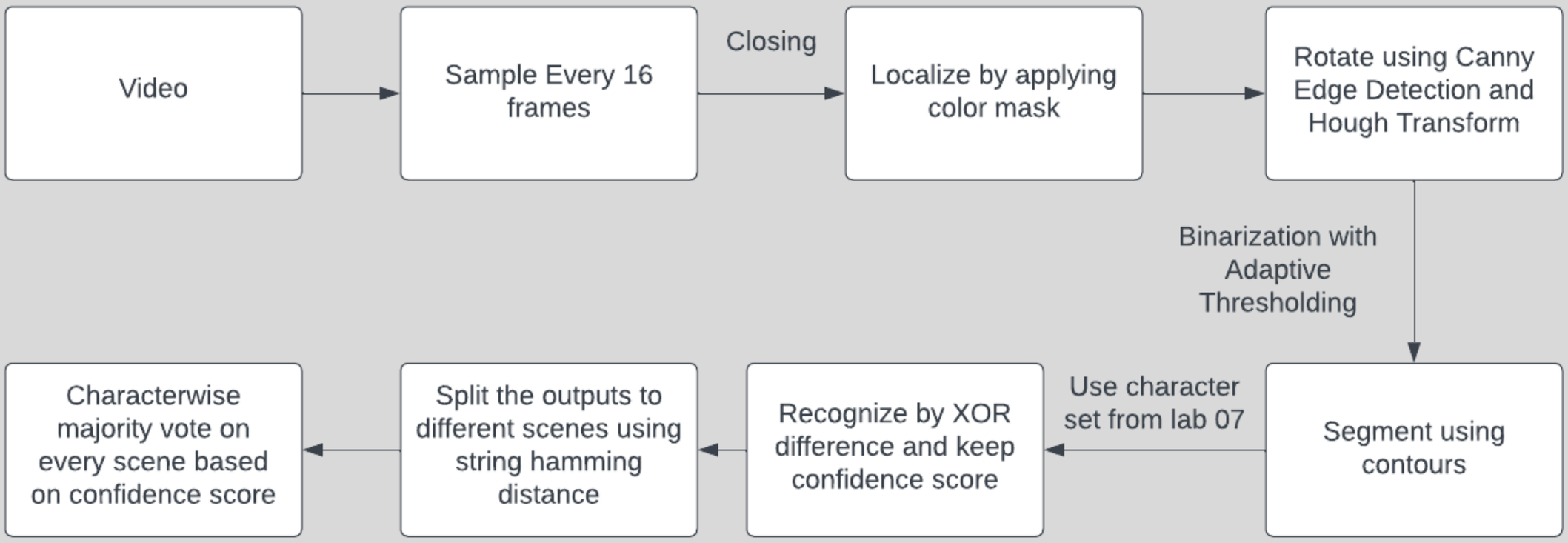
Pipeline Chart



Evaluation on the training video

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RESULTS:
                              Category I    Category II   Category III    Category IV         Total
          True positives(TP) [ 28.          93.33333333  10.          100.           1.
  10.           0.           0.          39.          65.        ]
         False positives(FP) [1. 0. 0. 0. 8. 0. 0. 0. 9. 0.]
         False negatives(FN) [  1.          3.33333333   0.           0.           2.
  20.          10.         100.          13.          21.66666667]
 Too late true positives(LTP) [0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
----------------------------------------------------
                       Score [0.93333333 1.         0.09090909 0.         0.         0.
 0.         0.         0.63934426 0.        ]
    Score of Category I & II: 0.95
```

Outcome of evaluation.py

Edge Cases

The handling of edge cases in character recognition, such as confusion of an 8 for a B, is the responsibility of the weighted majority voting. Since most of the time, more than a single prediction is made for the same character instance, there is more room for differentiating morphological details between morphologically similar characters.

Scene Transitions and Majority Voting

We process the entire video at once and keep all the necessary data for each frame. Afterwards, we calculate the hamming distance of every pair of adjacent results and define a transition as a hamming distance greater than 2. When we detect the start and the end of a scene, we implement majority voting for all the frames of that scene.

For the purpose of achieving higher plate recognition accuracy, we are considering many prediction instances of the same plate. After making as many plate predictions as possible and having saved the XOR difference scores for every character prediction, weighted majority voting is performed for every character according to the XOR difference scores.

Future Improvements

The two greatest weaknesses of our system are the quality of the cropped plates after rotation and the lack of localization of international license plates. These issues prevent us from recognizing plates of categories III and IV. In the future, implementing different rotation algorithms and using Canny Edge Detection for localization can help boost the performance of our system.