Traffic Sign Detection for Vision-based Driver Assistance in Land-based Vehicles

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Motivation

Autonomous vehicle has been an active area of research for a few decades. Intensive research has been done on using a front viewing camera for vehicle localization and navigation, environment mapping, and obstacle avoidance.

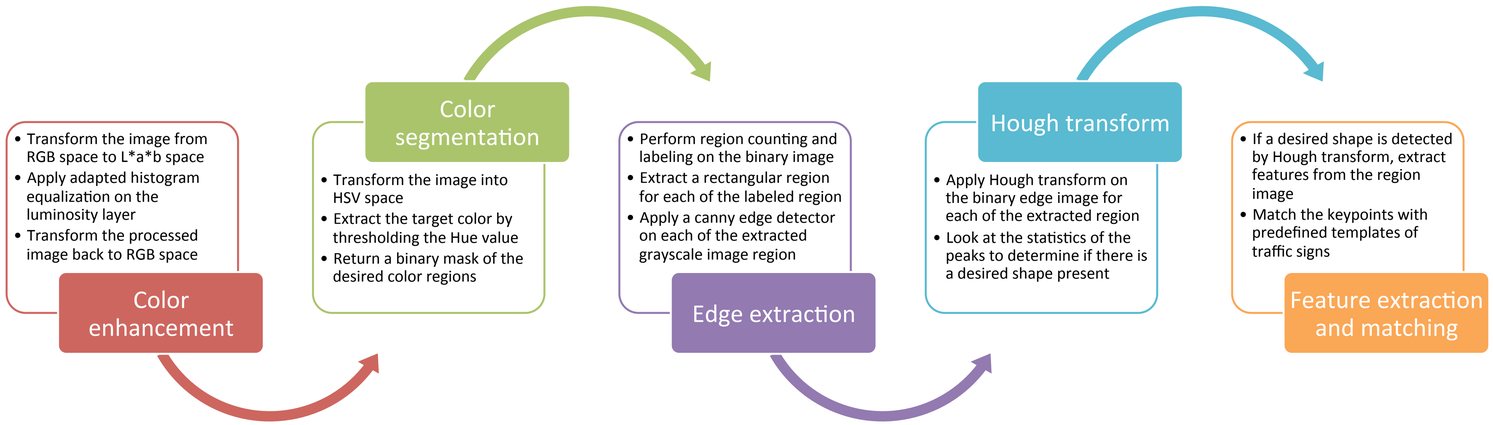
Objectives

- Fast: can be implemented in real time
- Low-cost: does not require high quality camera
- Accurate: low false-positive rate
- Robust: invariant to illumination, orientation, partial blockage, etc.

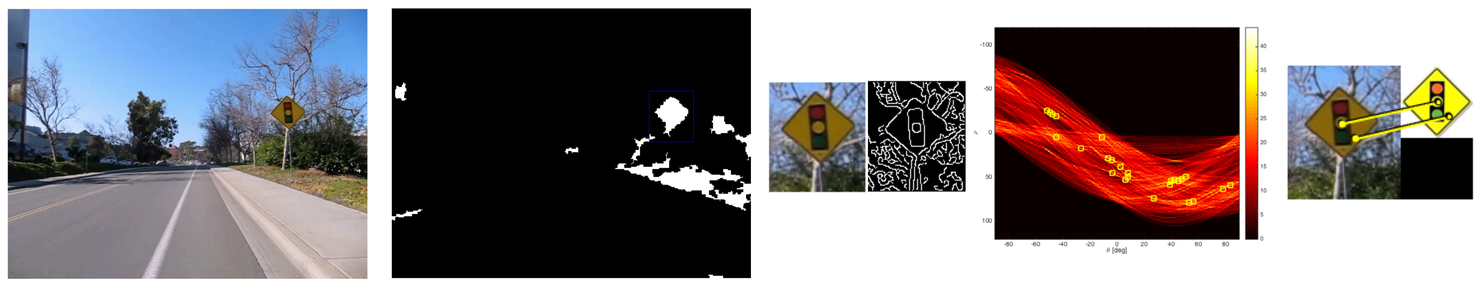
Related Work

- **Color-based methods**
  - RGB space thresholding [Estevez and Kehtarnavaz, 1996]
  - HSI space thresholding [Kuo and Lin, 2007]
  - HSV space thresholding [Paclik et al., 2000]
- **Shape-based methods**
  - Hough transform [Garcia-Garrido, 2005], [Barrile, 2012]
  - Gradient-based centroid voting scheme [Loy, 2004]
- **Learning-based methods**
  - AdaBoost and Haar-like classifiers [Viola and Jones, 2001]

Image Processing Algorithm



Result and Conclusion



- Illumination condition is the key factor in color segmentation step
- Complexity of background results in outliners in Hough transform
- Low resolution is the main difficulty for accurate feature matching
- Machine-learning technique can potentially improve the detection result