LICENSE PLATE DETECTION

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INTRODUCTION

• The goal is to detect license plates and correctly recognize the characters on the plate.
PREVIOUS WORK

• ALGORITHMIC AND MATHEMATICAL PRINCIPLES OF AUTOMATIC NUMBER PLATE RECOGNITION SYSTEMS - ONDREJ MARTINSKY – BRNO

• Local Enhancement of Car Image for License Plate Detection - V. Abolghasemi and A. Ahmadyfard – EUSIPCO at Poland 2007

• AutoVu by Genetec – Provides ALPR cameras for law enforcement, commercial organizations, etc.
ASSUMPTIONS / CONSTRAINTS

• Minimal glare on image and camera lens
• Minimal distractor objects
• Sufficient lighting of vehicle
• Plate located ~1m from the camera
• US License plates
TASKS

• License Plate Localization
  • Isolating the plate from the rest of the image

• Character Segmentation
  • Extracting characters images of interest

• Optical Character Recognition
  • Translate captured image into alpha-numeric text
LICENSE PLATE LOCALIZATION

• Convert image to BW
• 5x5 median filter to reduce noise
• Erosion / dilation by ‘disk’ structuring element – difference
• Convolve image with 2x2 box to enhance edges
• Intensity scale and adjust contrast
• Dilation by ‘line’ structuring element – horizontal and vertical
• Regionprops ➔ BoundingBox criteria ➔ crop plate
LICENSE PLATE LOCALIZATION
LICENSE PLATE LOCALIZATION
CHARACTER SEGMENTATION

- Convert image to BW
- 5x5 median filter to reduce noise
- Open by ‘disk’ structuring element
- Regionprops → BoundingBox criteria
  - Alignment
  - Grouping
  - Width / height ratios
- Crop characters images
CHARACTER SEGMENTATION
OPTICAL CHARACTER RECOGNITION

• Create database of license plate characters
• Create templates of all characters → cell image
• Resize characters to match template
• Normalized two-dimensional cross-correlation
• Find coordinates of highest correlation
• Case structure to match coordinates with corresponding character
OPTICAL CHARACTER RECOGNITION
OPTICAL CHARACTER RECOGNITION

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DISCUSSION

• Achievements
  • Recognizing characters on detected plate with given assumption and contraints

• Limitations
  • Plate detection
  • Image resolution
FUTURE WORK

• Detect multiple license plates in an image

• Create version to run in real time

• Tweak algorithm to ignore distractor objects