

# ICT Virtual Organization of ASEAN Institutes and NICT (ASEAN IVO)

### SVD Based Document Image Recognition System for Vehicle Identification

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#### Introduction

#### Document Images

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Text



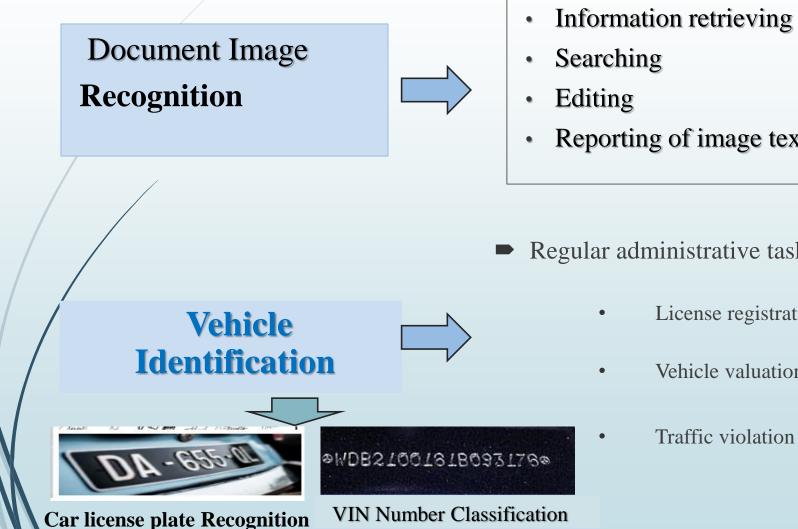
Car license plate







# **Document Image Recognition**



- Reporting of image text

- Regular administrative tasks such as
  - License registration,
  - Vehicle valuation assessment,
    - Traffic violation cases









# **Vehicle Identification**

VIN Number Classification

@WDB21001818093178@

#### **Car license plate Recognition**

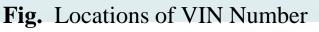
- Religious Personal
- Hire Vehicle
- Health and Safety Executive
- Tourist Vehicle
- Private vehicle
- Ambassador

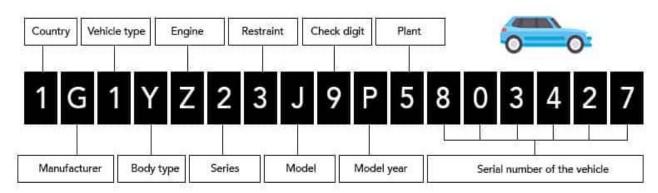














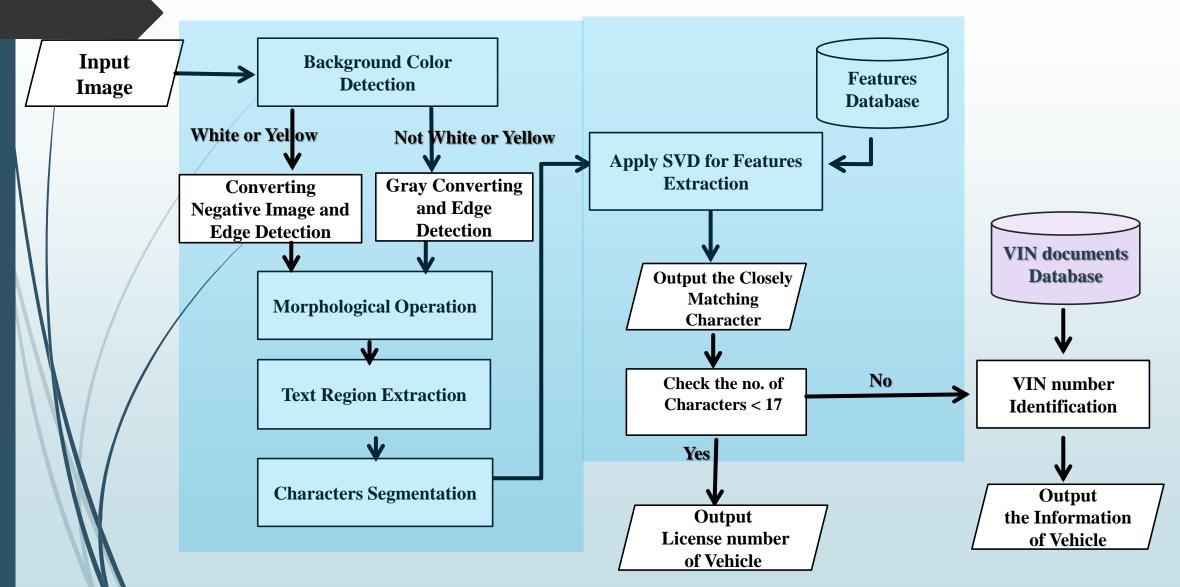


# **Objectives**

- To improve the vehicle registration plates recognition result and VIN classification result.
  - To generate the Chassis image database.
  - To create the image database by the several types of vehicle registration plates of Myanmar.
  - To implement the automatic Vehicle identification Model.



### **System Overview**



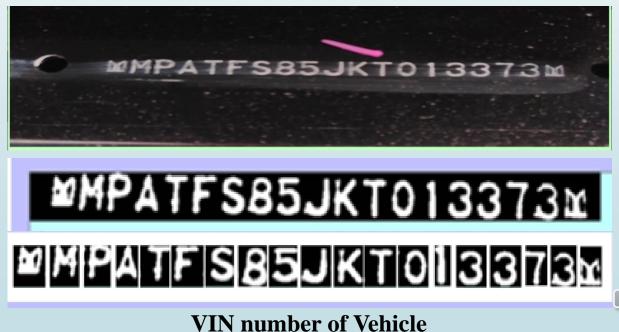
# **System Implementation**

#### Algorithm of Character Segmentation

- 1. Binarization to the input image.
- 2. Created objects count (White Pixel) histogram along the width of the image.
- 3. Find the starting and ending points of each adjacent nonzero area.
- 4. Crop each character according to the result of step(3).
- 5. Temporary save these cropped character images in local disk for feature calculation process.



License number of Vehicle



#### **Feature Matching and Classification**

The operation procedure is as follow:

- 1. Create data matrix, say 'A'
- 2. Apply SVD,  $A = U \sum V^T$
- 3. Compute feature descriptor matrix,  $H = \sum V^T$
- 4. Given a test vector 'a' and compute  $a^T U$
- 5. Repeat  $a^T U$  to match the dimension  $H = \sum V^T$
- 6. Find the minimum of  $|| remap (a^T U, size(H, 2)) H) ||$  to get the desired class.



# **Experimental Result**



Fig.(a). Illustration of the Character Recognition (License plate)

#### Table.1. VIN number information

| VIN Number = MPATFS85JKT013373 |                   |            |  |
|--------------------------------|-------------------|------------|--|
| 1                              | Brand             | ISUZU      |  |
| 2                              | Vehicle Type      | Double Cab |  |
| 3                              | Model Year        | 2019       |  |
| 4                              | Country of Origin | Thailand   |  |



Fig.(b). Illustration of the Character Recognition (VIN)

#### Table.2. Accuracy Rate

|   | Test Item     | Accuracy |
|---|---------------|----------|
| 1 | License Plate | 99.6%    |
| 2 | VIN           | 98.7%    |

### Conclusion

- A vehicle identification system is developed for the need of actual requirement in Myanmar.
- According to the implementation and results, we can say that the system can truly crop the interested text area and segmented each character.
- This proposed model applied to both vehicle number recognition and VIN number identification.
- Furthermore, car information management system can easily be added for more information about inspected vehicle.
- Currently, recognition process is only available in offline. The real time vehicle examination and identification systems should be done by using available the network and web camera in future.





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