# EECS442 Final Project Presentation
# License Plate Recognition

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# Introduction: License Plate recognition

**- Application**

- Check plate registration status by police forces
- Electronic toll collection
- Parking lot fee collection

- **Example vehicle image**


# Method summary





**CNN prediction**

**819KXH75**

# Method – Plate Localization and Extraction

- **Edge detection to remove unnecessary information**

❑ Apply two kernels horizontally and vertically

❑ Filter pixels by defining a threshold

- **Calculate histogram to extract the plate**

❑ Calculate column-wise and row-wise difference

❑ Calculate horizontal and vertical histogram by defining a threshold

❑ Traverse histogram to get pairs of starting points and ending points

❑ Choose start and end points with largest difference (length)

# Method – Character Segmentation

- **Calculate the column weight(sum) to do horizontal segmentation**

❑ Large color difference(black and white) between character and the space in the middle of the two characters

- **Calculate the row weight(sum) to do vertical segmentation**

❑ Set the top and bottom boundaries for each character

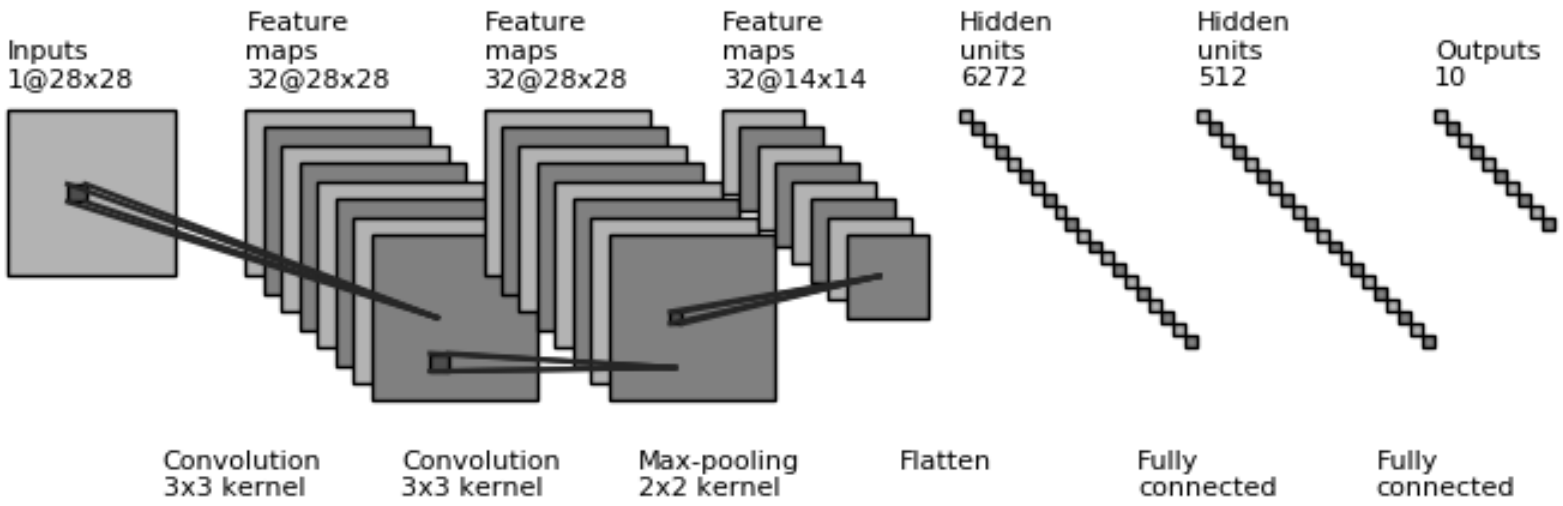
- **Use the character feature to further remove the noise**

❑ The ratio of row to column sits in a specific range (0.5 – 2.0)

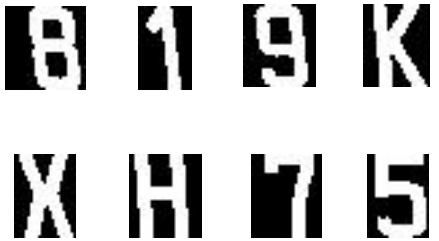
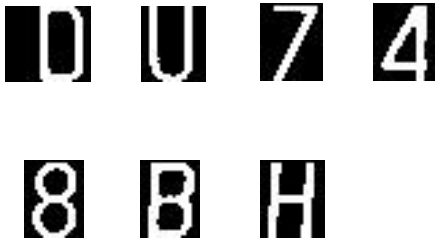
❑ The ratio of the sum of character matrix to its (row * column) is greater than some threshold value( > 0.1)

# Method – Character Recognition

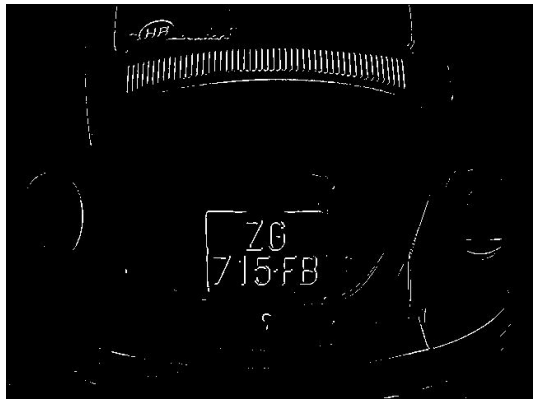
- EMNIST – an extension of MNIST dataset
- trained on 131,600 characters, 47 balanced class
- 87.33% accuracy on EMNIST test data



# Results – Good example

| Original Images | After Extraction | After Segmentation | Recognition Result |
|---|---|---|---|
|  |  |  | 819KXH75 |
|  |  |  | 0U748BH |

# Results – Bad Example

| Original Images | After Edge Detection | After Extraction | Recognition Result |
| --- | --- | --- | --- |
|  |  |  | N/A |
|  |  |  | N/A |

# Discussion and Improvements

- Rotation and illumination invariant for extraction
- Remove noise for extraction and segmentation
- Improve accuracy for CNN recognition (R-CNN, better models)

# Conclusion

- Implement a typical algorithm for license plate recognition
- Good results for extraction and segmentation
- Accuracy for recognition need to be improved

For any questions or concerns, feel free to contact:

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