

Hand Gesture Recognition Using Convolutional Neural Network for People Who Have Experienced A Stroke

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Outline:

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Illustrated framework of system
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Experimental Method

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The dataset used for the implementation

✓ Simple hand signs cards

✓ Three examples for seven universal common hand gestures for three different hands post extraction

✓ CNN Implementation

Parameters Comparison

✓ CNN for Training & Testing

Conclusion & Future work

The motivation of this study

- To develop a new gesture model to help stroke patient (Paraplegia).

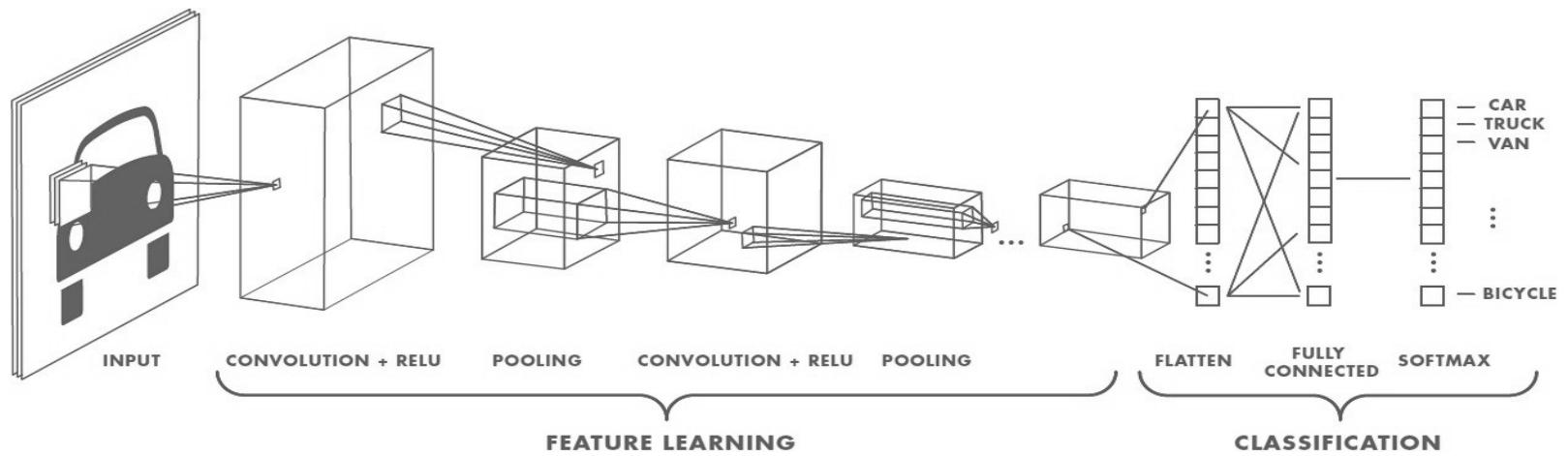


Illustrated framework of system Implementation



Convolutional Neural Network

- CNN is one of deep learning methods.
- CNN topology is created in 7 layers:
 - *ImageInputLayer*
 - *Convolution2DLayer* -
 - *ReLU**Layer*
 - *MaxPooling2DLayer*
 - *FullyConnectedLayer*
 - *SoftmaxLayer*
 - *ClassificationOutputLayer*



Simple hand signs cards



Simple hand signs cards (1)

Dataset used for the implementation

- 20 Participants
- 7 Gestures
- 140 Videos in total
- 24,698 extracted images



a) Drink



a) Drink



a) Drink



b) Eat



b) Eat



b) Eat



c) Good\\Bravo



c) Good\\Bravo



c) Good\\Bravo



d) Stop



d) Stop



d) Stop



e) That



e) That



e) That



f) Close



f) Close



f) Close



g) Family



g) Family

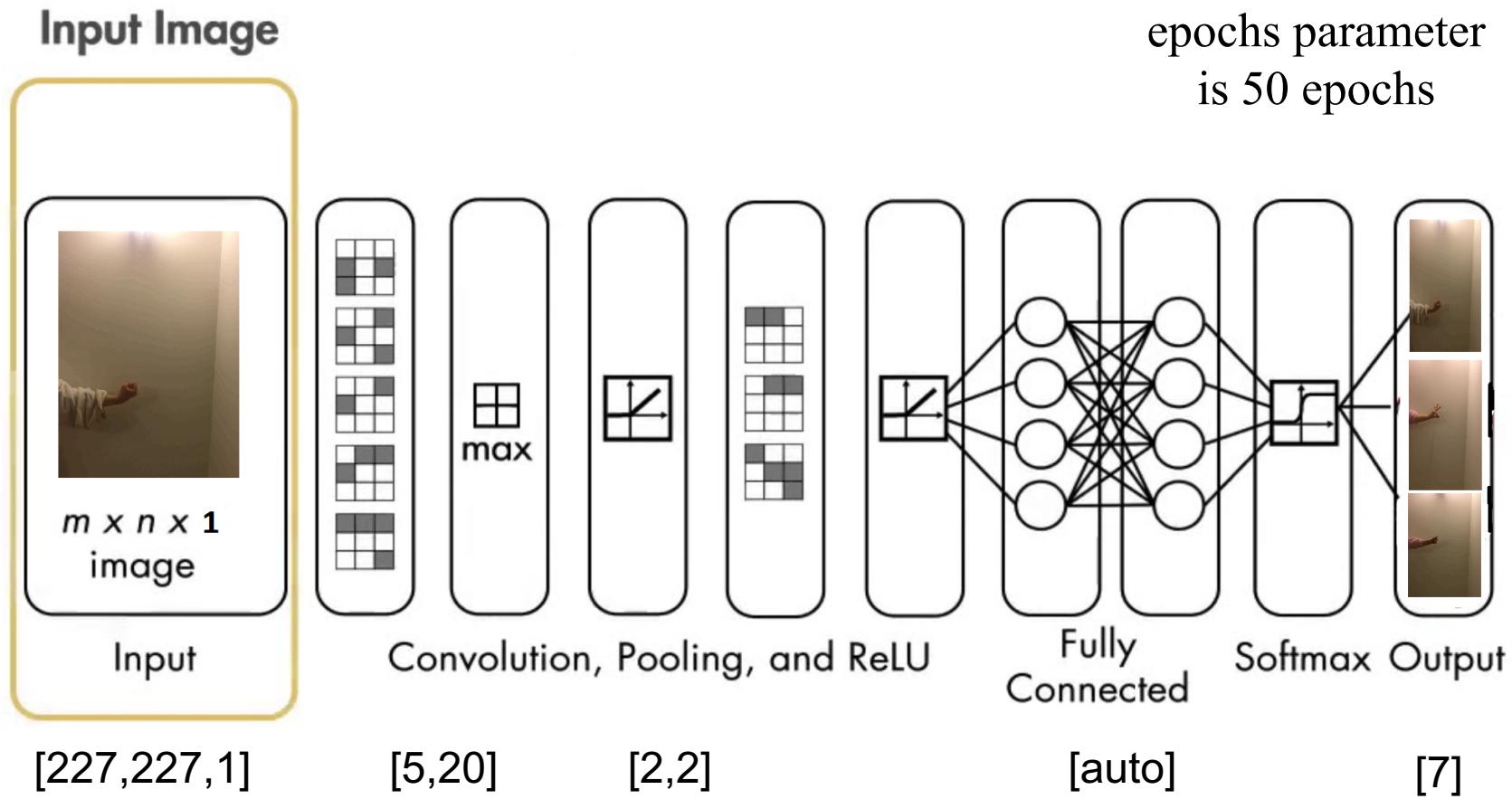


g) Family

Three
examples for
seven
universal
common hand
gestures for
three different
hands post
extraction



CNN Implementation



Parameters for Comparison

Execution time

Sensitivity

Specificity

The Positive Predictive Value

Positive Likelihood (LR+)

Negative Predictive Value

Negative Likelihood (LR-)

CNN for Training & Testing

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TABLE I. CNN TRAINING AND TESTING APPROACH

Factors	CNN	
	<i>Training</i>	<i>Testing</i>
Exe Time ± SD (sec)	15,598± 244.9784	15,598± 244.9784
Accuracy ± SD	1± 0	0.9912± 0.0086
Sensitivity ± SD	1± 0	0.9934±0.0042
Specificity ± SD	1± 0	0.9989±0.0023
Positive Predictive Value (PPV) ± SD	1± 0	0.9934±0.0040
Negative Predictive Value (NPV) ± SD	1± 0	0.9989±0.0021
Positive Likelihood (LR+) ± SD	1± 0	884.4175±37.5328
Negative Likelihood (LR-)± SD	1± 0	0.0066±1.7920
RMS ± SD	1± 0	1± 0

Conclusion& Future Work

- The results of this experiment show the capabilities of CNN method (2).
- In future work, the number of gestures will be extended to ten common gestures using 3-D Holoscopic imaging technique camera.

References

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2. N. Alnaim and M. Abbod, “Mini gesture detection using neural networks algorithms,” *Search the world's largest collection of optics and photonics applied research.*, 15-Mar-2019. [Online]. Available: <https://www.spiedigitallibrary.org/conference-proceedings-of-spie/11041/1104121/Mini-gesture-detection-using-neural-networks-algorithms/10.1117/12.2522790.short?SSO=1>.

Thank you for Listening



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