INSULTING HAND GESTURE DETECTOR PROJECT

OUR TEAM

Nuttapol
Onton
6330166021

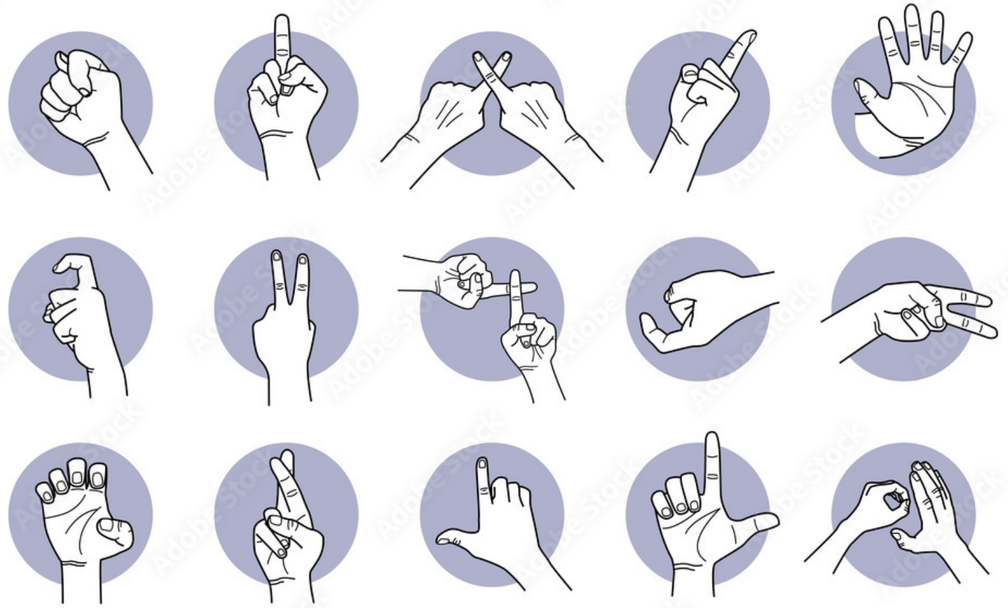
Natchapon
Chitturongaporn
6330148721

CONTENT

INTRODUCTION

INSULTING HAND GESTURE DETECTOR

The objective of this project is to identify the middle finger hand gesture in real-time camera feeds and implement a censorship mechanism to obscure the gesture before the content is uploaded to social media platforms.



IMPLEMENTATION & TECHNIQUES

IMPLEMENTATION

Leveraging MediaPipe hand detection, we identify hands and capture the precise finger positions. This information is then integrated into a rules-based classifier in the subsequent stage.

HAND DETECTION

Applying a rules-based classification approach involves determining whether each image represents a middle finger hand gesture by analyzing the finger positions obtained from hand detection.

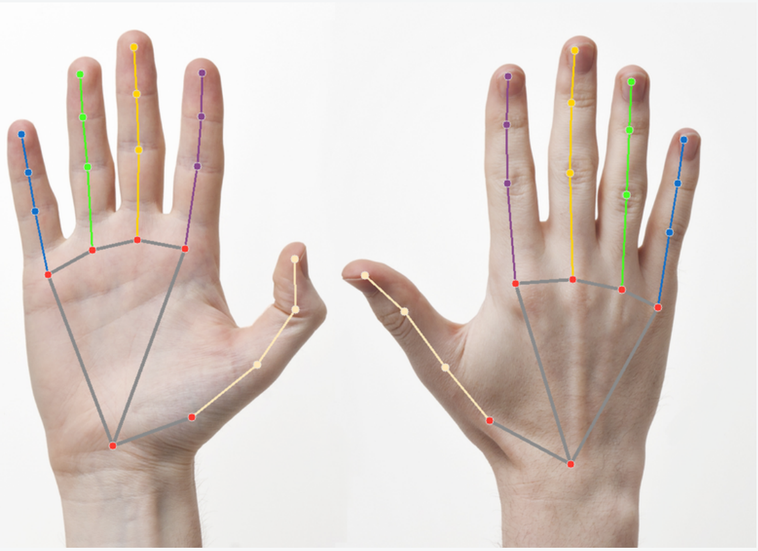
HAND CLASSIFIER

Apply Gaussian blur to images featuring a middle finger hand gesture as identified through the classification process.

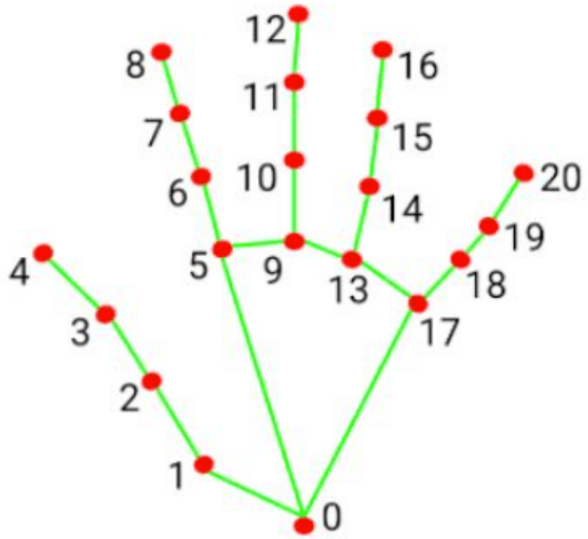
BLUR IMAGE

HAND DETECTION

MEDIA PIPE



Hand Land Marks

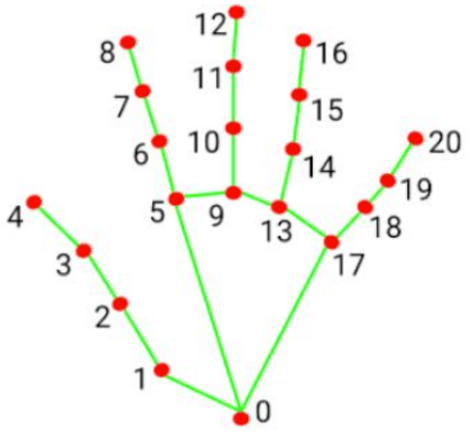


0. WRIST
1. THUMB_CMC
2. THUMB_MCP
3. THUMB_IP
4. THUMB_TIP
5. INDEX_FINGER_MCP
6. INDEX_FINGER_PIP
7. INDEX_FINGER_DIP
8. INDEX_FINGER_TIP
9. MIDDLE_FINGER_MCP
10. MIDDLE_FINGER_PIP
11. MIDDLE_FINGER_DIP
12. MIDDLE_FINGER_TIP
13. RING_FINGER_MCP
14. RING_FINGER_PIP
15. RING_FINGER_DIP
16. RING_FINGER_TIP
17. PINKY_MCP
18. PINKY_PIP
19. PINKY_DIP
20. PINKY_TIP

HAND CLASSIFICATION

RULES-BASED CLASSIFICATION

Hand Land Marks



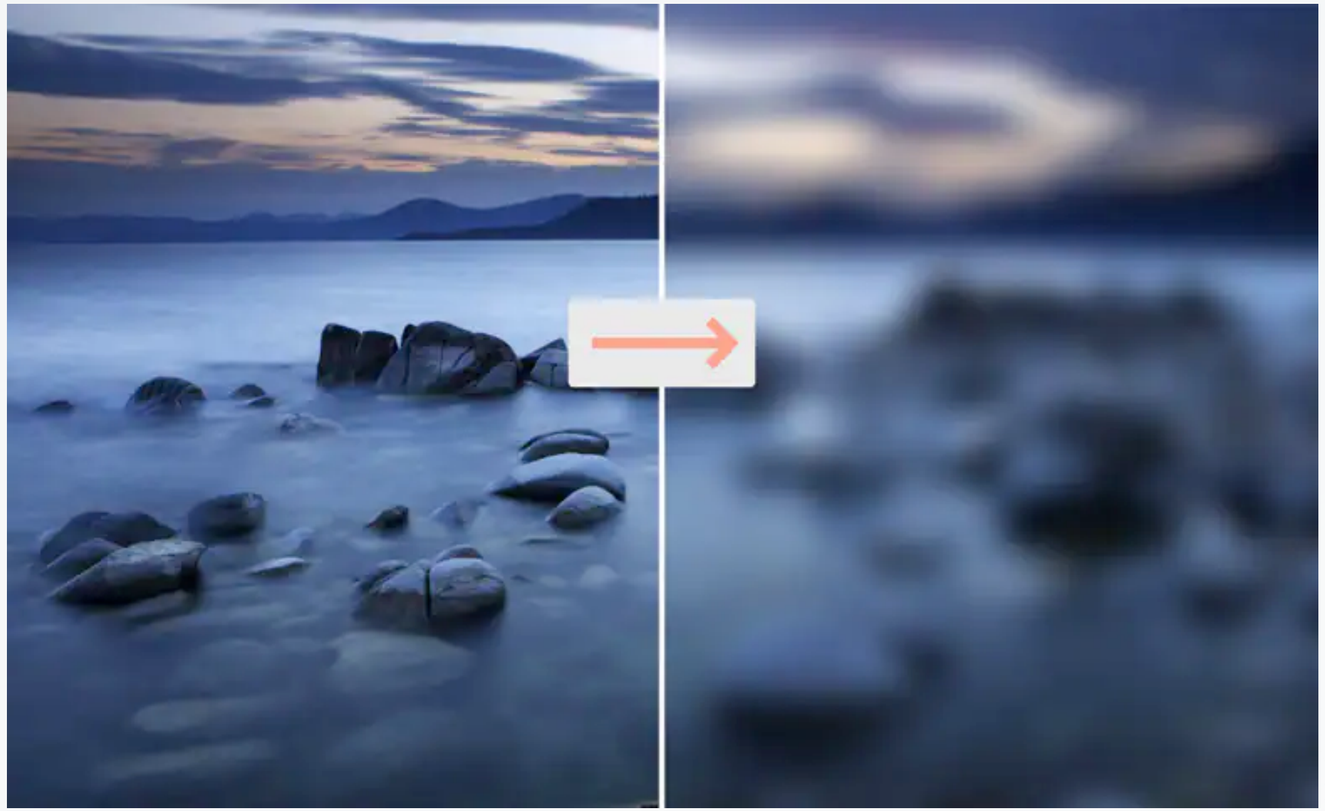
0. WRIST
1. THUMB_CMC
2. THUMB_MCP
3. THUMB_IP
4. THUMB_TIP
5. INDEX_FINGER_MCP
6. INDEX_FINGER_PIP
7. INDEX_FINGER_DIP
8. INDEX_FINGER_TIP
9. MIDDLE_FINGER_MCP
10. MIDDLE_FINGER_PIP
11. MIDDLE_FINGER_DIP
12. MIDDLE_FINGER_TIP
13. RING_FINGER_MCP
14. RING_FINGER_PIP
15. RING_FINGER_DIP
16. RING_FINGER_TIP
17. PINKY_MCP
18. PINKY_PIP
19. PINKY_DIP
20. PINKY_TIP

finger_length = | TIP - MCP |
std_length = middle_length / 2

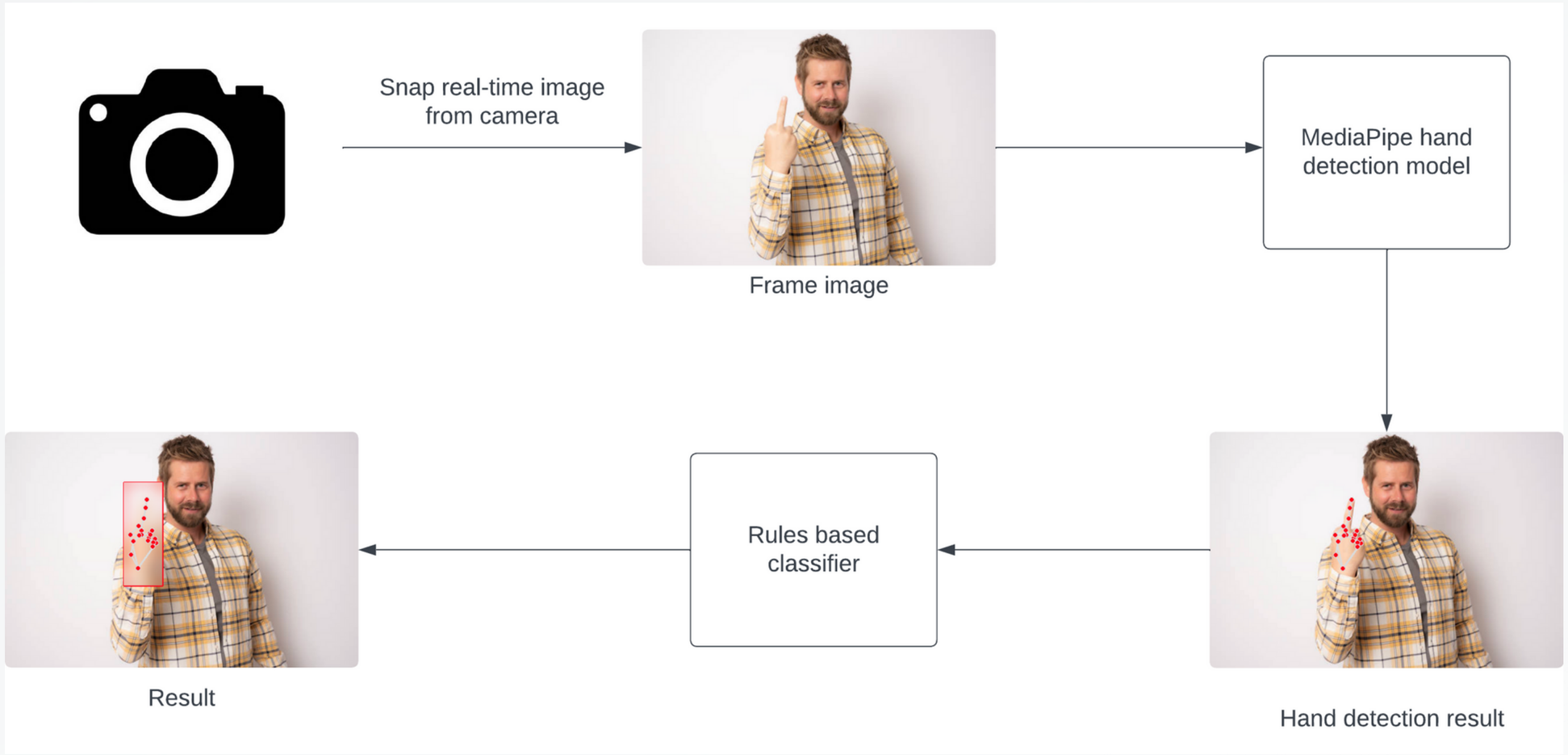
Condition :
If std_length > index_length and
std_length > ring length and
std_length > pinky_length

HAND CLASSIFICATION

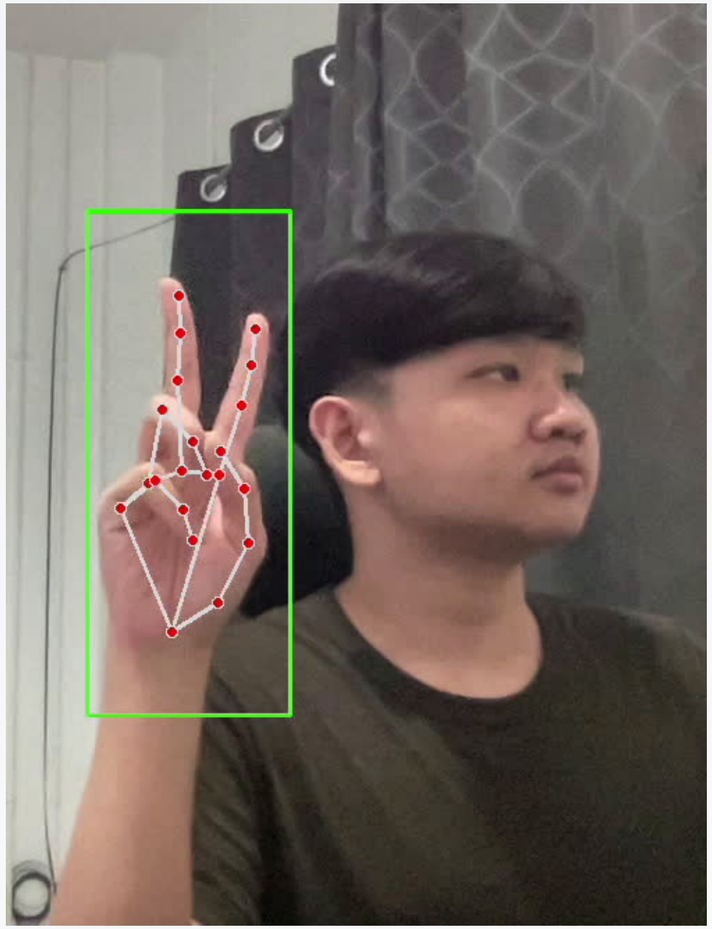
GAUSSIAN BLUR



DATA PIPELINE



DEMO



RESULT & ANALYSIS

RESULT

Datasets

1. Hand Dataset on Kaggle
2. HOD Benchmark Dataset on GitHub

Non-insulting hand gestures

- 150 images

Insulting hand gesture

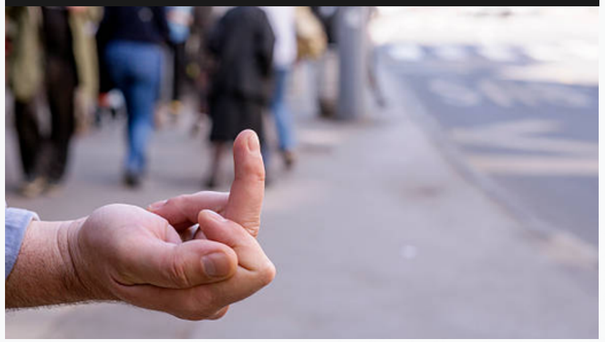
- Hard case
  - 50 images
- Normal case
  - 100 images

Insulting hand gesture

Insulting hand gesture

Normal case

Insulting hand gesture



Hard case

RESULT

Hard case (50 + 50)

- Accuracy : 0.79
- Confusion Matrix

TP : 50	FP : 0
FN : 21	TN : 29

- Classification Report

	precision	recall	f1-score	support
0	0.70	1.00	0.83	50
1	1.00	0.58	0.73	50
accuracy			0.79	100
macro avg	0.85	0.79	0.78	100
weighted avg	0.85	0.79	0.78	100

RESULT

Normal case (100 + 100)

- Accuracy : 0.855
- Confusion Matrix

TP : 100	FP : 0
FN : 29	TN : 71

- Classification Report

	precision	recall	f1-score	support
0	0.78	1.00	0.87	100
1	1.00	0.71	0.83	100
accuracy			0.85	200
macro avg	0.89	0.85	0.85	200
weighted avg	0.89	0.85	0.85	200

RESULT

All case (150 + 150)

- Accuracy : 0.833
- Confusion Matrix

TP : 150	FP : 0
FN : 50	TN : 100

- Classification Report

	precision	recall	f1-score	support
0	0.78	1.00	0.87	100
1	1.00	0.71	0.83	100
accuracy			0.85	200
macro avg	0.89	0.85	0.85	200
weighted avg	0.89	0.85	0.85	200

ANALYSIS

Cons

- Side view hand gesture
- Blur image
- Wear glove
- low resource for black skin hand

Pros

- High Accuracy
- no FN (False Negative)

Q&A