

Lie Detection via Micro Expression

2025.05.23

ISOO

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-

1. Background

1. Background

- What is micro-expression?

: A micro-expression is a facial expression that only lasts for a short moment.

Human emotions are an unconscious biopsychosocial reaction that derives from the amygdala and they typically last 0.5–4.0 seconds, although a micro-expression will typically last less than 1 second.^[1]

*amygdala: 편도체



1. Background

- What is micro-expression?



















: A micro-expression is a facial expression that only lasts for a short moment.





















1. Background

- What is AU(Action Unit)?

: 얼굴 근육을 기반으로 얼굴 표정을 분석하기 위해 사용되는 얼굴 근육 동작 단위

AU 9	AU 10	AU 11	AU 12	AU 13	AU 14
					
Nose Wrinkler	Upper Lip Raiser	Nasolabial Deepener	Lip Corner Puller	Cheek Puffer	Dimpler
AU 15	AU 16	AU 17	AU 18	AU 20	AU 22
					
Lip Corner Depressor	Lower Lip Depressor	Chin Raiser	Lip Puckerer	Lip Stretcher	Lip Funneler
AU 23	AU 24	*AU 25	*AU 26	*AU 27	AU 28
					
Lip Tightener	Lip Pressor	Lips Part	Jaw Drop	Mouth Stretch	Lip Suck

AU 1	AU 2	AU 4	AU 5	AU 6	AU 7
					
Inner Brow Raiser	Outer Brow Raiser	Brow Lowerer	Upper Lid Raiser	Cheek Raiser	Lid Tightener
*AU 41	*AU 42	*AU 43	AU 44	AU 45	AU 46
					
Lid Droop	Slit	Eyes Closed	Squint	Blink	Wink
AU 1+2	AU 1+4	AU 4+5	AU 1+2+4	AU 1+6	AU 6+7
					

[Action Unit 정의 예시]

2. Motivation & Goal

2. Motivation & Goal

← FER

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Competitions 9 Hugging Face Models 3

Filter by

572 Results

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DATE

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☐ This week 2

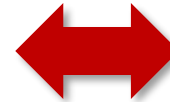
CREATOR

☐ You 0

☐ Others 572

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FER datasets in kaggle



← micro expression

<> Notebooks 793 ← Comments 11 **Datasets 11** X Hugging Face Models 10 Topics 7

Models 2 Competitions 1

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11 Results

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☐ Last 90 days 2

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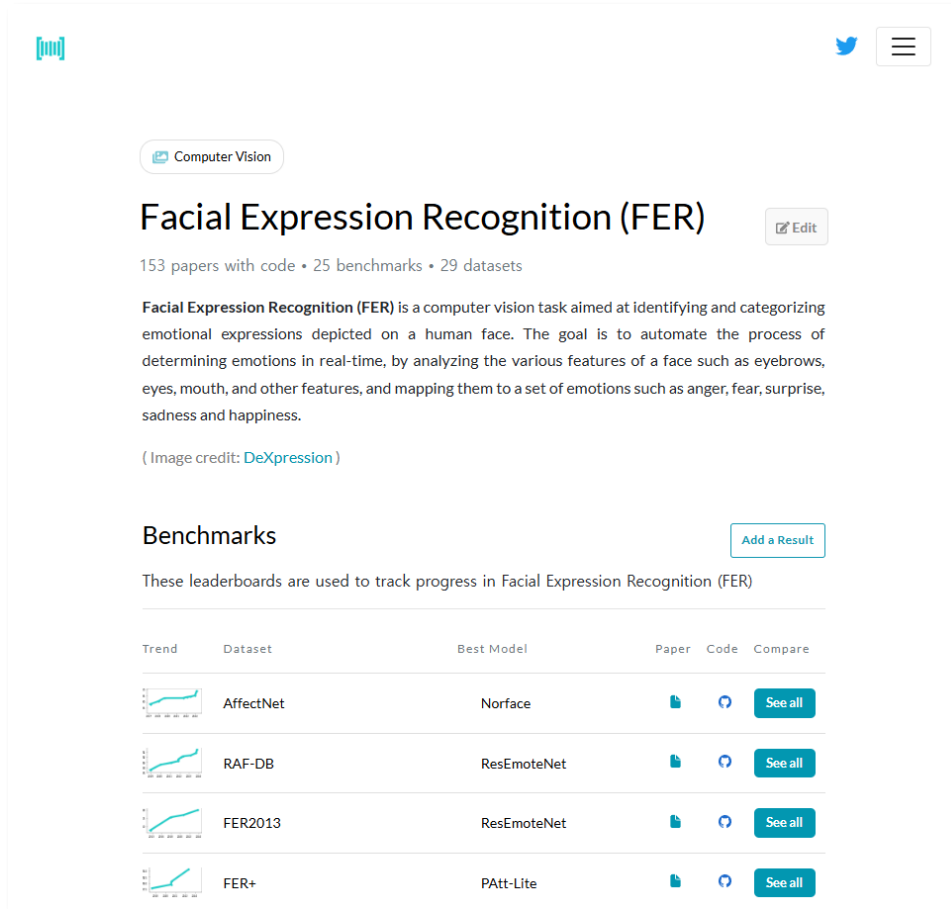
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☐ Others 11

	Micro Expression Dataset for Lie Detection Dataset · 2mo ago · by Devvrat Mathur Behavioral Analysis Micro Expression 1.	33 1,601 downloads
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	Facial Micro-Expression Recognition Dataset · 5mo ago · by Ziya Facial Micro-Expression Dataset for Emotion Recognition	4 58 downloads
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Micro-expression datasets in kaggle

2. Motivation & Goal



Computer Vision

Facial Expression Recognition (FER)

153 papers with code • 25 benchmarks • 29 datasets

Facial Expression Recognition (FER) is a computer vision task aimed at identifying and categorizing emotional expressions depicted on a human face. The goal is to automate the process of determining emotions in real-time, by analyzing the various features of a face such as eyebrows, eyes, mouth, and other features, and mapping them to a set of emotions such as anger, fear, surprise, sadness and happiness.

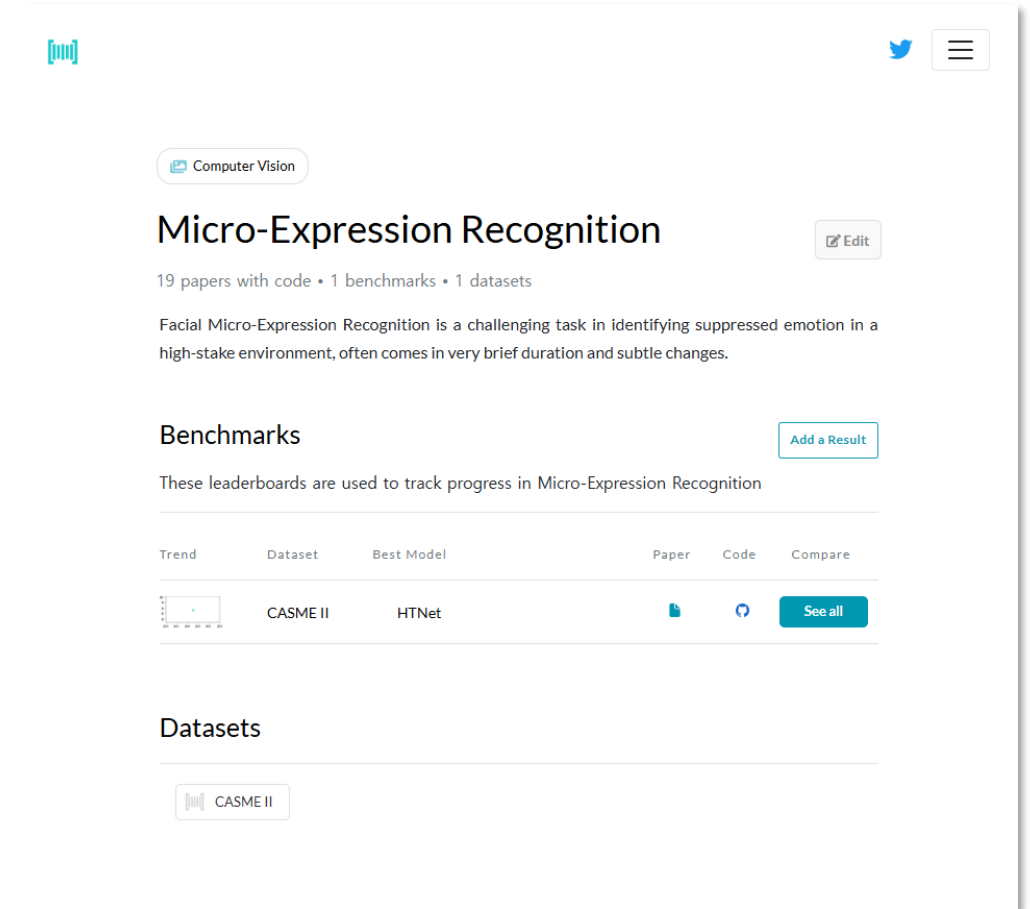
(Image credit: DeXpression)

Benchmarks

These leaderboards are used to track progress in Facial Expression Recognition (FER)

Trend	Dataset	Best Model	Paper	Code	Compare
	AffectNet	Norface			See all
	RAF-DB	ResEmoteNet			See all
	FER2013	ResEmoteNet			See all
	FER+	PAtt-Lite			See all

FER researches in paperswithcode



Computer Vision

Micro-Expression Recognition

19 papers with code • 1 benchmarks • 1 datasets

Facial Micro-Expression Recognition is a challenging task in identifying suppressed emotion in a high-stake environment, often comes in very brief duration and subtle changes.

Benchmarks

These leaderboards are used to track progress in Micro-Expression Recognition

Trend	Dataset	Best Model	Paper	Code	Compare
	CASME II	HTNet			See all

Datasets

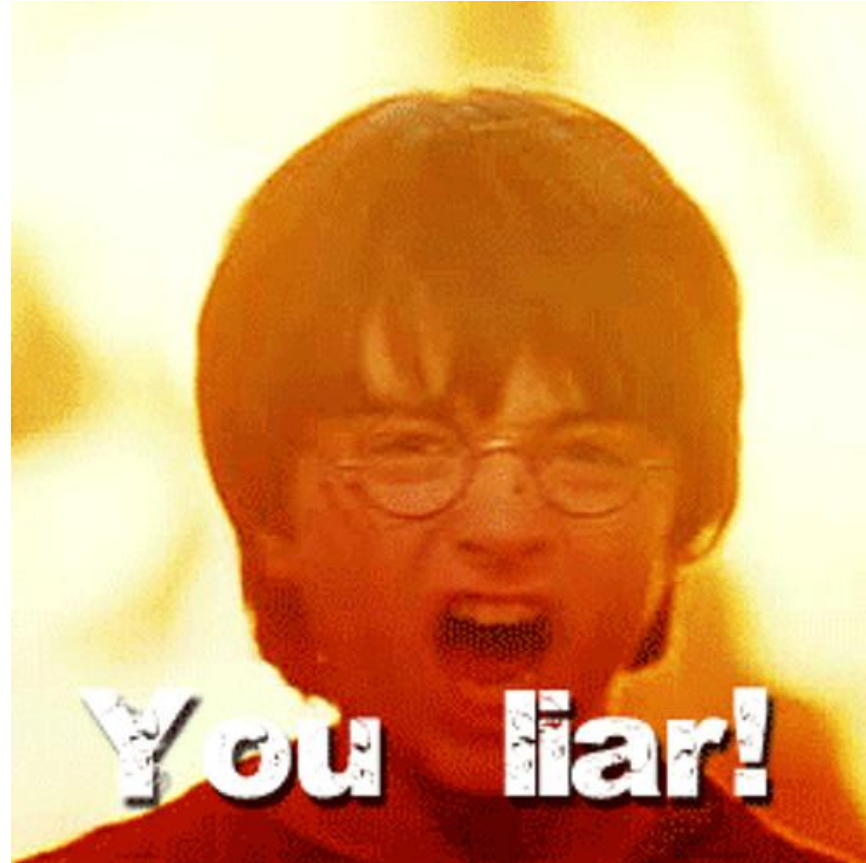
CASME II

Micro-Expression researches in paperswithcode

2. Motivation & Goal

Goal

- Detect a liar by using micro expression

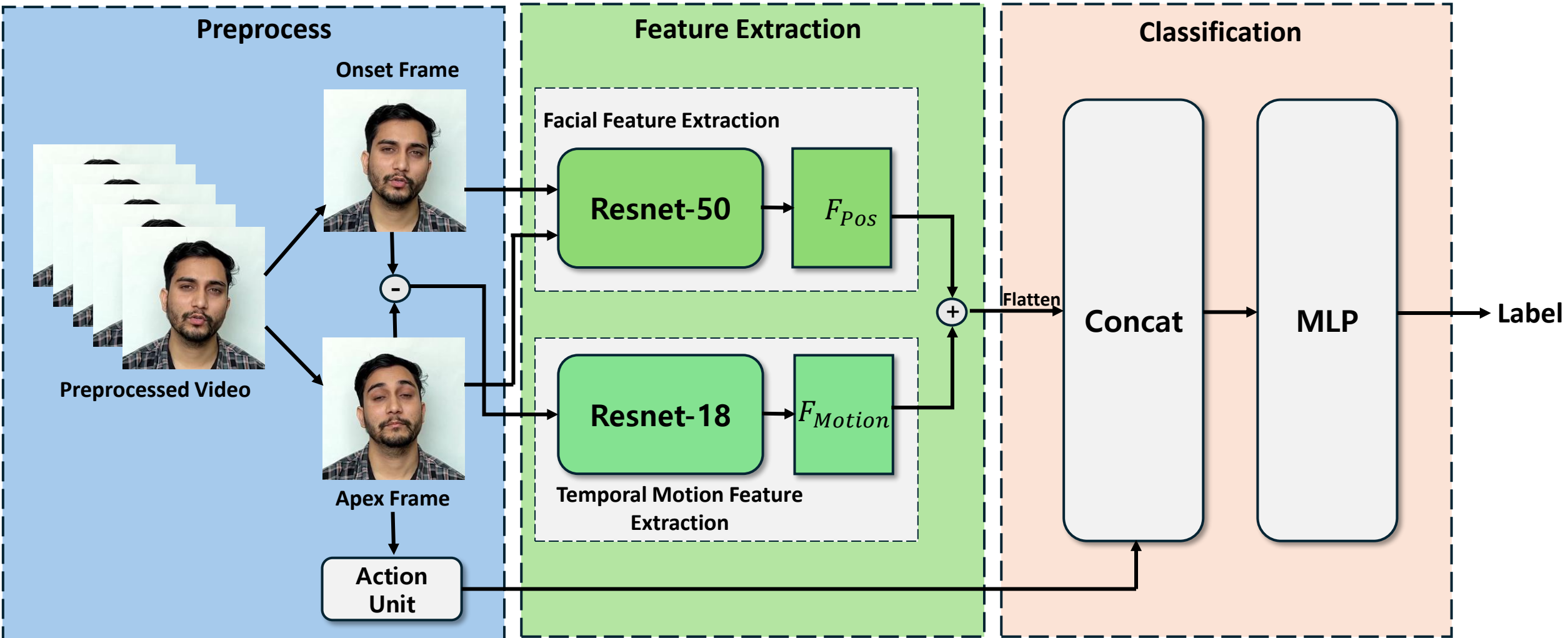


3. Ongoing Efforts & Plans

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Ongoing Efforts

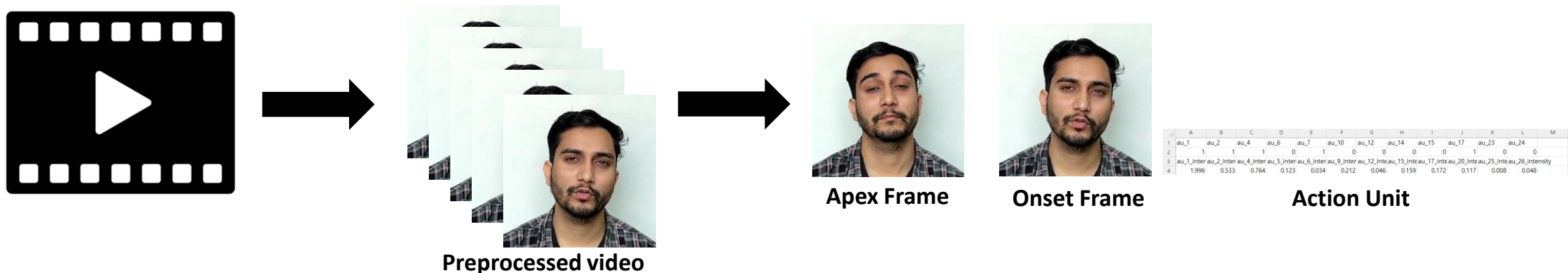
- Step: Preprocessing → Feature Extraction → Binary Classification → Evaluation
 - Preprocessing: Choose dataset and make source code for preprocessing.
 - Feature Extraction : Construct Resnet structure for FPF and TMFE.
 - Binary Classification: Make source code for binary classification with logistic regression & Find other classification methods.
 - Evaluation: Null
-



3. Ongoing Efforts & Plans

Ongoing Efforts

- Step: Preprocessing → Feature Extraction → Binary Classification → Evaluation
- Preprocessing: Choose dataset and make source code for preprocessing.



3. Ongoing Efforts & Plans

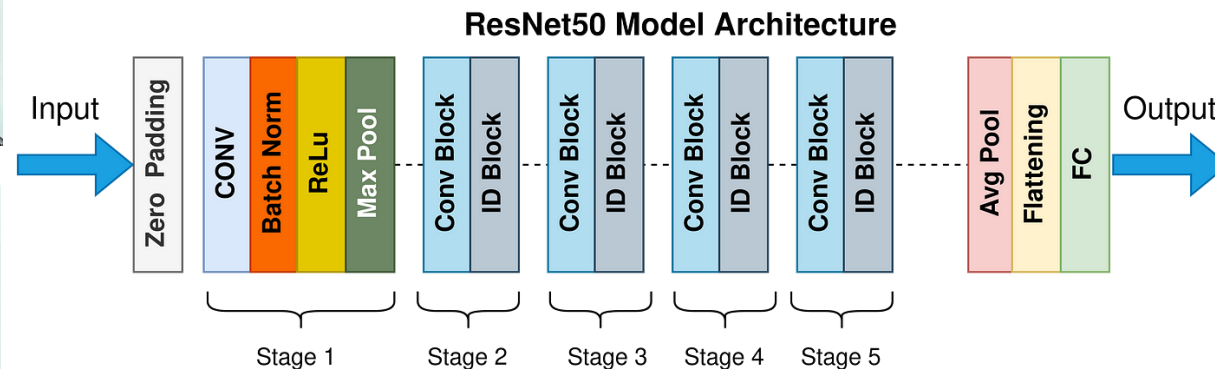
Ongoing Efforts

- Step: Preprocessing → Feature Extraction → Binary Classification → Evaluation
- Feature Extraction : Construct Resnet structure for FPF and TMFE.

Onset Frame



Apex Frame



```
Anaconda Prompt (miniconda) x + v
(py39) C:\Users\woosu\gitProjects\test\Resnet-18>python resnet_18.py
tensor([[[[1.9342e-02, 0.0000e+00, 0.0000e+00, ..., 0.0000e+00,
0.0000e+00, 0.0000e+00],
[1.0366e-01, 6.4665e-02, 0.0000e+00, ..., 2.7349e-02,
6.0581e-02, 1.4099e-02],
[1.9496e-01, 2.9185e-02, 2.3769e-01, ..., 1.7621e-01,
2.6515e-01, 5.8474e-02],
...,
[2.7078e-01, 2.2612e-01, 8.0220e-01, ..., 3.0217e-01,
3.2452e-01, 1.8696e-01],
[1.1334e+00, 2.1674e+00, 1.7078e+00, ..., 1.2834e+00,
3.4004e-01, 5.2197e-01],
[1.8434e+00, 1.1041e+00, 1.9679e+00, ..., 1.2575e-01,
1.5439e+00, 9.1817e-01]]]])
```

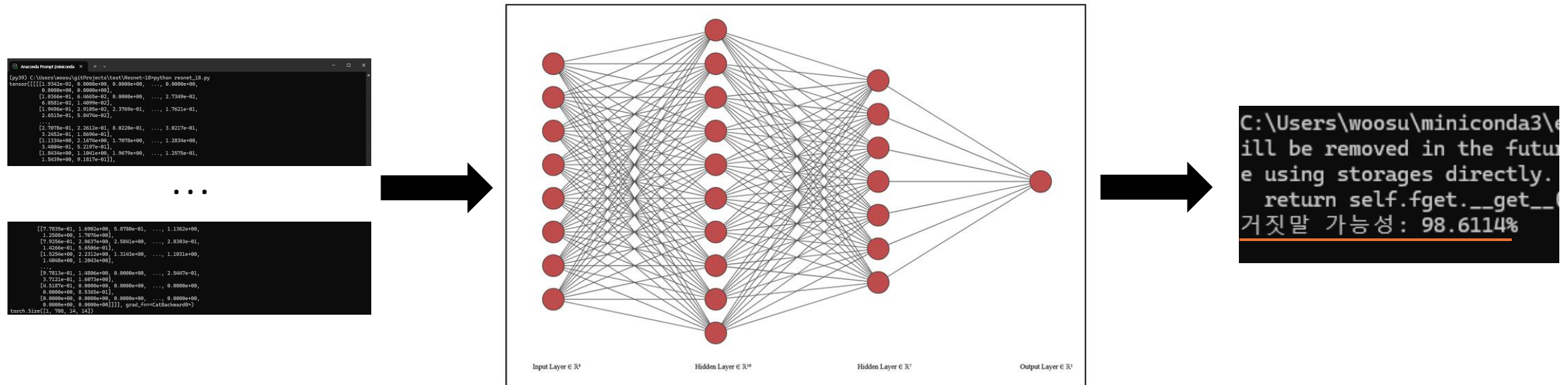
```
[[7.7835e-01, 1.6902e+00, 5.8780e-01, ..., 1.1362e+00,
1.2588e+00, 1.7076e+00],
[7.9256e-01, 2.0637e+00, 2.5841e+00, ..., 2.8303e-01,
1.4266e-01, 5.6506e-01],
[1.5254e+00, 2.2312e+00, 1.3143e+00, ..., 1.1031e+00,
1.4048e+00, 1.2043e+00],
...,
[9.7813e-01, 1.4806e+00, 0.0000e+00, ..., 2.5447e-01,
3.7121e-01, 1.6073e+00],
[4.5137e-01, 0.0000e+00, 0.0000e+00, ..., 0.0000e+00,
0.0000e+00, 8.5355e-01],
[0.0000e+00, 0.0000e+00, 0.0000e+00, ..., 0.0000e+00,
0.0000e+00, 0.0000e+00]]]]) grad_fn=<CatBackward0>)
torch.Size([1, 708, 14, 14])

torch.Size([1, 708, 14, 14])
```

3. Ongoing Efforts & Plans

Ongoing Efforts

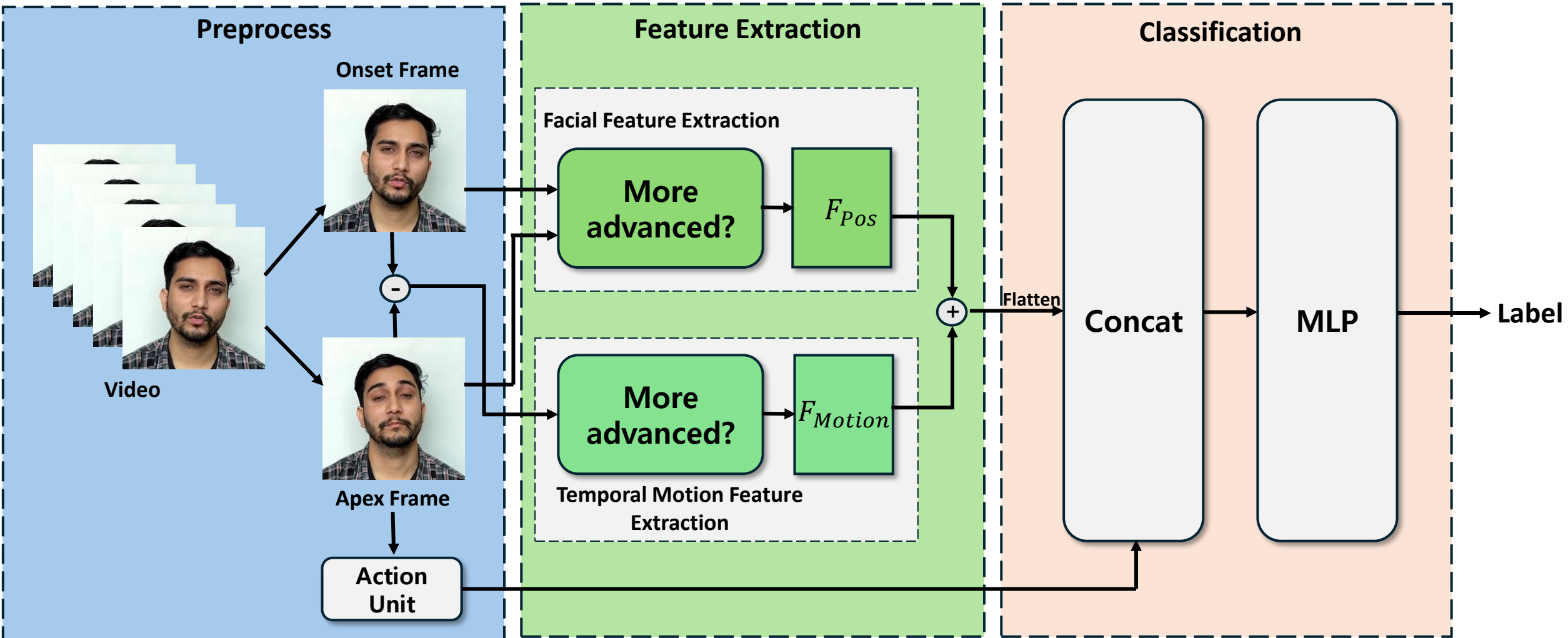
- Step: Preprocessing → Feature Extraction → Binary Classification → Evaluation
- Binary Classification: Make source code for binary classification with logistic regression & Find other classification methods.



3. Ongoing Efforts & Plans

Plans

- Step: Preprocessing → Feature Extraction → Binary Classification → Evaluation
 - Preprocessing: Use additional datasets to make final datasets.
 - Feature Extraction : Test other methods and choose final methods.
 - Binary Classification: Test other methods and choose final methods and finetuning.
 - Evaluation: Choose classification evaluation method.
-



4. Challenges & Issues

4. Challenges & Issues

- Challenges 1: To advance the structural design of the FER model (transformer?).
 - Challenges 2: Finetuning.
 - Issue 1: Dependency.
-

5. Reference

- <https://en.wikipedia.org/wiki/Microexpression>
 - <https://www.kaggle.com/search?q=FER+in%3Adatasets>
 - <https://www.kaggle.com/search?q=Micro-expression+in%3Adatasets>
 - <https://paperswithcode.com/task/facial-expression-recognition>
 - <https://paperswithcode.com/task/micro-expression-recognition>
 - <https://openreview.net/pdf?id=mHYkcQzdae>
 - https://ai.google.dev/edge/mediapipe/solutions/vision/face_landmarker?hl=ko
 - https://github.com/ihp-lab/LibreFace/tree/main/AU_Detection
-

Thanks for listening

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