



MUAY TH.AI TRAINER

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- 3 EDA + Demo
- 4 Challenges
- 5 Models
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1 INTRODUCTION

WHAT IS MUAY THAI?



มวยไทย
Thai Boxing

Art of
8
Limbs

WHAT IS MUAY THAI?



FISTS



ELBOWS

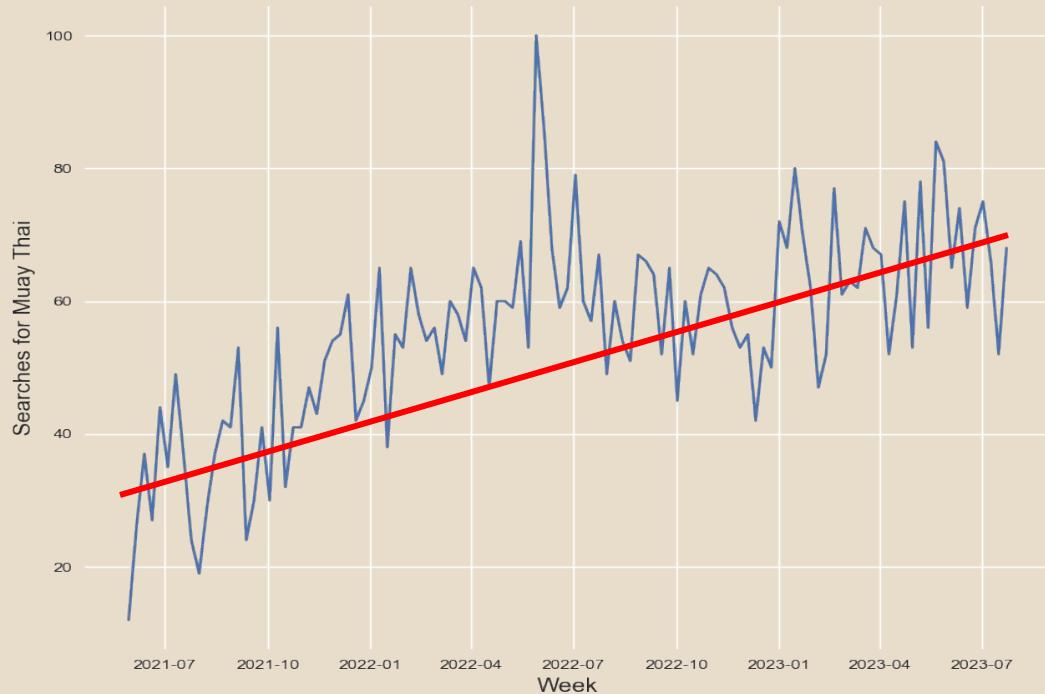


KNEES



SHINS

INTEREST IN MUAY THAI (SINGAPORE)

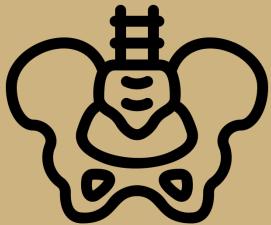


**STEADY INCREASE
FROM 2021-2023**

BUT IS MUAY THAI
GOOD FOR YOU?



**EXCELLENT FOR
CARDIOVASCULAR HEALTH**



**INCREASES LOWER BACK AND
HIP STRENGTH**

GREAT FOR WEIGHT LOSS

1000 KCAL =

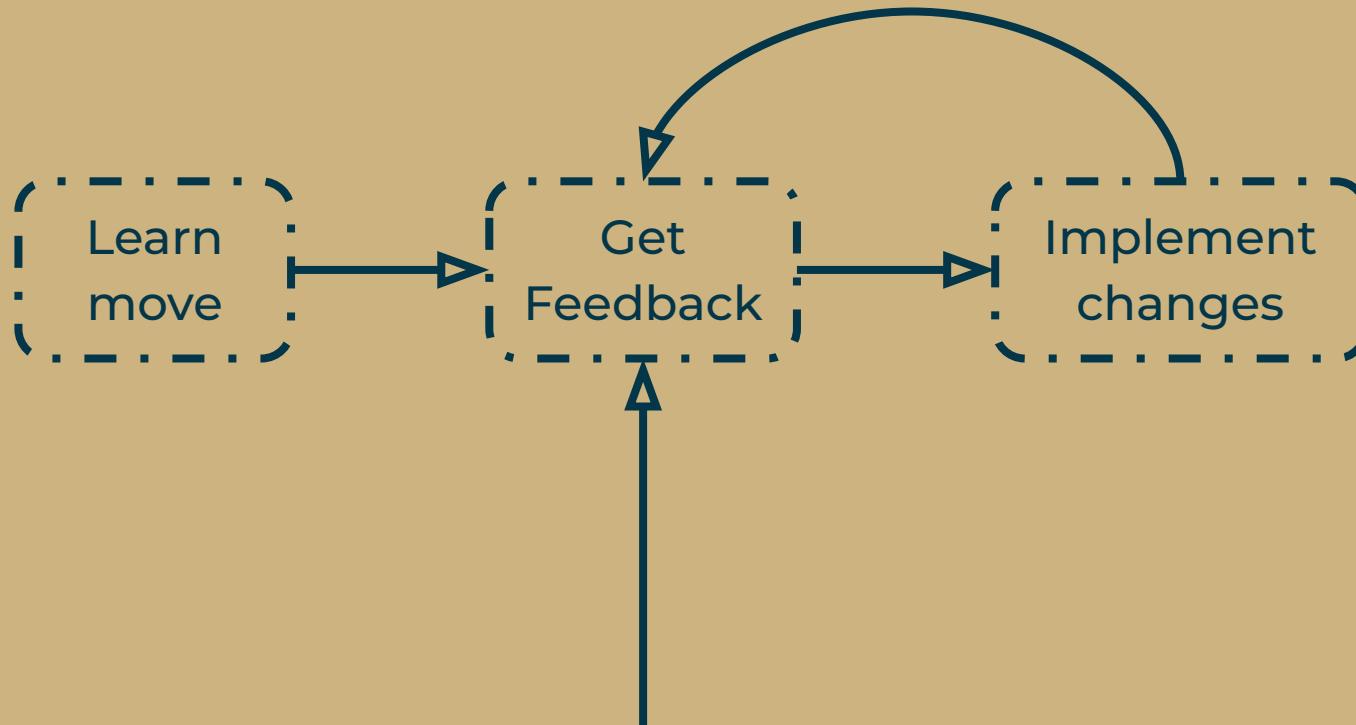
In 1h of training



2x McSpicy

HOW DO PEOPLE
GET BETTER?

SIMPLIFIED PROGRESSION PATH





neue

EVOLVE
MIXED MARTIAL ARTS



GHETTO FITNESS

Join A Gym



Dieselnoi Chor Thanasukarn vs Samart Payakaroon (1982) - stadium audio & in color

Study Pro Fighters



Get Personal Training



HEAVY BAG BLUEPRINT 2.0

The #1 heavy bag workout program for Muay Thai addicts to take their striking technique and fight conditioning to the next level.

★★ Over 100 5-Star Reviews ★★

LEARN MORE



THE FIGHTER'S BODY ACADEMY

The most badass at-home Muay Thai training program ever created. A complete 2-year program that will get you in the best shape of your life.

● Over 800+ Members! 🔥

LEARN MORE



NAK MUAY NATION

Take a deep dive into the strategies and tactics of the Muay Thai fight game with in-depth tutorials, private lessons & fight breakdowns.

🔥 200+ HD Training Videos 🔥



Subscribe To Courses

COST



Join A Gym



Get Personal Training

REQ DOMAIN KNOWLEDGE

Study Pro Fighters



Subscribe To Courses

EFFECTIVENESS



Join A Gym



Get Personal Training



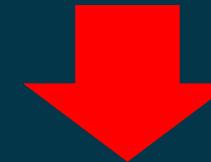
Study Pro Fighters



Subscribe To Courses



INTEREST



TIME & MONEY





**PEOPLE ARE
TURNING ONLINE**



Posted by [REDACTED]

4

Not sure if my form is much better here, tried to rotate hips more and lead my kicks with my knee, think some old habits are still sneaking through but let me know how this looks? [check my form](#)



Posted by [REDACTED]

90

How can I improve my roundhouse? [check my form](#)



Posted by [REDACTED]

22

Feeedback on my technique [check my form](#)



Posted by [REDACTED]

21

Thoughts on jab [check my form](#)



Small bag session, any tips?

[check my form](#)



↑ 27 ↓

23

Share

Heavybag work

[check my form](#)



↑ 66 ↓

30

Share

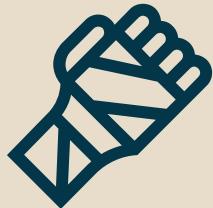
0:17 / 1:57



DIGITAL WELLNESS MARKET

S\$280M

In 2023

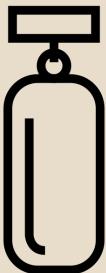


S\$396M

In 2027



PROBLEM STATEMENT



“

Proper form is necessary to prevent injury and maximise effectiveness. However, group classes lack personalised attention, and costly personal training isn't feasible for many.

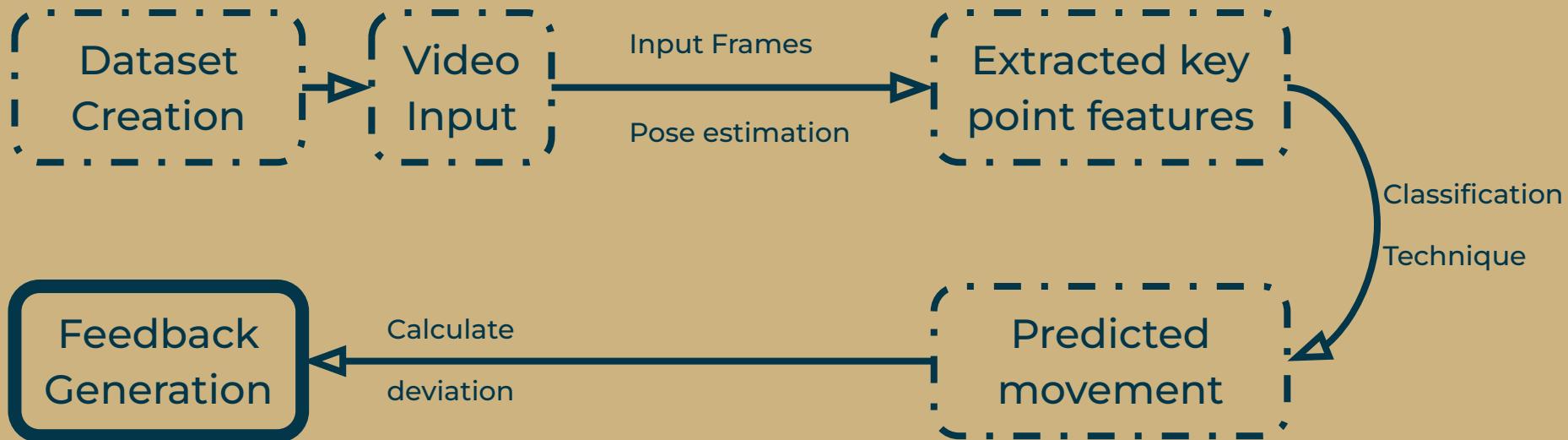
An AI Muay Thai trainer can offer affordable real-time form guidance.

”



2 METHODOLOGY

METHODOLOGY



TOOLS



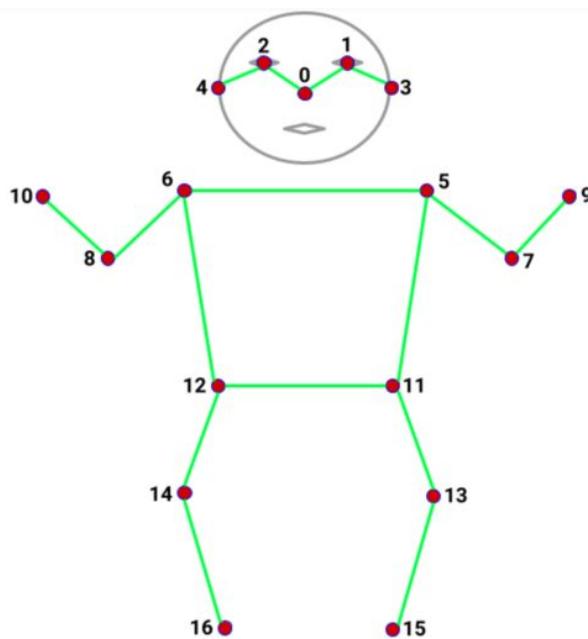


TOOLS



Image pose detection

movenet/singlepose/thunder



- 0: nose
- 1: left_eye
- 2: right_eye
- 3: left_ear
- 4: right_ear
- 5: left_shoulder
- 6: right_shoulder
- 7: left_elbow
- 8: right_elbow
- 9: left_wrist
- 10: right_wrist
- 11: left_hip
- 12: right_hip
- 13: left_knee
- 14: right_knee
- 15: left_ankle
- 16: right_ankle

TOOLS

Intended Use

Primary Intended Uses

- Optimized to be run in the browser environment using [Tensorflow.js](#) with WebGL support or on-device with [TF Lite](#).
- Tuned to be robust on **detecting fitness/fast movement with difficult poses and/or motion blur**.
- Most suitable for detecting the pose of a single person who is **3ft ~ 6ft** away from a device's webcam that captures the video stream.
- Focus on detecting the pose of the person who is closest to the image center and ignore the other people who are in the image frame (i.e. background people rejection).
- The model predicts **17 human keypoints** of the full body even when they are occluded. For the keypoints which are outside of the image frame, the model will emit low confidence scores. A confidence threshold (recommended default: 0.3) can be used to filter out unconfident predictions.

Primary Intended Users

- People who build applications (e.g. fitness/physical movement, AR entertainment) that require very **fast inference** and **good quality single-person pose detection** (with background people rejection) on **standard consumer devices** (e.g. laptops, tablets, cell phones).

MOVENET TRAINED ON

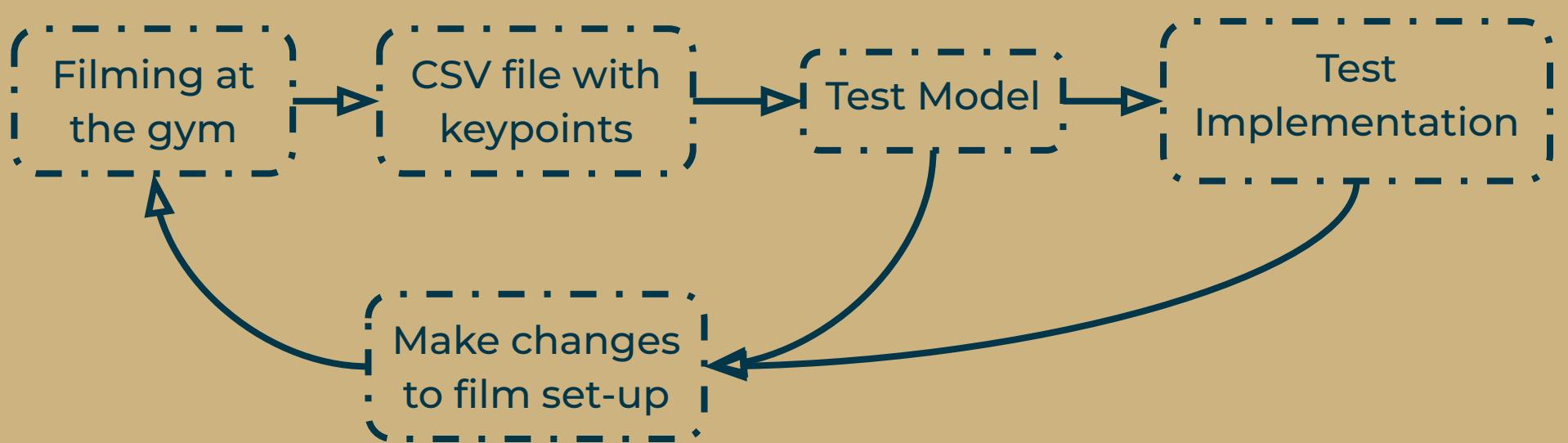
COCO

64,000

ACTIVE

23,500

DATASET CREATION



TWO CLASSES



FISTS



ELBOWS



KNEES



SHINS

TWO CLASSES



JAB



KICK

EVENTUAL SIZE OF DATASET

jabs

13,676

rows

kicks

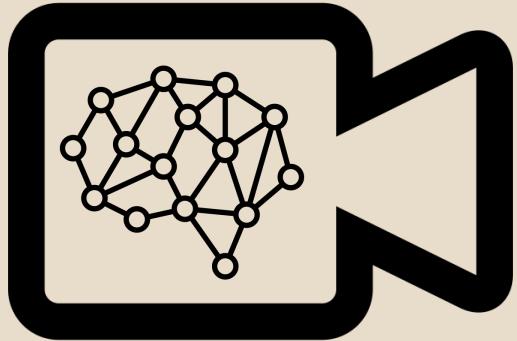
17,279

rows



3

EDA + DEMO



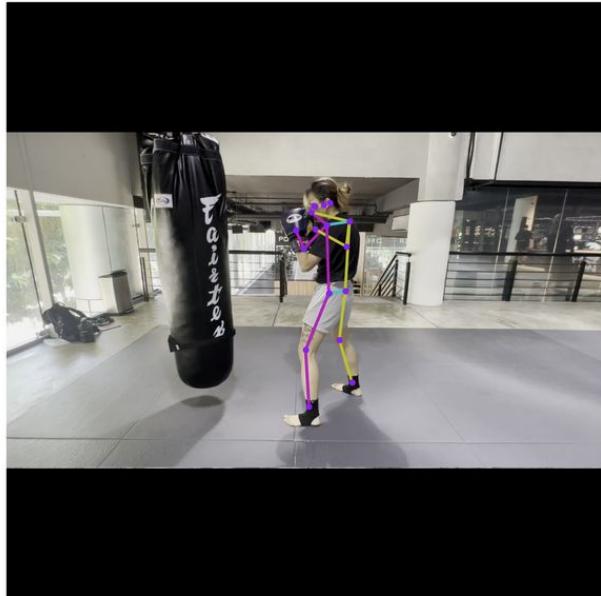
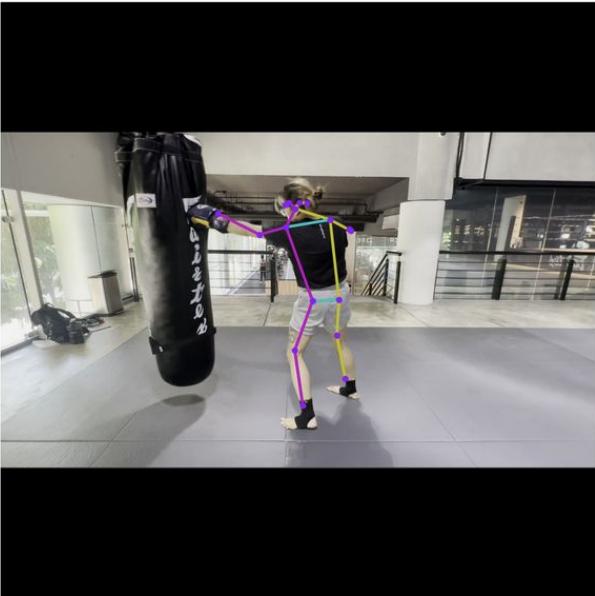
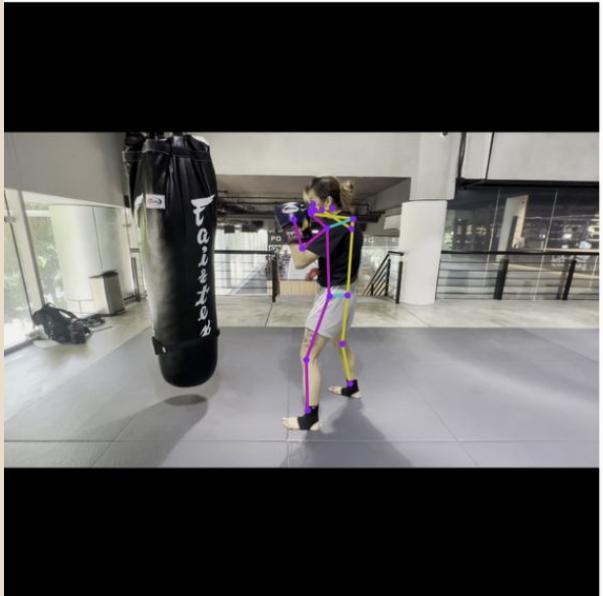


4 CHALLENGES

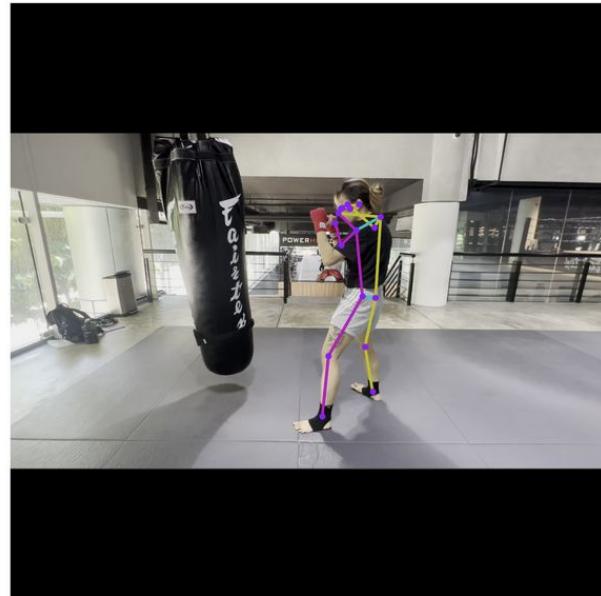
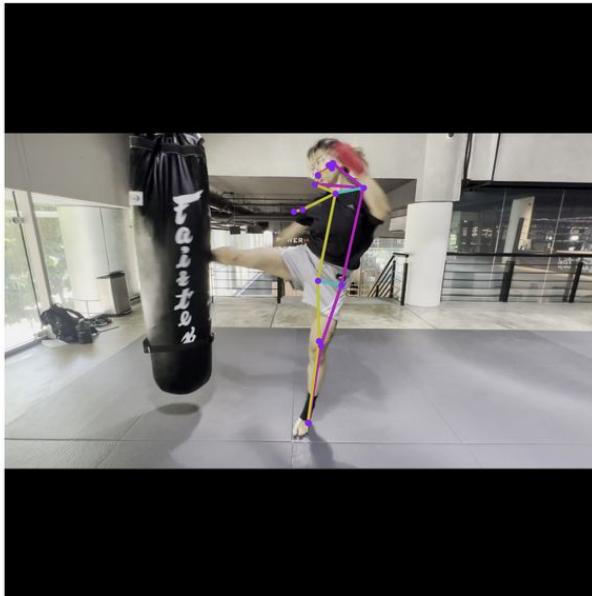
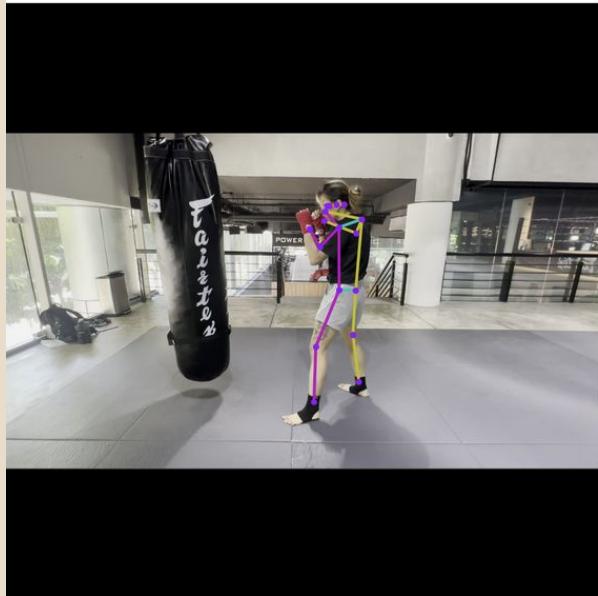
CHALLENGE #1

**THE MOVEMENTS ARE TOO FAST FOR
KEYPOINT PREDICTION**

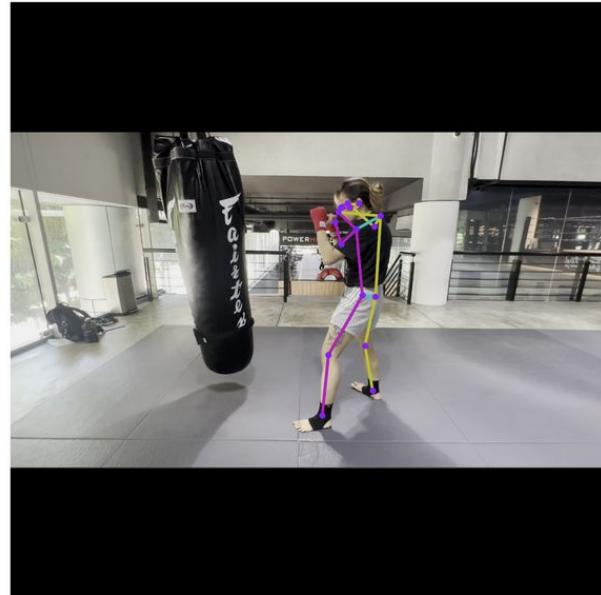
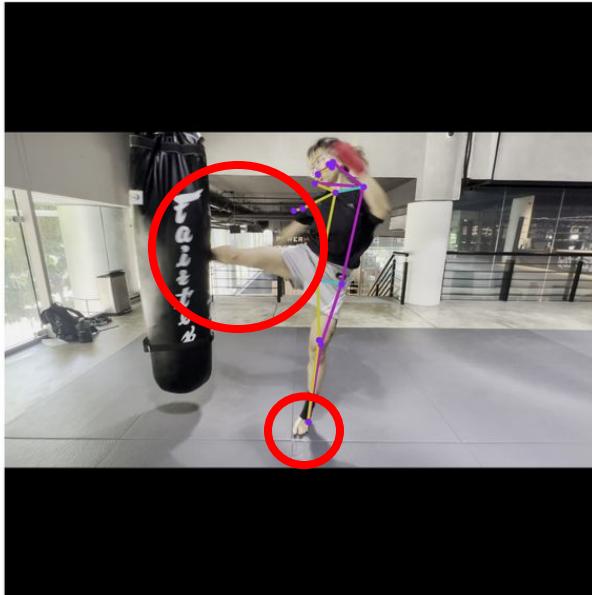
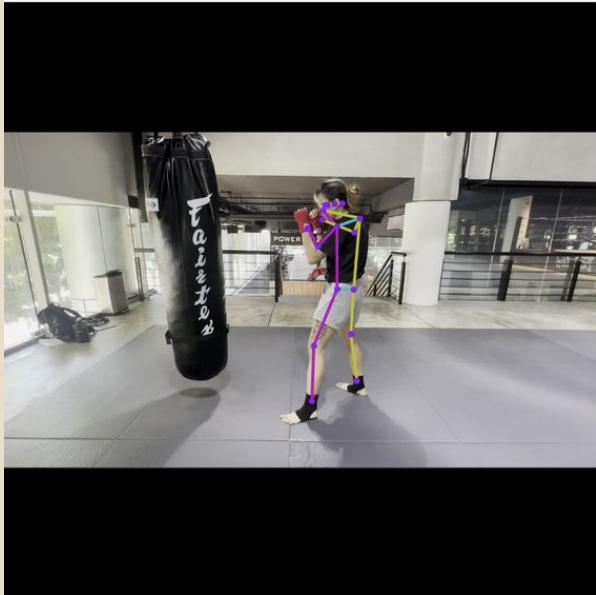
JAB



KICK



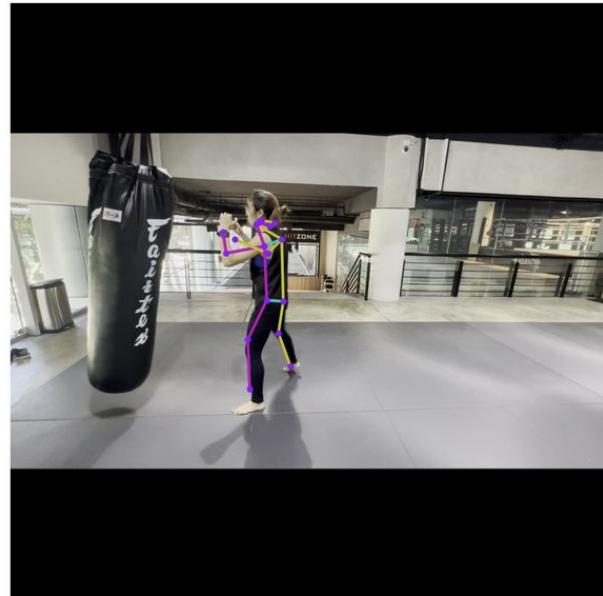
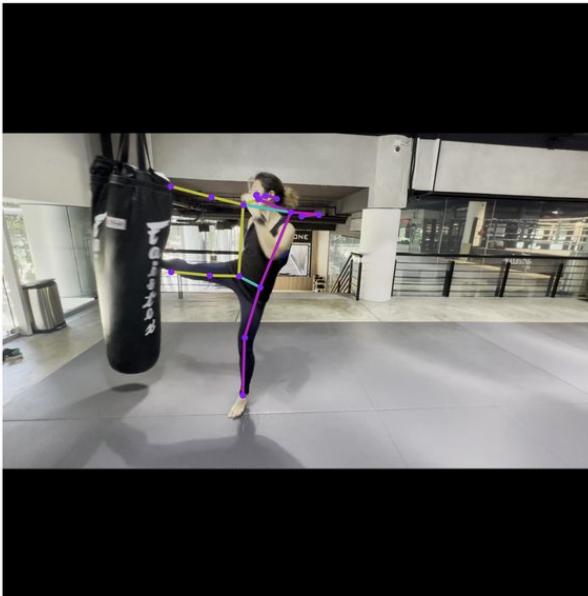
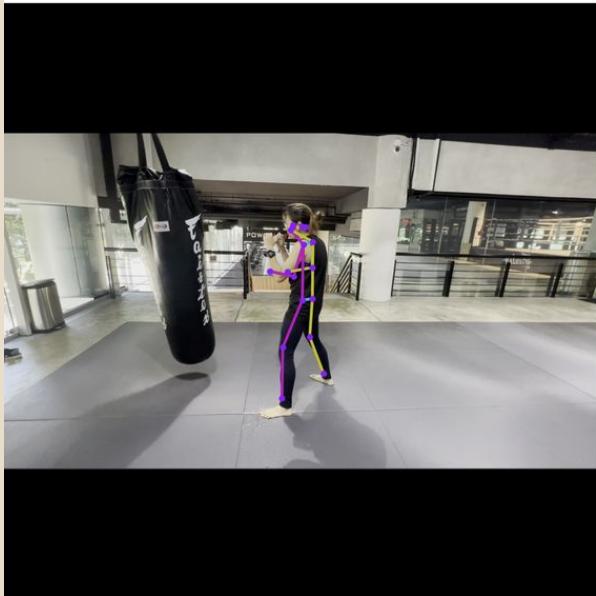
KICK



SOLUTION #1

**INCREASING CONTRAST BETWEEN THE
HUMAN FIGURE AND BACKGROUND**

DATA CLEANING - KICK



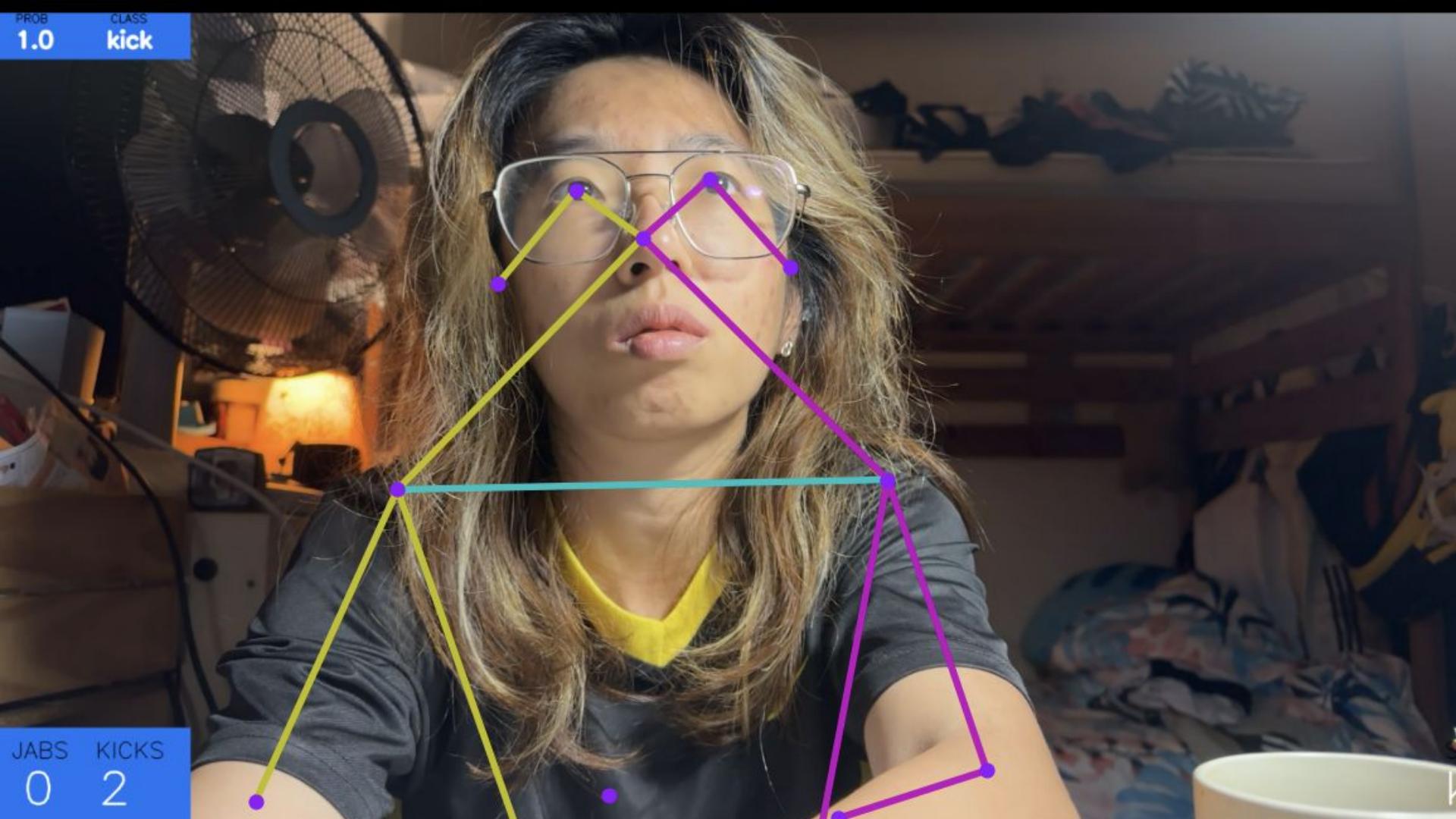
CHALLENGE #2

**THE MODEL BEHAVES ERRATICALLY
WHEN CONFRONTED WITH SITUATIONS IT
WAS NOT TRAINED FOR**

PROB
1.0

CLASS
kick

JABS KICKS
0 2



SOLUTION #2

**WRITE CODE TO DETECT WHEN THE
CAMERA PLACEMENT IS INCORRECT**

Please film yourself from the side
and ensure your ankles are visible

JABS KICKS
0 0

CHALLENGE #3

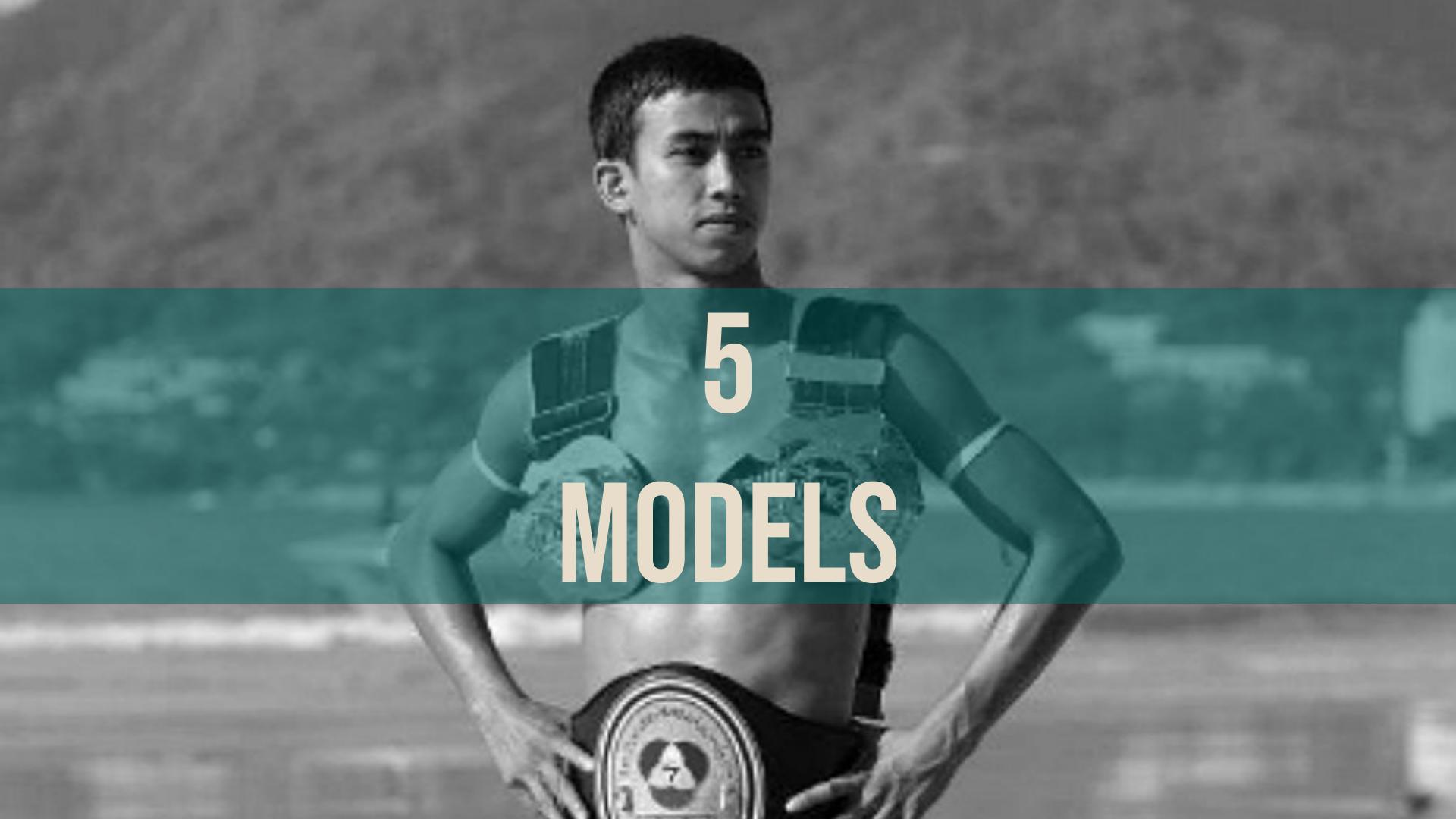
**THE MODEL HAD DIFFICULTY COUNTING
THE NUMBER OF JABS AND KICKS**

SOLUTION #3

**WROTE FUNCTIONS TO DISTINGUISH A
NEW THIRD CLASS—‘GUARD’**

EVENTUAL SIZE OF DATASET

jabs : guard : kicks
3,355 : 4,217 : 5,079
rows rows rows



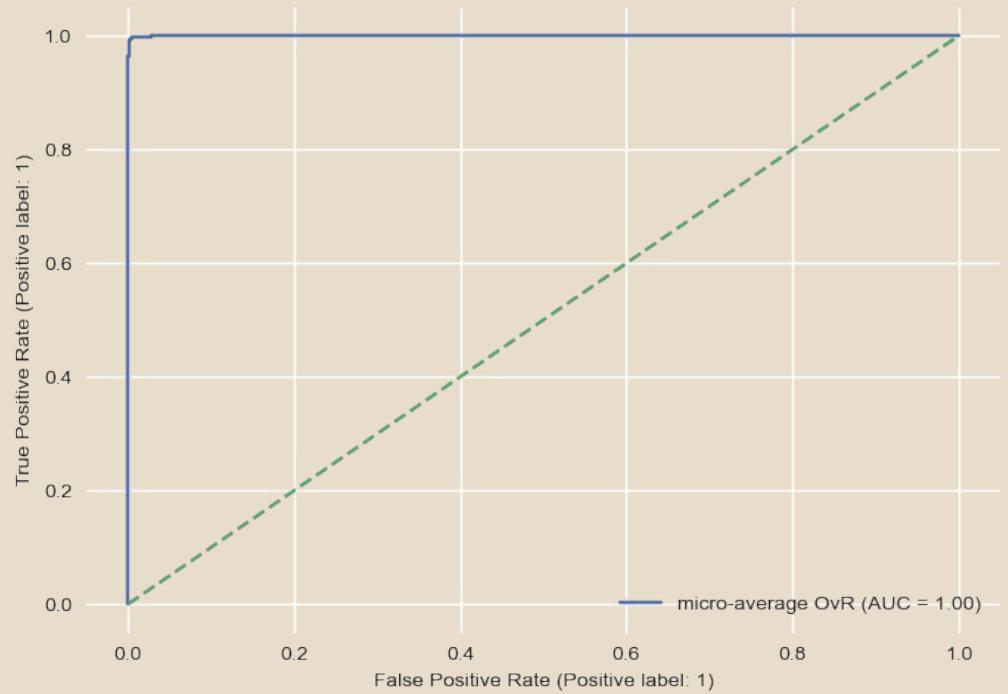
5 MODELS

MODEL PERFORMANCE

	TRAIN	TEST				TIME TAKEN (SECONDS)
	ROC-AUC	ROC-AUC	Precision	Recall	F1-Score	
LOGISTIC REGRESSION (BASELINE)	0.99	0.99	0.94	0.94	0.94	67.8
RANDOM FOREST	1.00	1.00 (↑ 1%)	1.00 (↑ 6%)	1.00 (↑ 6%)	1.00 (↑ 6%)	85.1 (↓ 25.5%)
ADA BOOST	0.99	0.99	0.91 (↓ 3%)	0.89 (↓ 5%)	0.89 (↓ 5%)	40.6 (↑ 40.1%)
REGULARISED GREEDY FOREST	1.00	1.00 (↑ 1%)	0.99 (↑ 5%)	0.99 (↑ 5%)	0.99 (↑ 5%)	21.5 (↑ 68.3%)

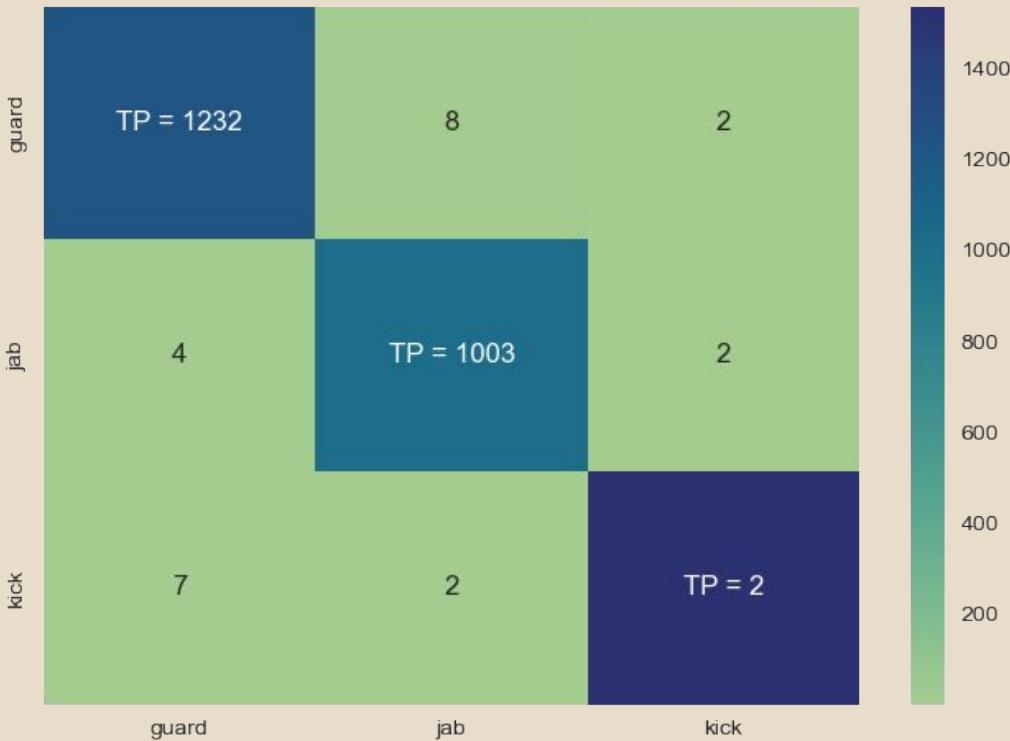
1.0

ROC-AUC

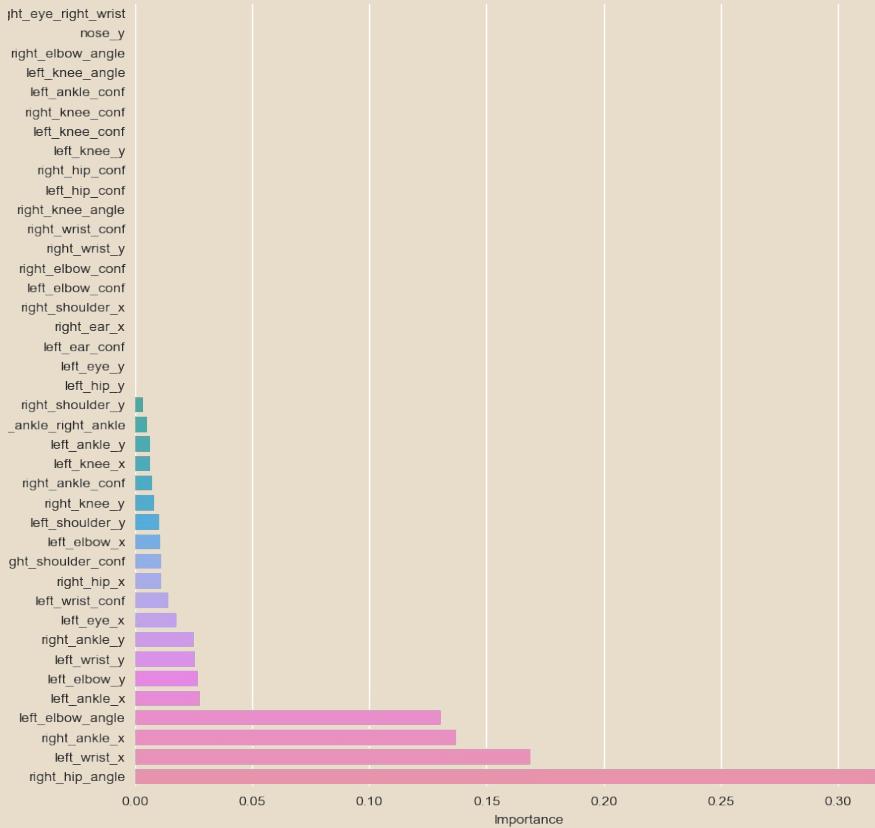


0.99

f1-Score



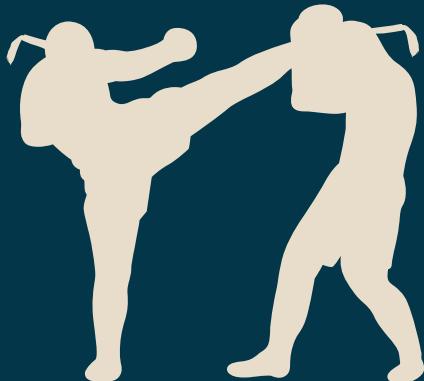
1. RIGHT HIP ANGLE
2. LEFT WRIST X
3. RIGHT ANKLE X
4. LEFT ELBOW ANGLE
5. LEFT ANKLE X





6 CONCLUSION

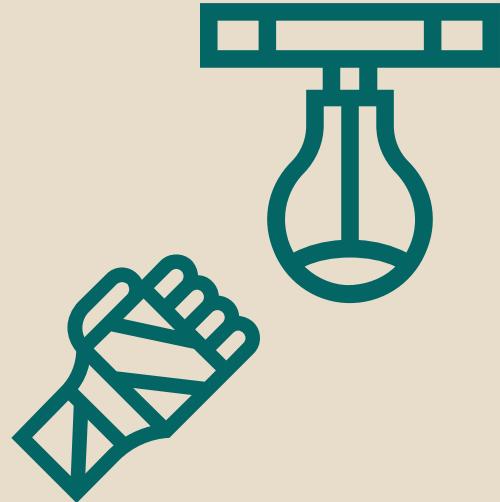
INSIGHTS



1. The model was able to achieve the end goal of giving recommendations for the two classes.
2. However, in order to truly be useful for live training, the speed of the model needs to be improved.
3. Overall, this is a successful proof of concept.

FUTURE WORK

1. Improve the speed of the model, possibly by hosting on a cloud server and/or cleaning up the code.
2. Expand the training set to make it more reliable in more situations (lighting, angles, etc.).
3. Expand to other Muay Thai moves.



A boxer with a headband and wrapped hands is in a ring. A large, semi-transparent white rectangle covers the center of the image, containing the text "Q&A".

Q&A