MUAY TH.AI TRAINER

Wynne Chen (DSI37)

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1

INTRODUCTION

WHAT IS MUAY THAI?

มวยไทย
Thai Boxing

Art of

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Limbs

WHAT IS MUAY THAI?

FISTS   ELBOWS   KNEES   SHINS
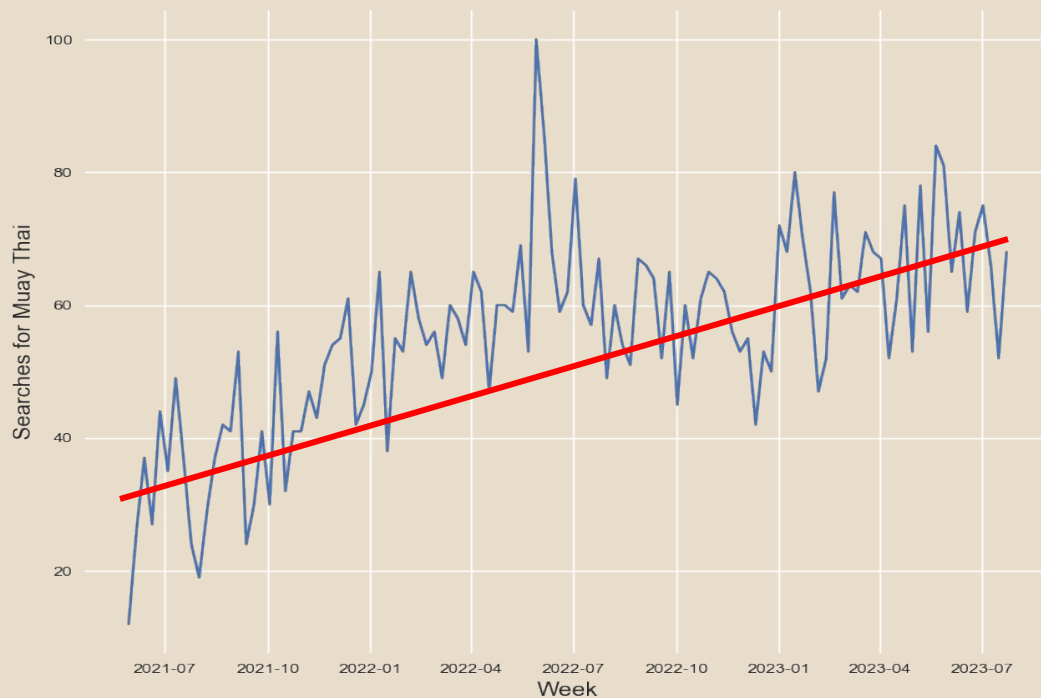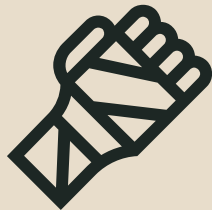
INTEREST IN MUAY THAI (SINGAPORE)

STEADY INCREASE
FROM 2021-2023

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.
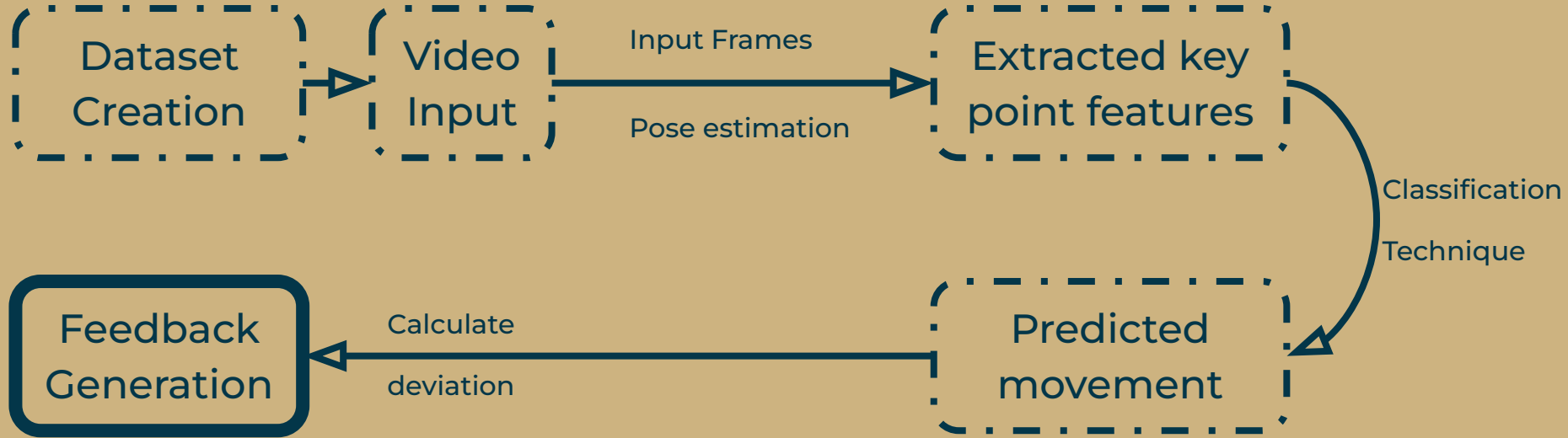
2
METHODOLOGY

METHODOLOGY

TOOLS

TOOLS

Image pose detection
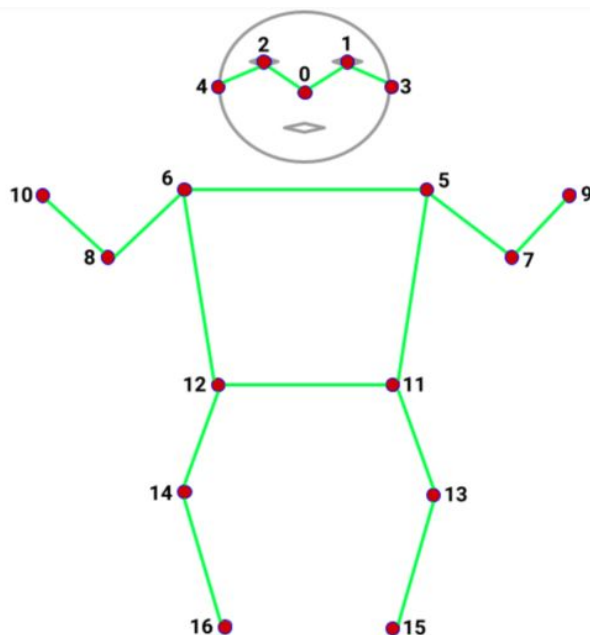
movenet/singlepose/thunder

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

TWO CLASSES

FISTS   ELBOWS   KNEES   **SHINS**
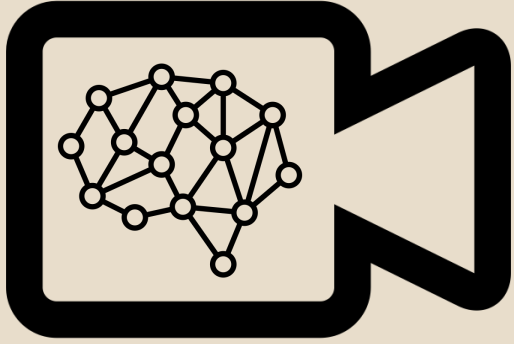
TWO CLASSES

JAB
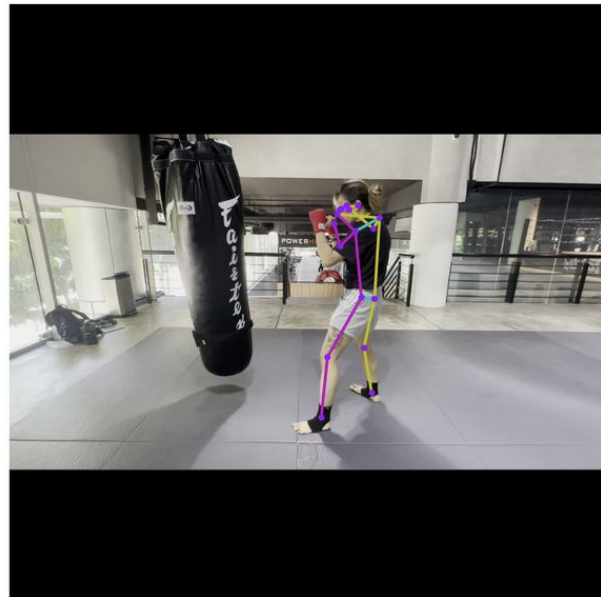

KICK

3
EDA + DEMO

4
CHALLENGES

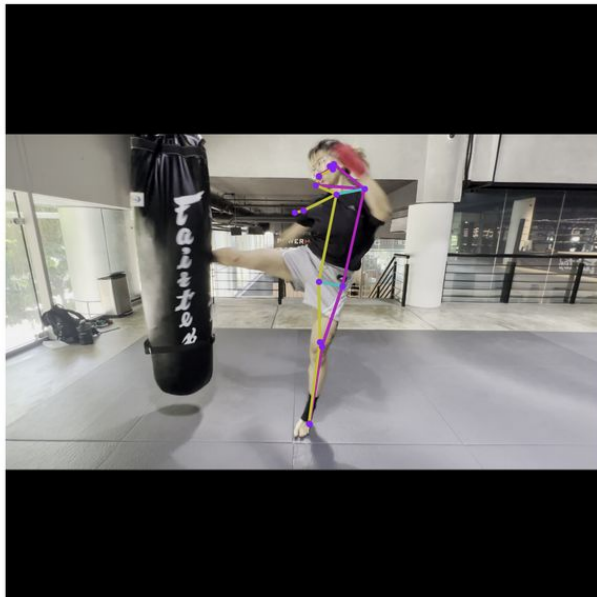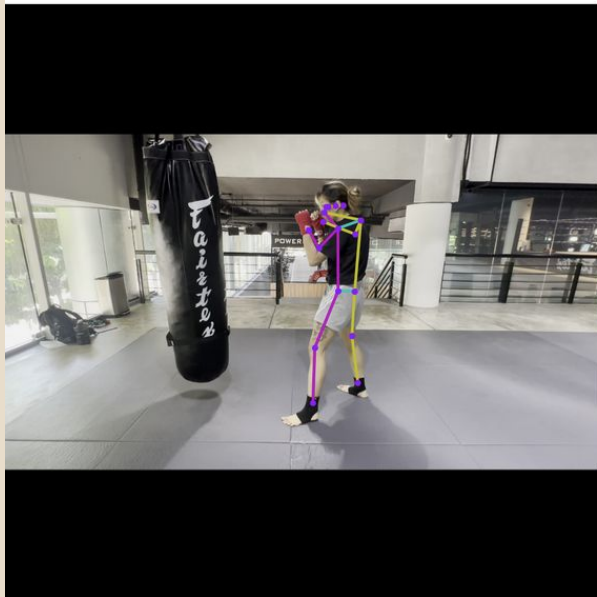# CHALLENGE #1

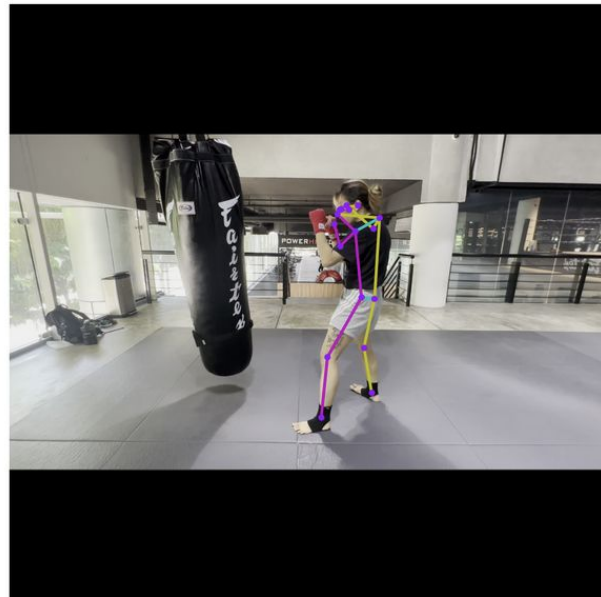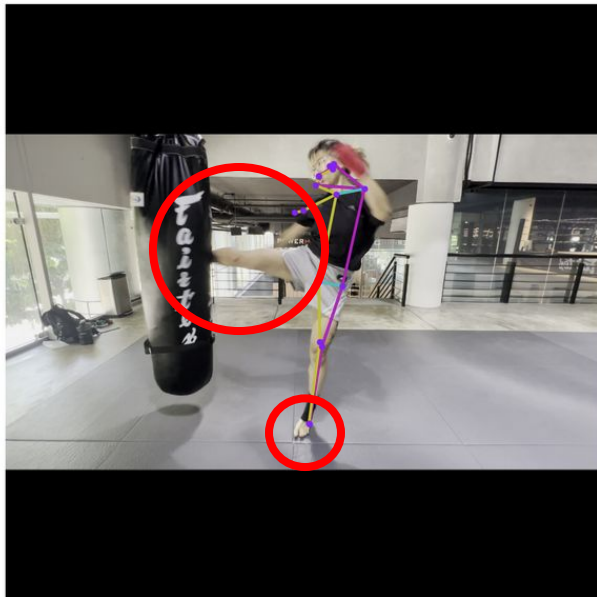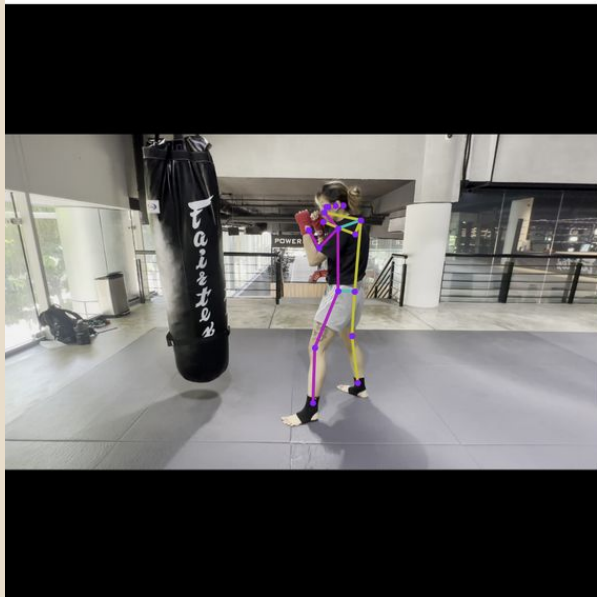## THE MOVEMENTS ARE TOO FAST FOR KEYPOINT PREDICTION
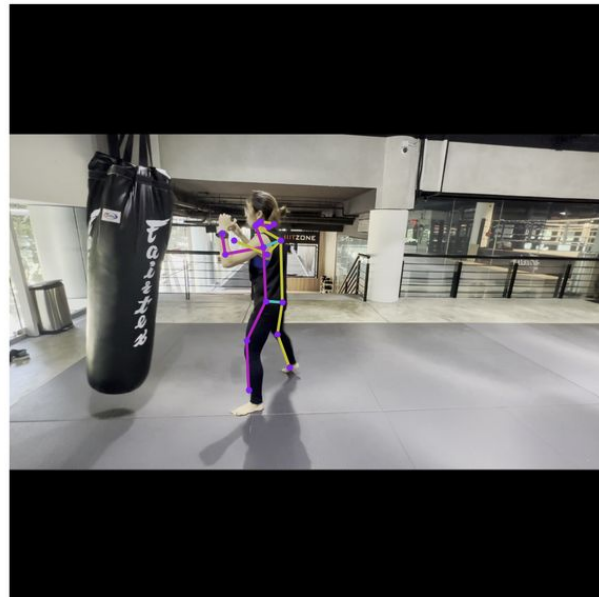
JAB
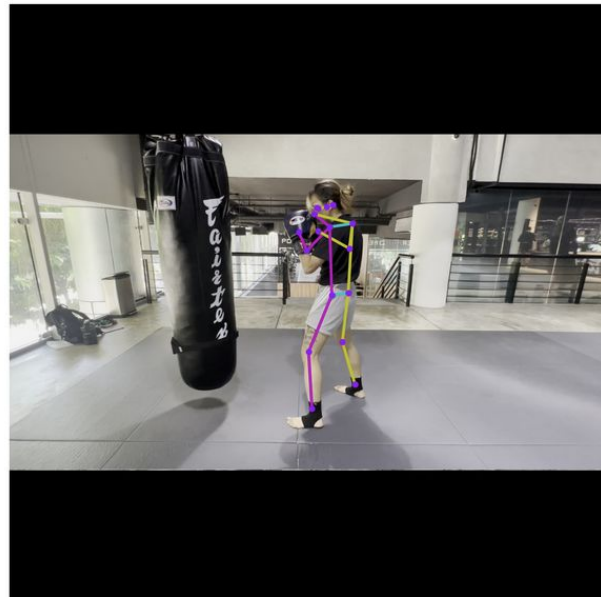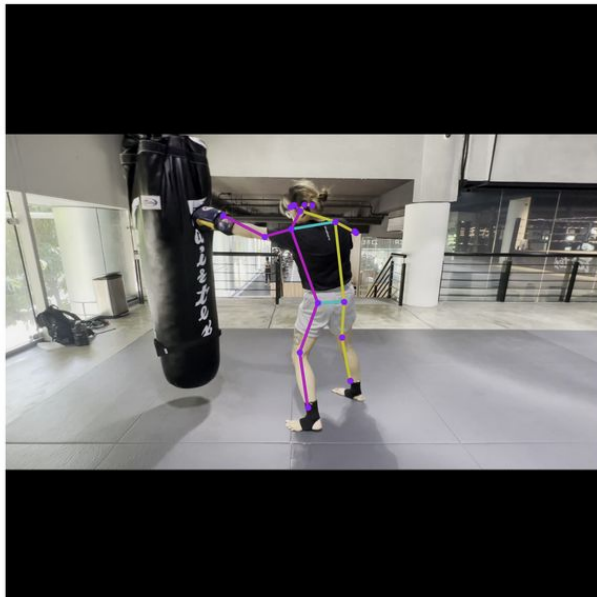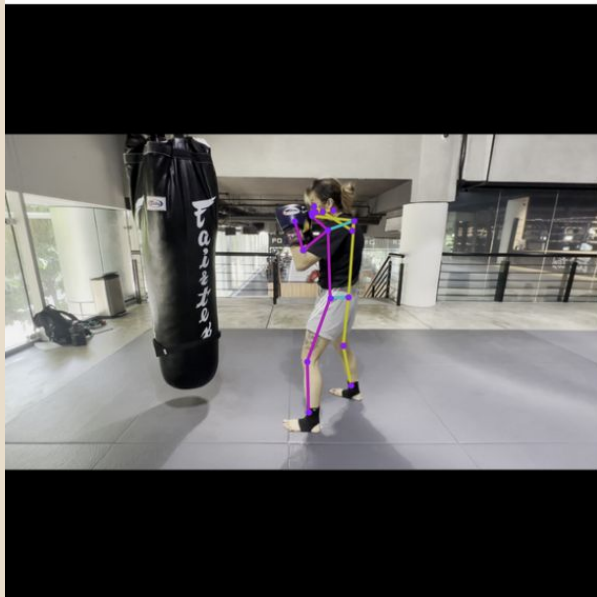
KICK
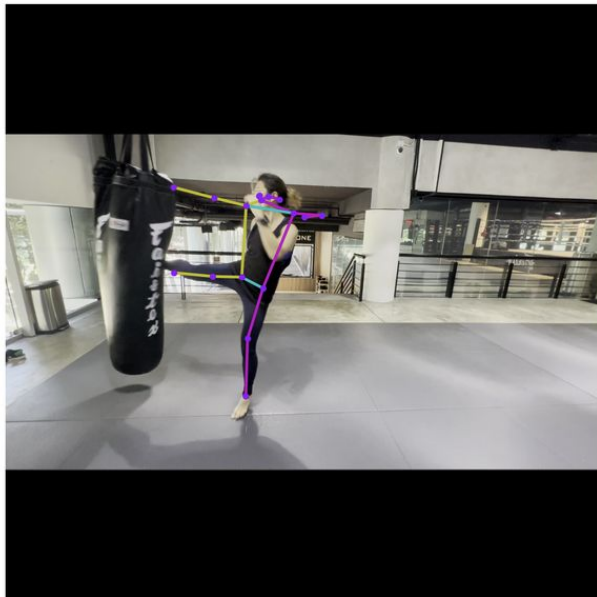
KICK

SOLUTION #1

INCREASING CONTRAST BETWEEN THE HUMAN FIGURE AND BACKGROUND

DATA CLEANING - KICK
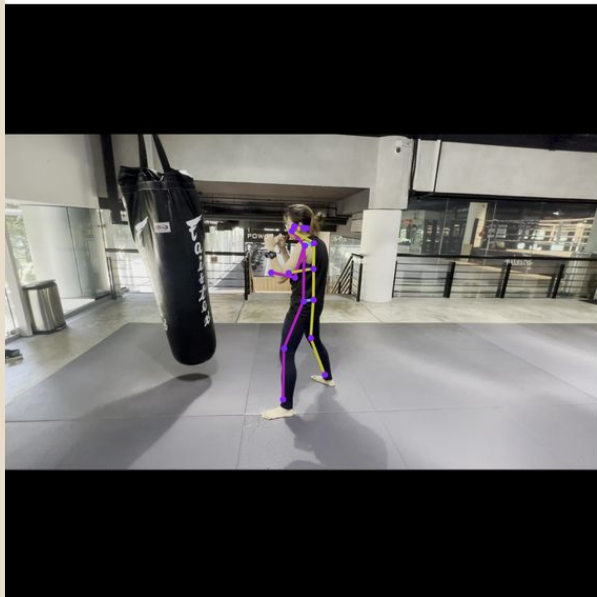
THE MODEL BEHAVES ERRATICALLY WHEN CONFRONTED WITH SITUATIONS IT WAS NOT TRAINED FOR
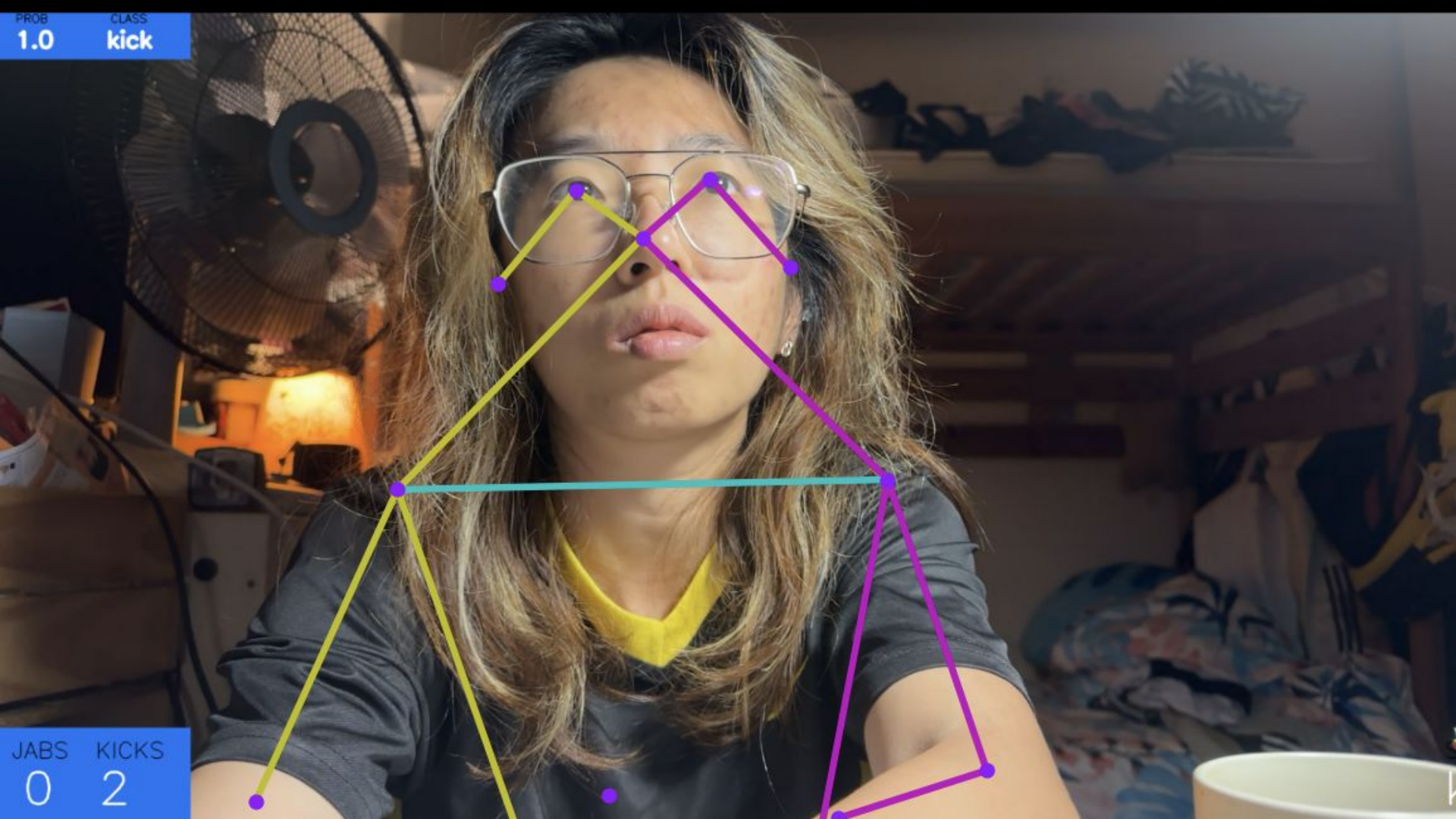
SOLUTION #2

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'

5
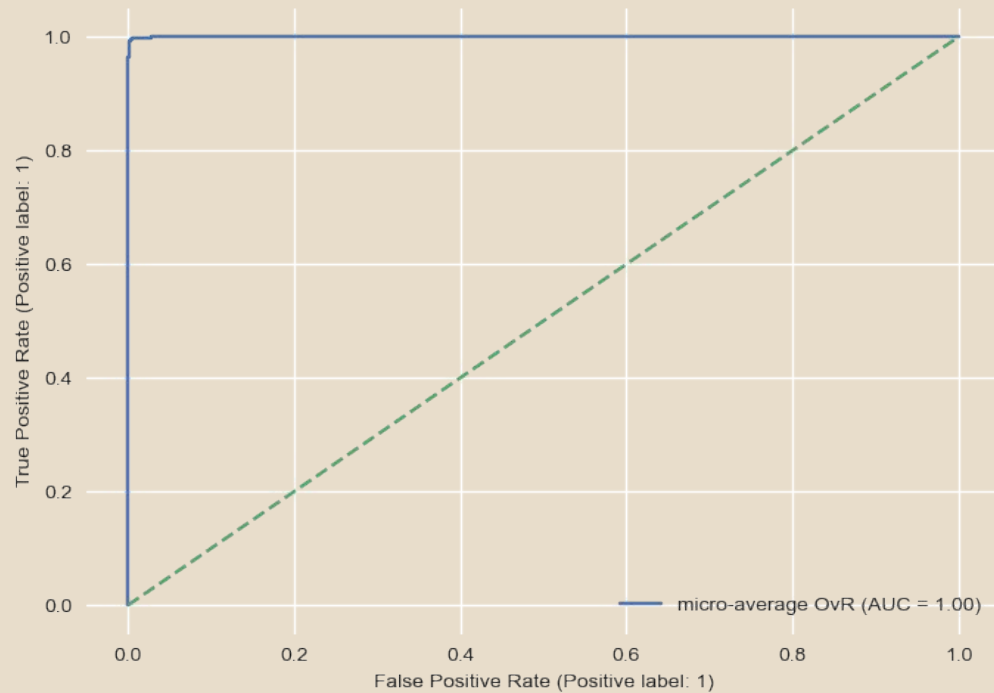# MODELS

MODEL PERFORMANCE

	ROC-AUC (TRAIN)	ROC-AUC (TEST)	TIME TAKEN (SECONDS)
LOGISTIC REGRESSION (BASELINE)	0.99	0.99	67.8
RANDOM FOREST	1.00	1.00 (↑ 1%)	85.1 (↓ 25.5%)
ADA BOOST	0.99	0.99	40.6 (↑ 40.1%)
REGULARISED GREEDY FOREST	1.00	1.00 (↑ 1%)	21.5 (↑ 68.3%)

1.0
ROC-AUC
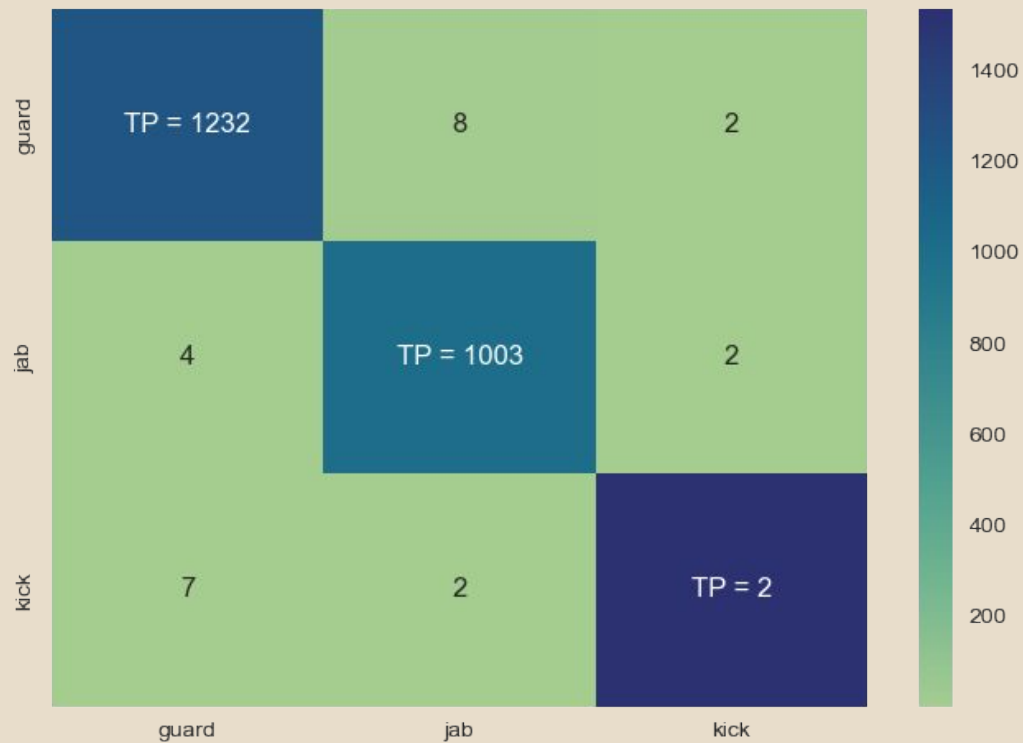
1. RIGHT HIP ANGLE
2. LEFT WRIST X
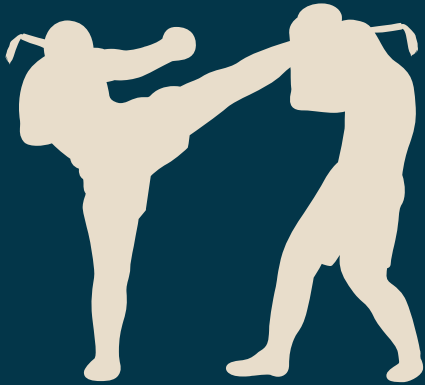3. RIGHT ANKLE X
4. LEFT ELBOW ANGLE
5. LEFT ANKLE X
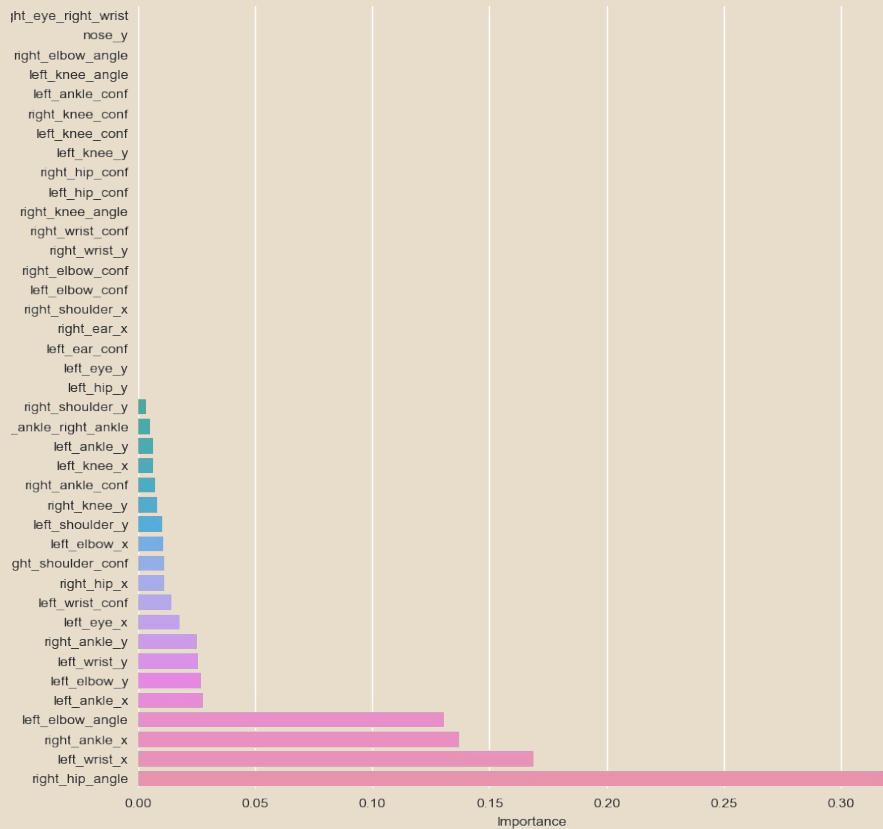
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CONCLUSION

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.

Q&A