

COMP5543 Course Project

How can AI be used to trade the stock?

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The game: Flip a coin



Head (50%):
You win \$1



Tail (50%):
You lose \$1

Would you play this game?



No,

because the expected value is 0,
it just wastes your time

The game: Flip a coin



Head (~~5~~% -> 70%):
You win \$1



Tail (~~5~~% -> 30%):
You lose \$1

Would you play this game?



How about now?

If you play 100 times, you expect to get \$40



Can we create this
game in the real
world?

Agenda

01

**Introduction of Object
Detection and Stock Market**

02

Initial Design

03

What I did

04

Result

Object Detection (Yolo)

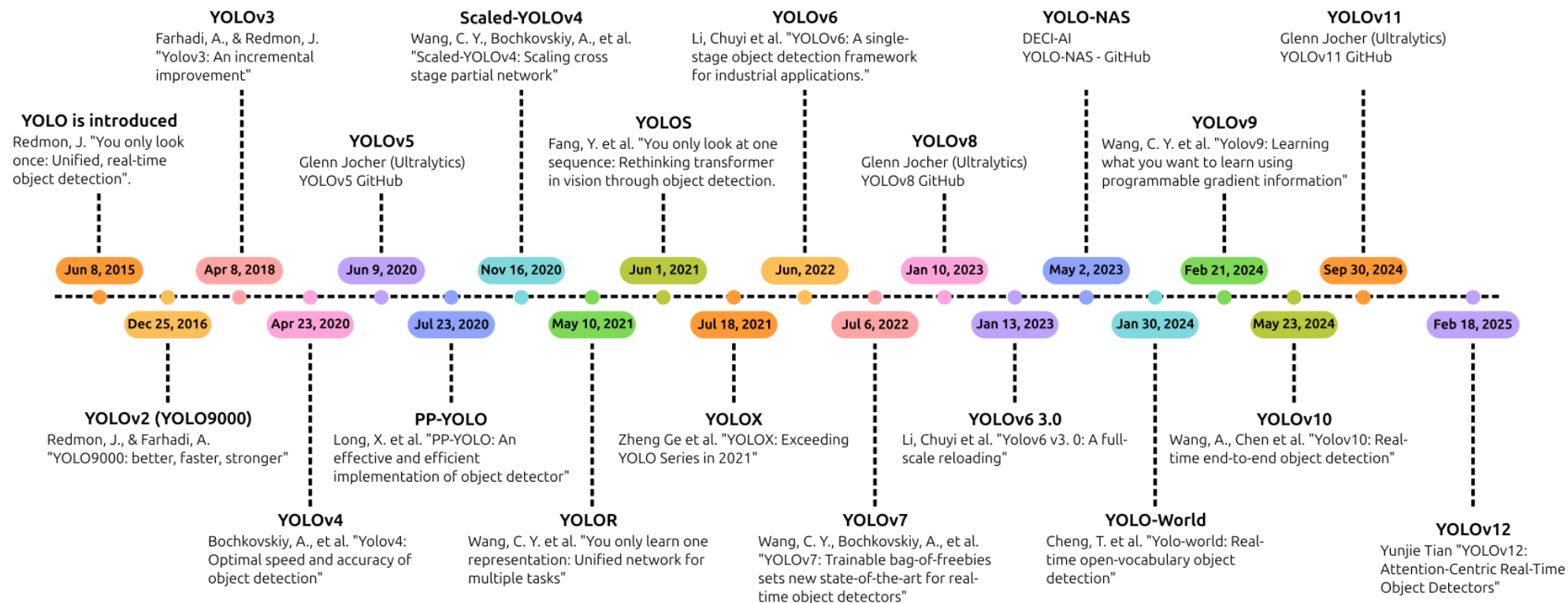
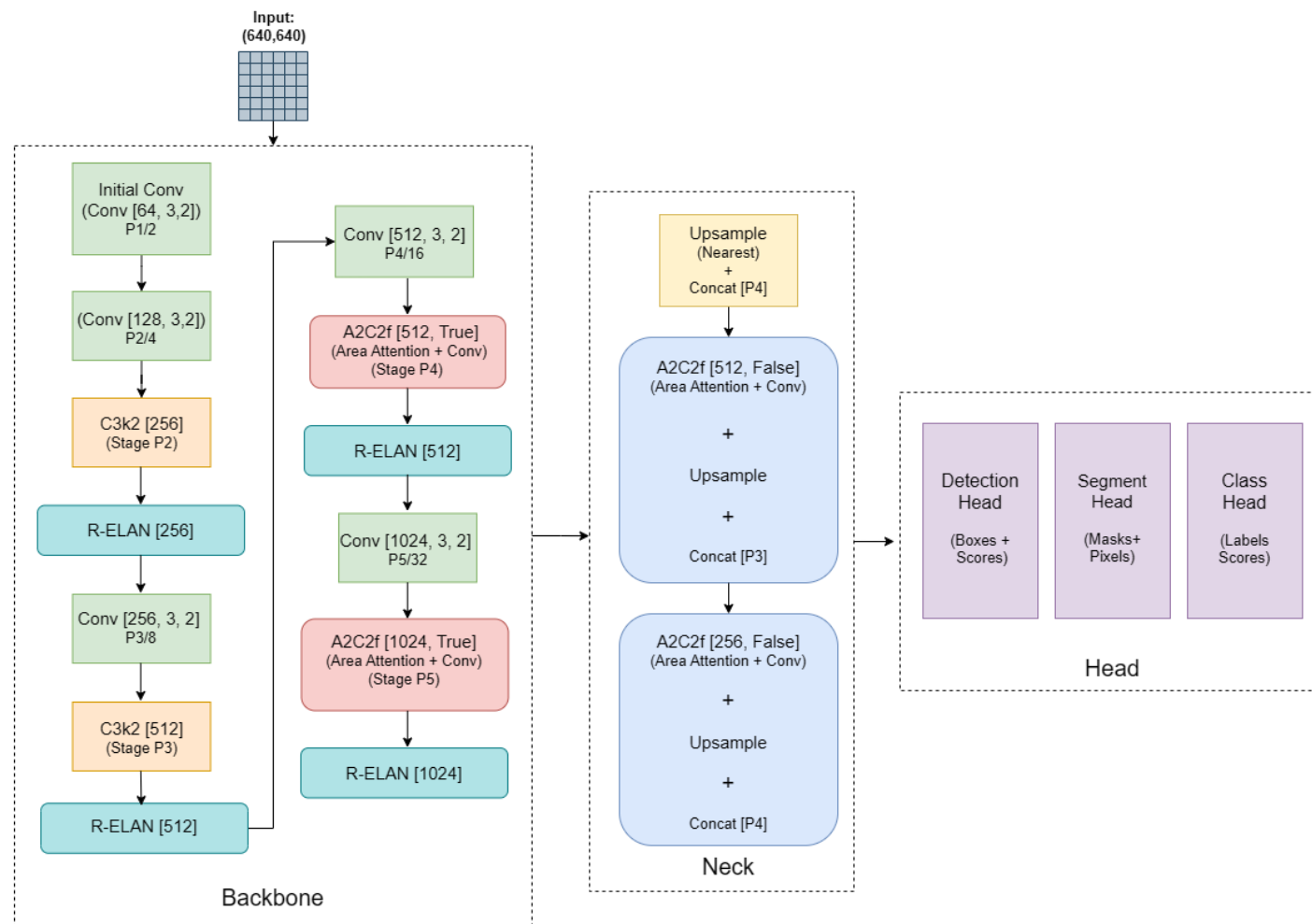


Figure 1: Evolution of YOLO Algorithms throughout the years.

01 Intro



YOLOv12 Architecture

Figure 2: YOLOv12 architecture showcasing the new Area Attention (A2) module and Residual Efficient Layer Aggregation Networks (R-ELAN).

01 Intro



Figure 3: A diagram of a child with a blue box and text

Domain knowledge of The Stock Market

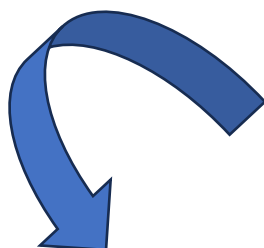
01 Intro

Collecting huge
amounts of data

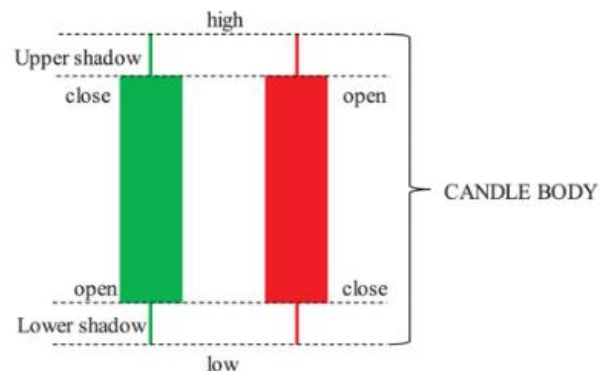


Buy and Sell

For better management
Candlestick appeared



Big Data



- **Open Price:** The starting price at the beginning of the period.
- **Close Price:** The final price at the end of the period.
- **High Price:** The highest price reached during the period (top of the wick).
- **Low Price:** The lowest price reached during the period (bottom of the wick).

FIGURE 4: A Candlestick Chart

01 Intro

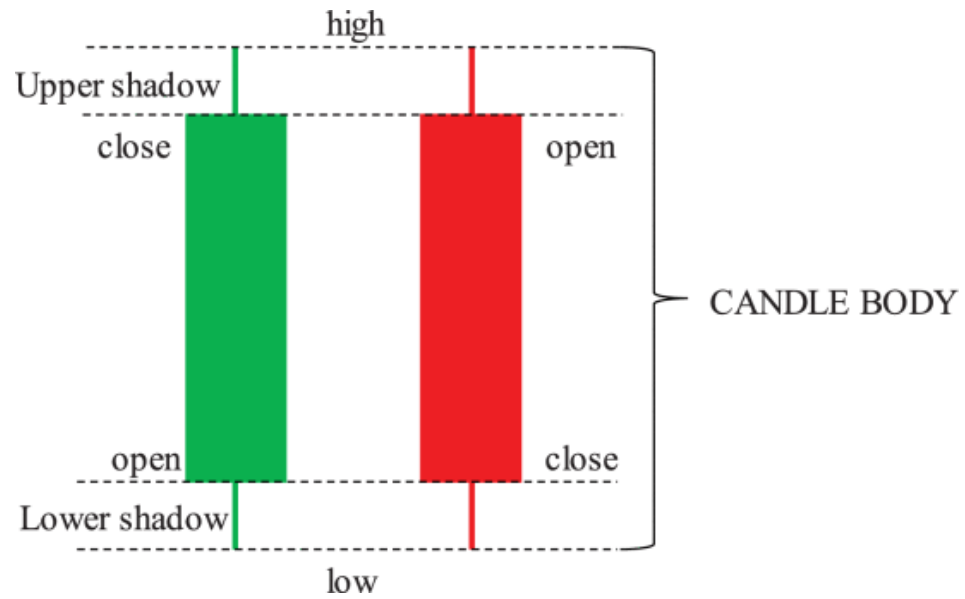


FIGURE 4: A Candlestick Chart



FIGURE 5: Candlestick chart of SPY

Connect many
Candlestick

01 Intro

Dow Theory



FIGURE 5: Candlestick chart of SPY

Assumptions:

1. The stock market is formed by a primary trend intermingled with secondary trends, while these secondary trends are composed of random fluctuations.
2. Stock markets fluctuate randomly most of the time.



Not all times—so is it possible to identify non-random time points?

Non-random Time Points

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Research on Cup and Handle Price Pattern Based on Svm Method

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Abstract. Analysis of the data of stock is one of the most important methods for investor to knowing if the stock is going to have a uptrend and determine whether call and put the stock. This is one of the methods that can highly decrease the risk of investing. Therefore, to decrease the risk of loss and increase the return, prediction of the stock price become a crucial task and has attracted many investors. To introduce a new method to solve the problem, this paper didn't focus on predicting the price of stock but cup and handle pattern. This pattern always implies that there is an upward trend follows this. The trouble is how to find out the stock has the pattern from many stock data. Based on machine learning (ML) techniques, this paper uses support vector machine (SVM) model to classify the data and to determine whether this set has the pattern or not. The model uses gaussian radial function as kernel function. The experiment result demonstrates that the classify model reach a relatively satisfied result and can give a relative good, classified result.

Keywords: Cup and handle pattern; machine learning; support vector machine; gaussian radial function.



FIGURE 6: Cup and handle PatternData

Research on Cup and Handle

https://www.researchgate.net/publication/379345807_Research_on_Cup_and_Handle_Price_Pattern_Based_on_Svm_Method

02 Initial Design

Initial Design

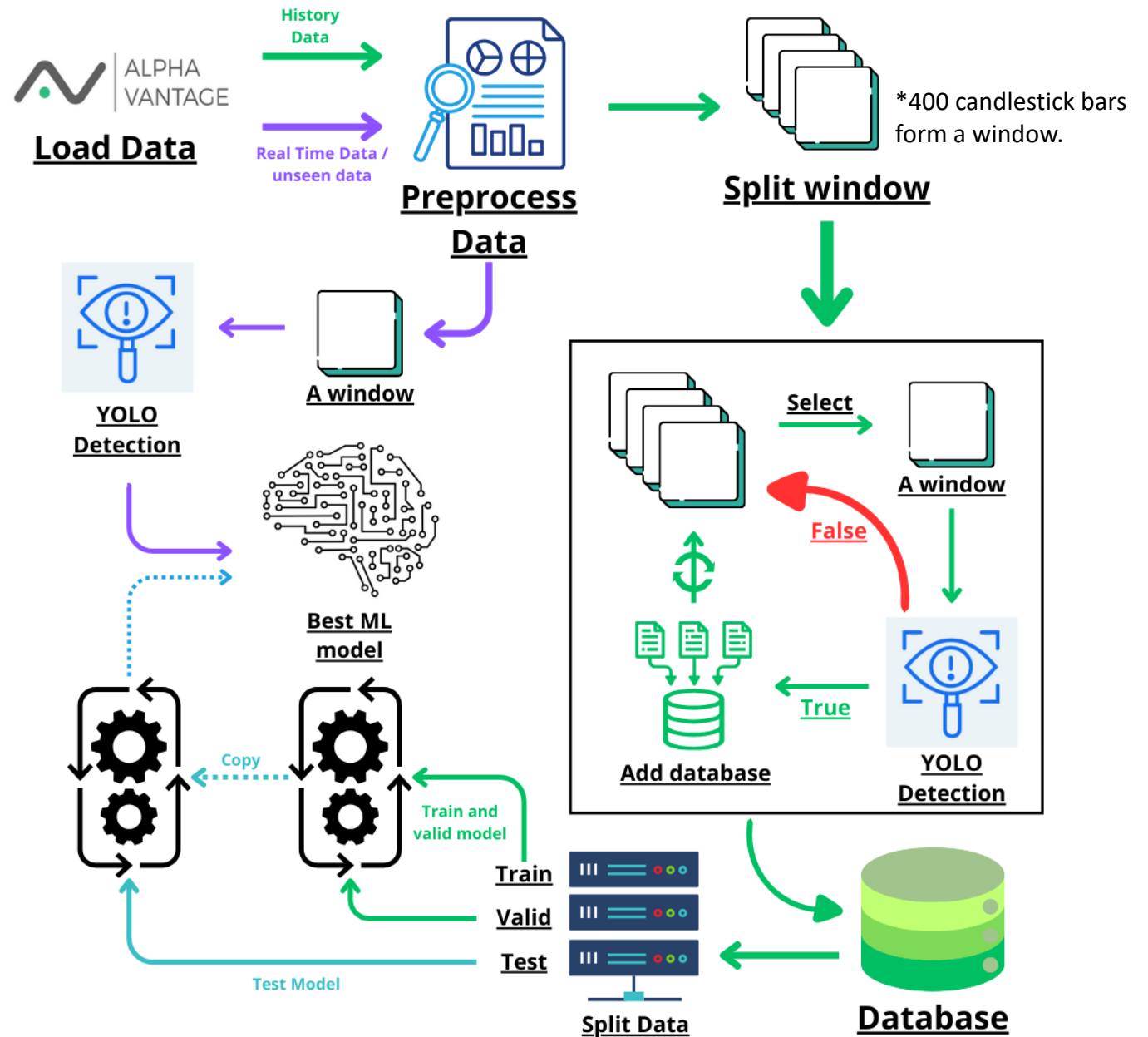


FIGURE 6: Initial Design

Dataset

S&P 2000-01-03 - 2025-02-18 => 358750 row (15-min OHLC datapoint) => 358349 window

- 80% for training
 - => 80% training data for training (=64% of original data)
 - => 20% training data for validation (=16% of original data)
- 20% for testing
 - (don't use it in the training and validation process for both Yolo and classifier)

(Extra Data)

TSLA 2021-09-02 to 2024-06-28 5-min OHLC data

03 Processing (YOLO)

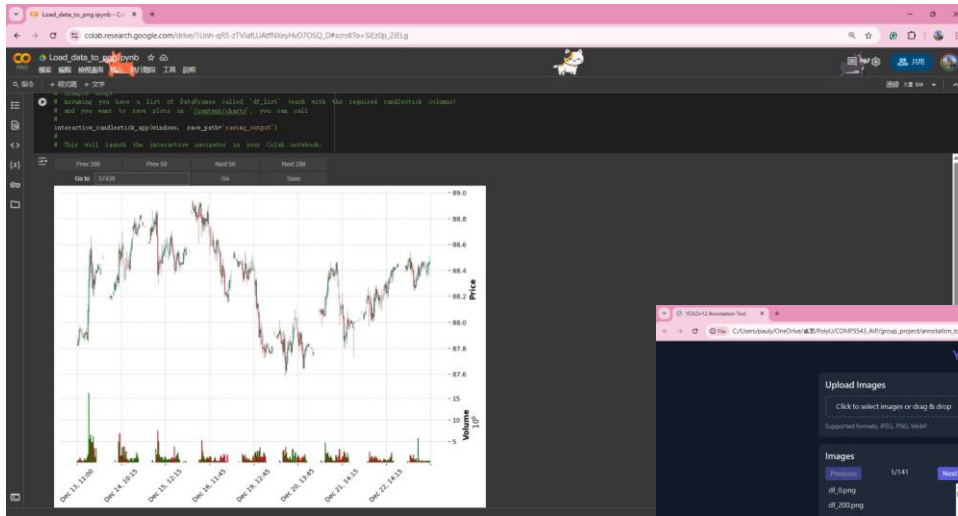


FIGURE 7: Window Selection Tool



Select the window
With Cup and handle

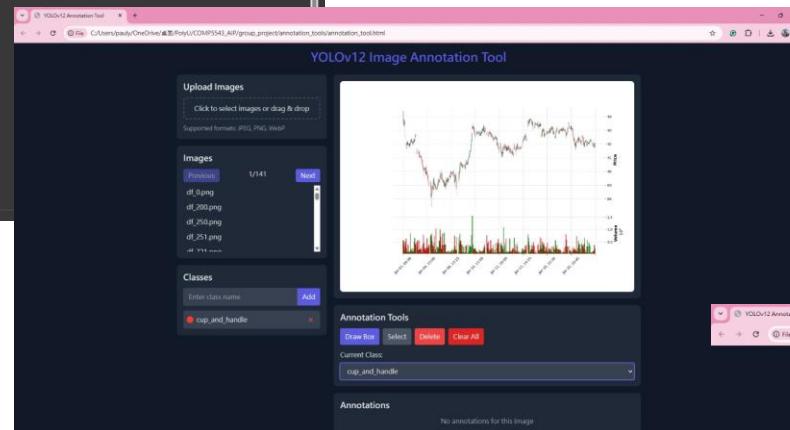
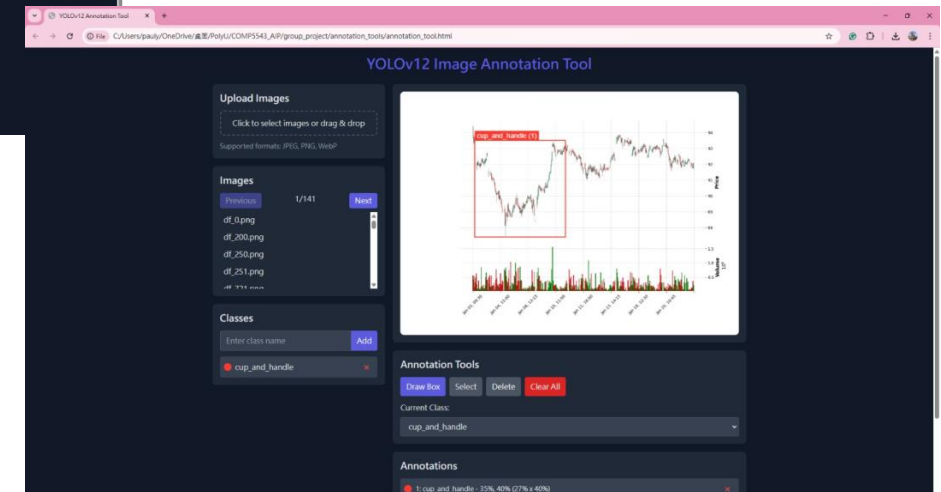


FIGURE 8: Annotation Tool



Annotation



03 Processing (YOLO)

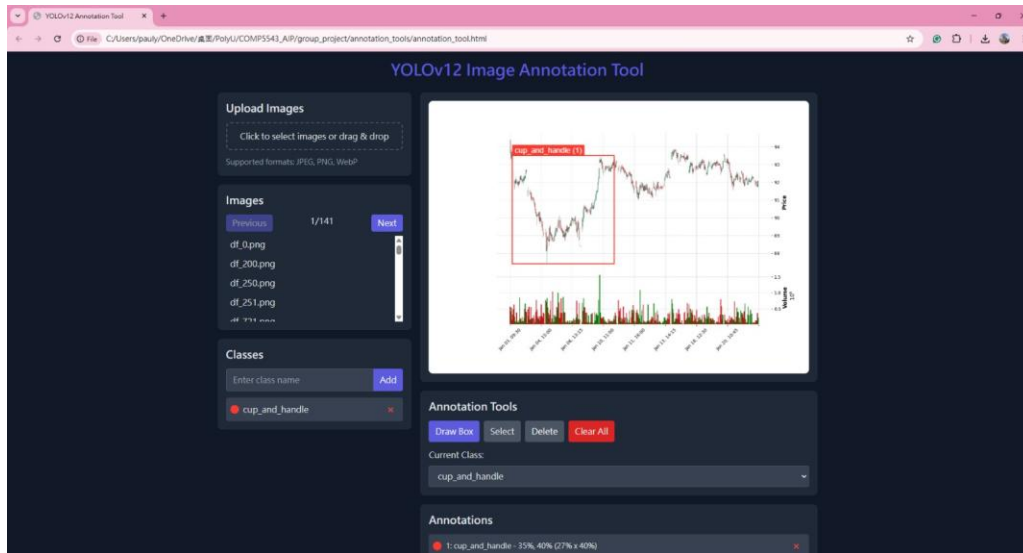
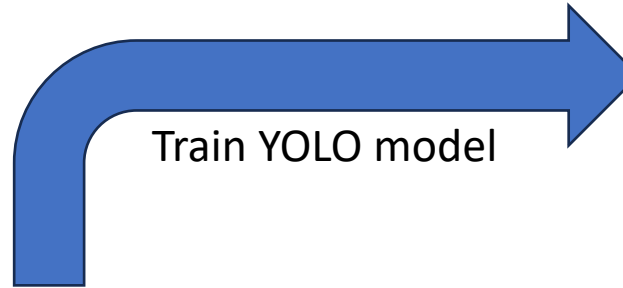


FIGURE 8: Annotation Tool

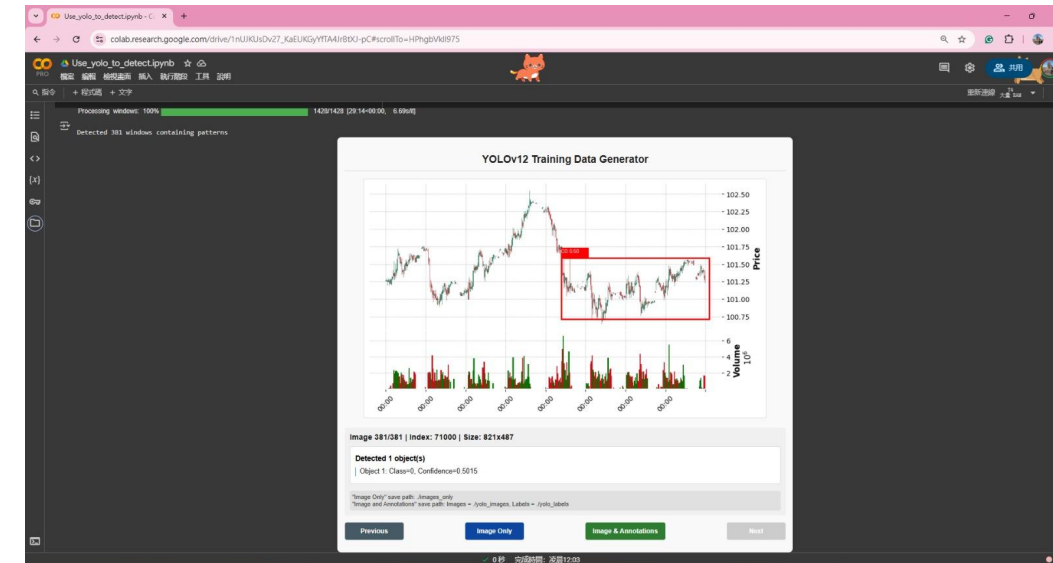


FIGURE 9: Reinforce Dataset Tool

- => Find more Data to reinforce the model
1. Some data may need to be annotated
 2. Some data can be directly added to the YOLO dataset

03 Processing (YOLO)

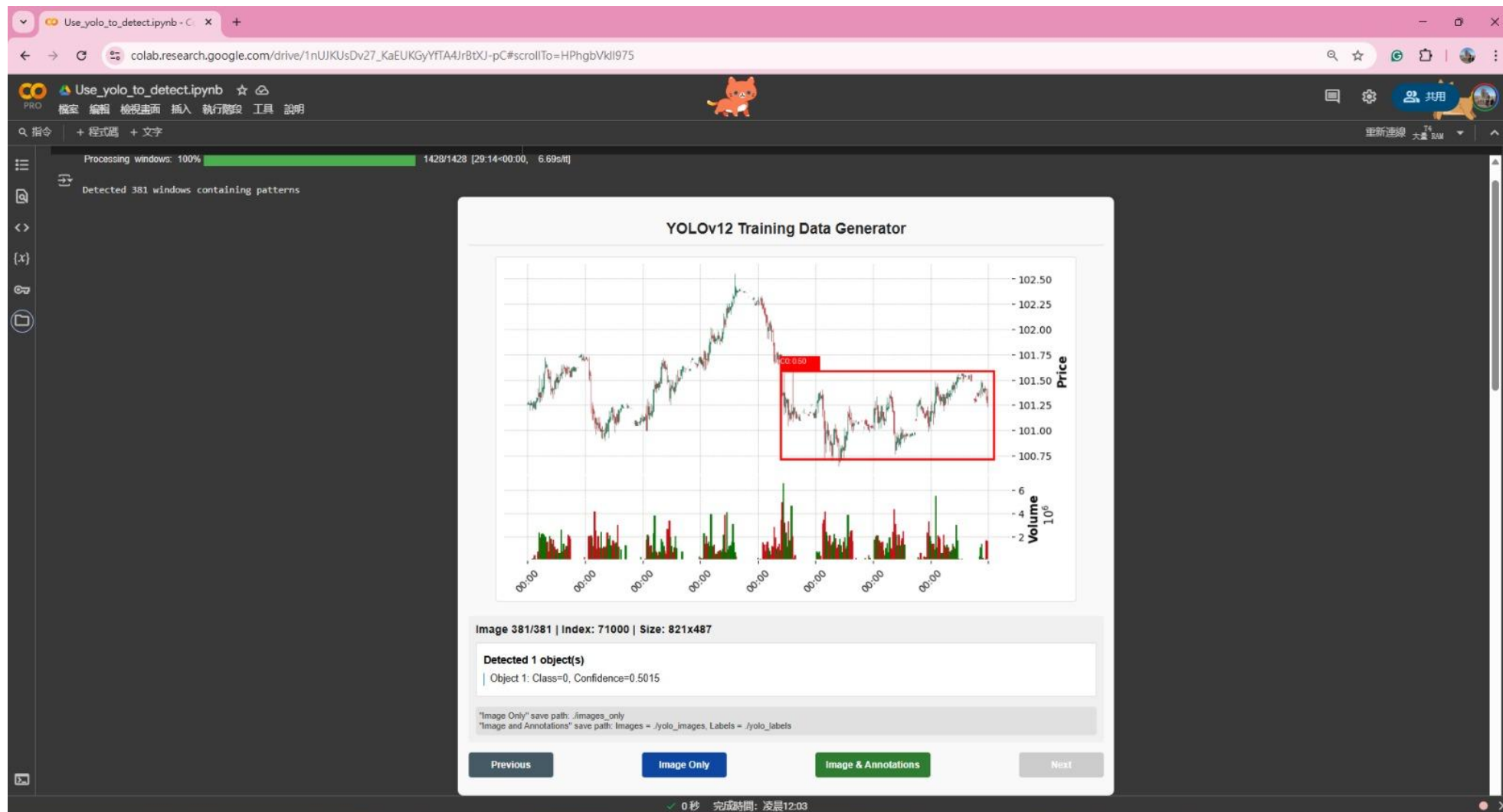


FIGURE 9: Reinforce Dataset Tool

03 Processing (Classifier)

Check it is successful or not

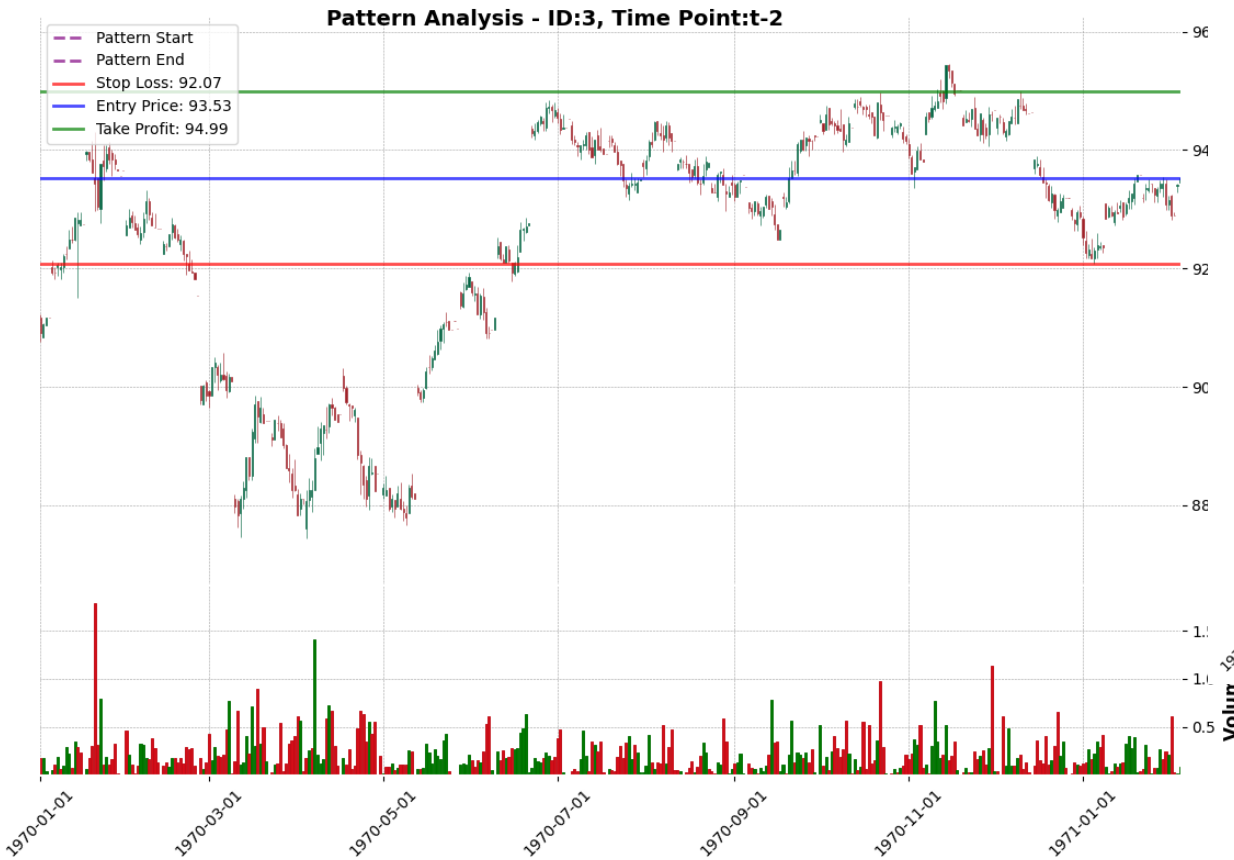
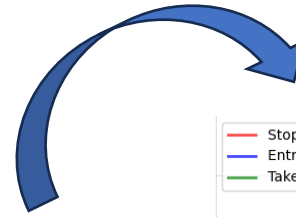


FIGURE 10: Baseline of the game
(Current window)



FIGURE 11: Baseline of the game
(Future window)

Game rule:

1. Hit the Stop Loss first => Loss
2. Hit the Take Profit first => Win



03 Processing (Classifier)

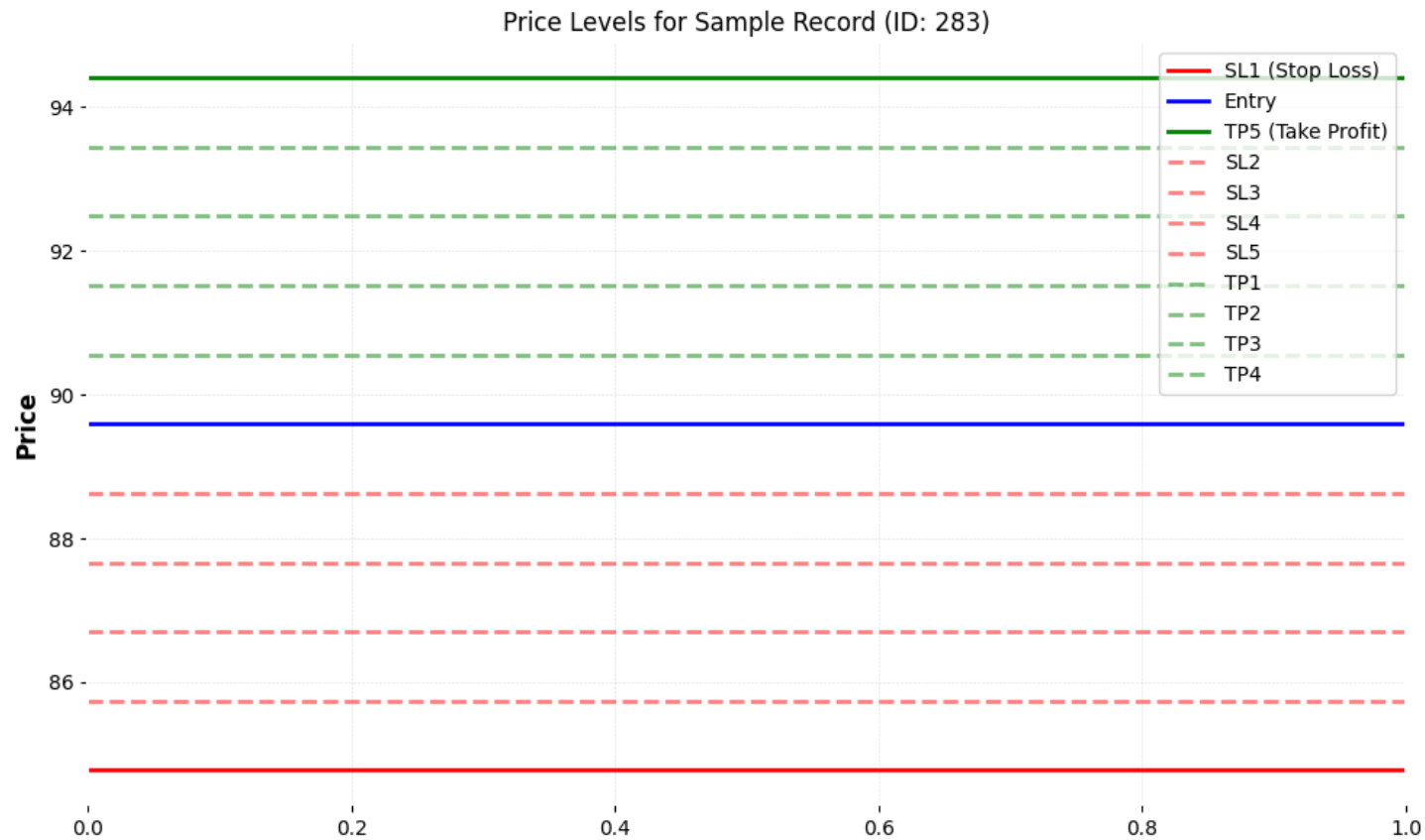


FIGURE 12: my enhancement of the game

Game rule (updated):
1. Hit the Stop Loss first => Loss
2. Hit the Take Profit first => Win

03 Processing (Classifier)

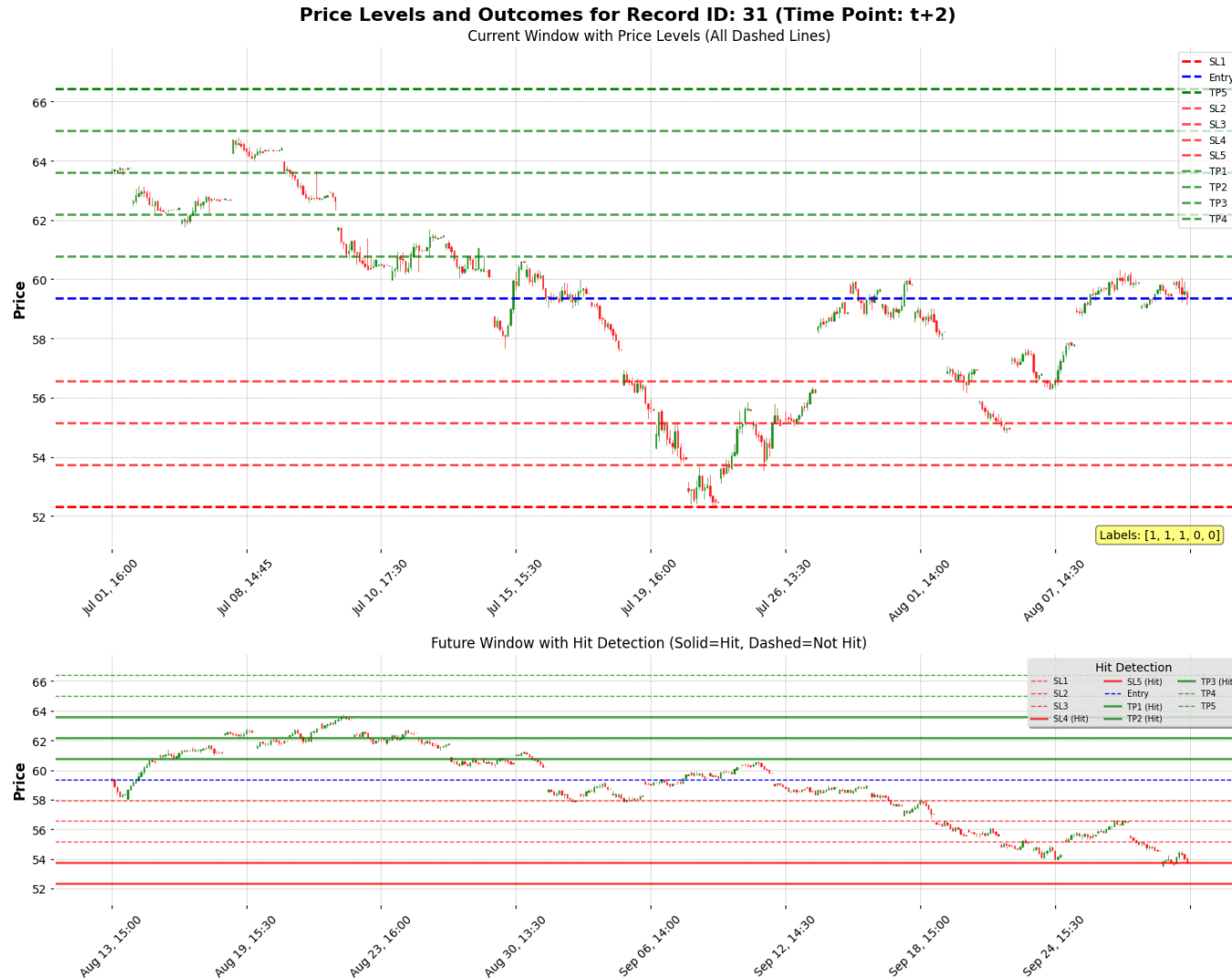


FIGURE 13: Demo of the game

Game rule (updated):

1. Hit the Stop Loss first => Loss
2. Hit the Take Profit first => Win

Train the classifier model to set the Stop Loss and Take Profit

⇒ Transformer

⇒ 1DCNN-LSTM

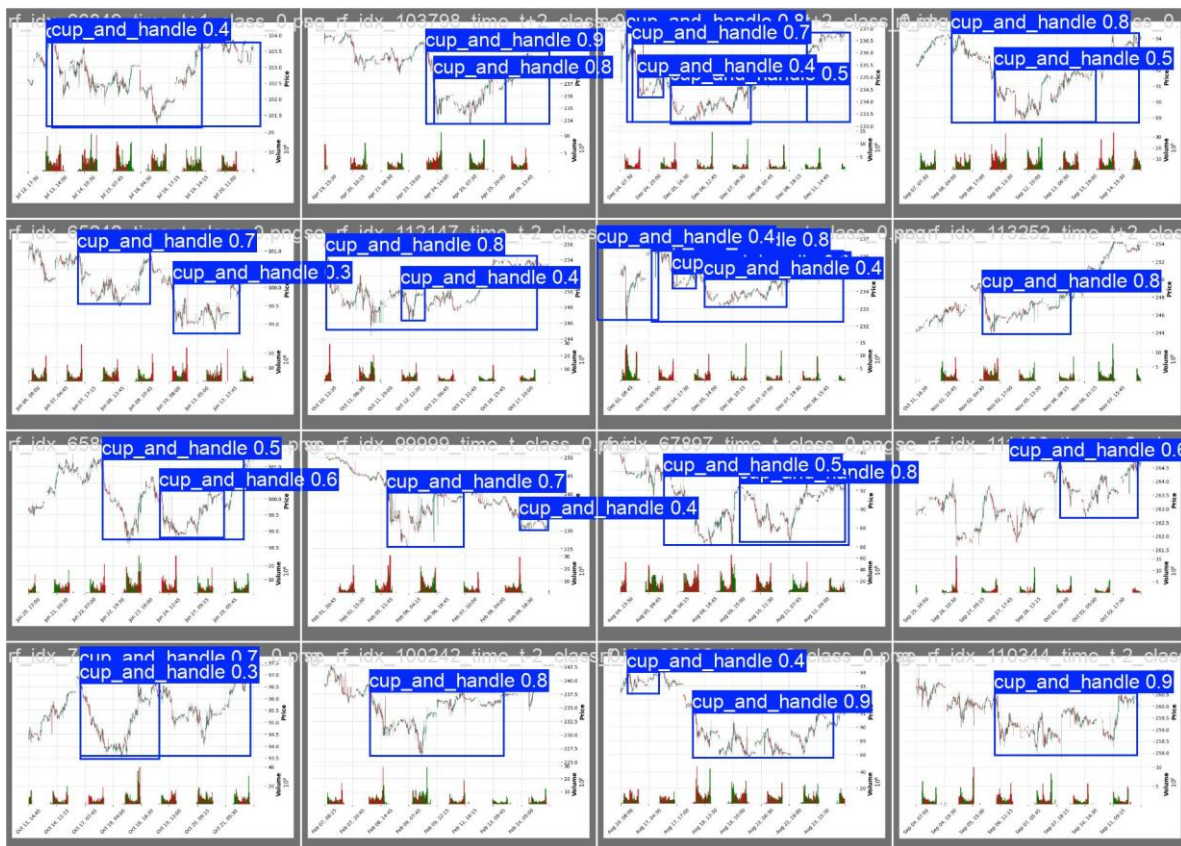


FIGURE 15: The Prediction of the YOLO Detection Model

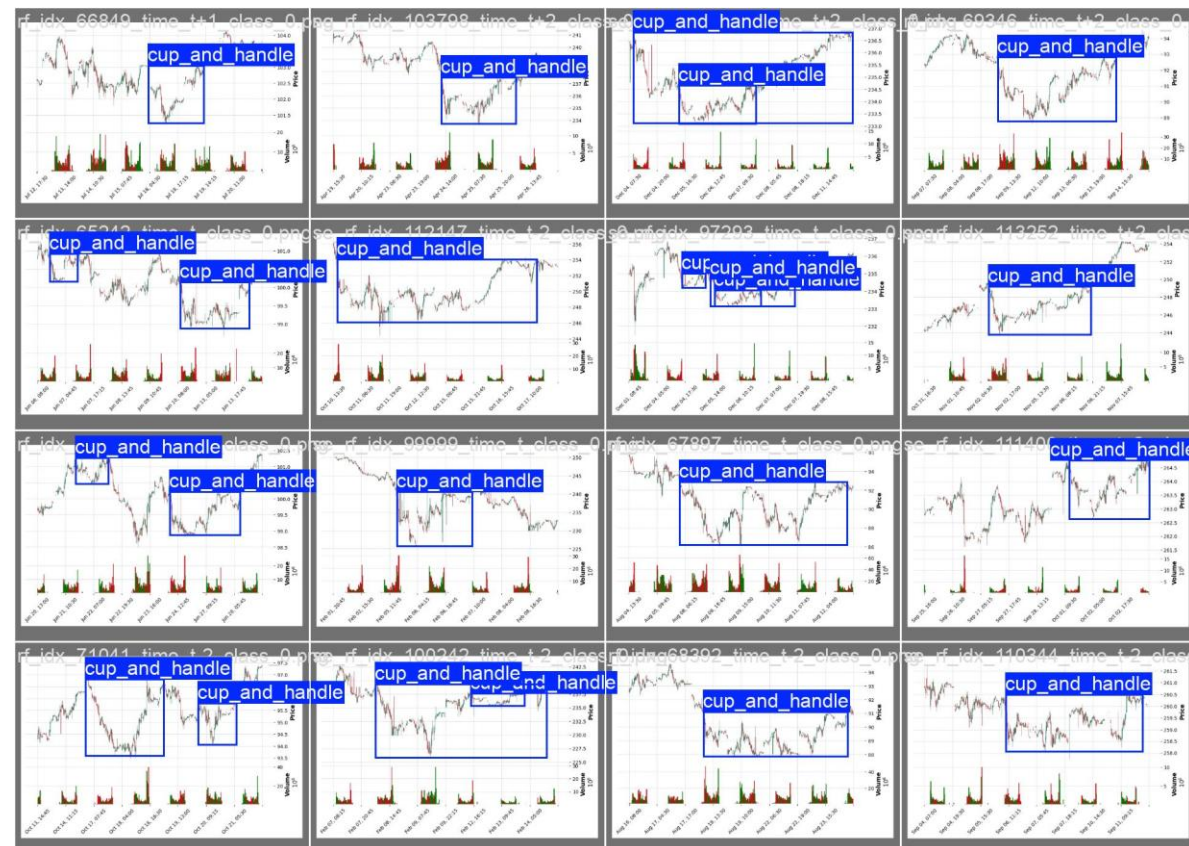


FIGURE 16: The Label of the YOLO Detection Model



FIGURE 17: The results of the YOLO detection model

***Also be the classifier model dataset*

04

Results (Classifier - SPY)

Train(Transformer):

Trading Analysis Results

Total Trades: 285

Successful Trades: 230

Failed Trades: 55

Overall Success Rate: 80.70%

Position Statistics:

Position 1: Selected 285 times, Success Rate: 80.70%

Train(1DCNN-LSTM):

Trading Analysis Results

Total Trades: 285

Successful Trades: 230

Failed Trades: 55

Overall Success Rate: 80.70%

Position Statistics:

Position 1: Selected 285 times, Success Rate: 80.70%

Results (Classifier - SPY)

Val(Transformer):

Trading Analysis Results

Total Trades: 72

Successful Trades: 55

Failed Trades: 17

Overall Success Rate: 76.39%

Position Statistics:

Position 1: Selected 72 times, Success Rate: 76.39%

Val(1DCNN-LSTM):

Trading Analysis Results

Total Trades: 72

Successful Trades: 55

Failed Trades: 17

Overall Success Rate: 76.39%

Position Statistics:

Position 1: Selected 71 times, Success Rate: 76.06%

Position 5: Selected 1 times, Success Rate: 100.00%

Results (Classifier - SPY)

Test(Transformer):

Trading Analysis Results

Total Trades: 47

Successful Trades: 36

Failed Trades: 11

Overall Success Rate: 76.60%

Position Statistics:

Position 1: Selected 47 times, Success Rate: 76.60%

Test(1DCNN-LSTM):

Trading Analysis Results

Total Trades: 47

Successful Trades: 36

Failed Trades: 11

Overall Success Rate: 76.60%

Position Statistics:

Position 1: Selected 47 times, Success Rate: 76.60%

04

Results (Classifier - TSLA)

TSLA 2021-09-02 to 2024-06-28 data

(Transformer)

Trading Analysis Results

Total Trades: 29

Successful Trades: 18

Failed Trades: 11

Overall Success Rate: 62.07%

Position Statistics:

Position 1: Selected 29 times, Success Rate: 62.07%

(1DCNN-LSTM)

Trading Analysis Results

Total Trades: 29

Successful Trades: 18

Failed Trades: 11

Overall Success Rate: 62.07%

Position Statistics:

Position 1: Selected 29 times, Success Rate: 62.07%

***This is unseen data**

The game: Flip a coin



Head (~60%):
You win \$1



Tail (~40%):
You lose \$1

Would you play this game?



When we know the prob,
It's the coin game

Limitation

- YOLO Detection Model works for finding non-random time point
- Decision classifier does not work
 - Insufficient data (345 training data)
 - Overfitting

Q & A



