# IS5006 Group Project

## Group 7

Ge Xiaomeng A0112747H
Goh Khai Hong A0212197H
Shen Siyuan A0112489B
Xue Bin A0039717X
Yong Chee Xian Matthew A0090988J
Zou Yang A0070179A

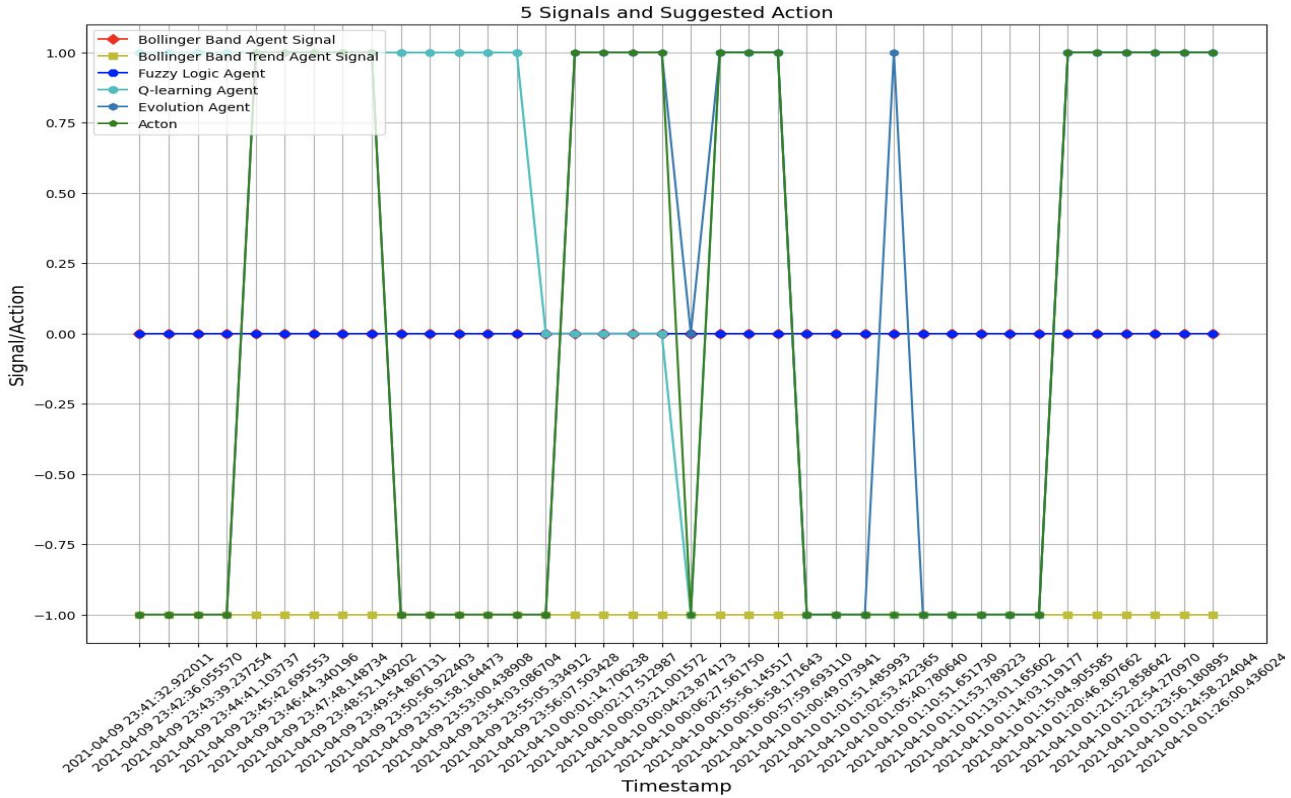
# Agenda

- Demo
- Simulation results
- Architecture
- Learning points
- Challenges & Solutions
- Strength and limitations
- Bonus and potential improvements

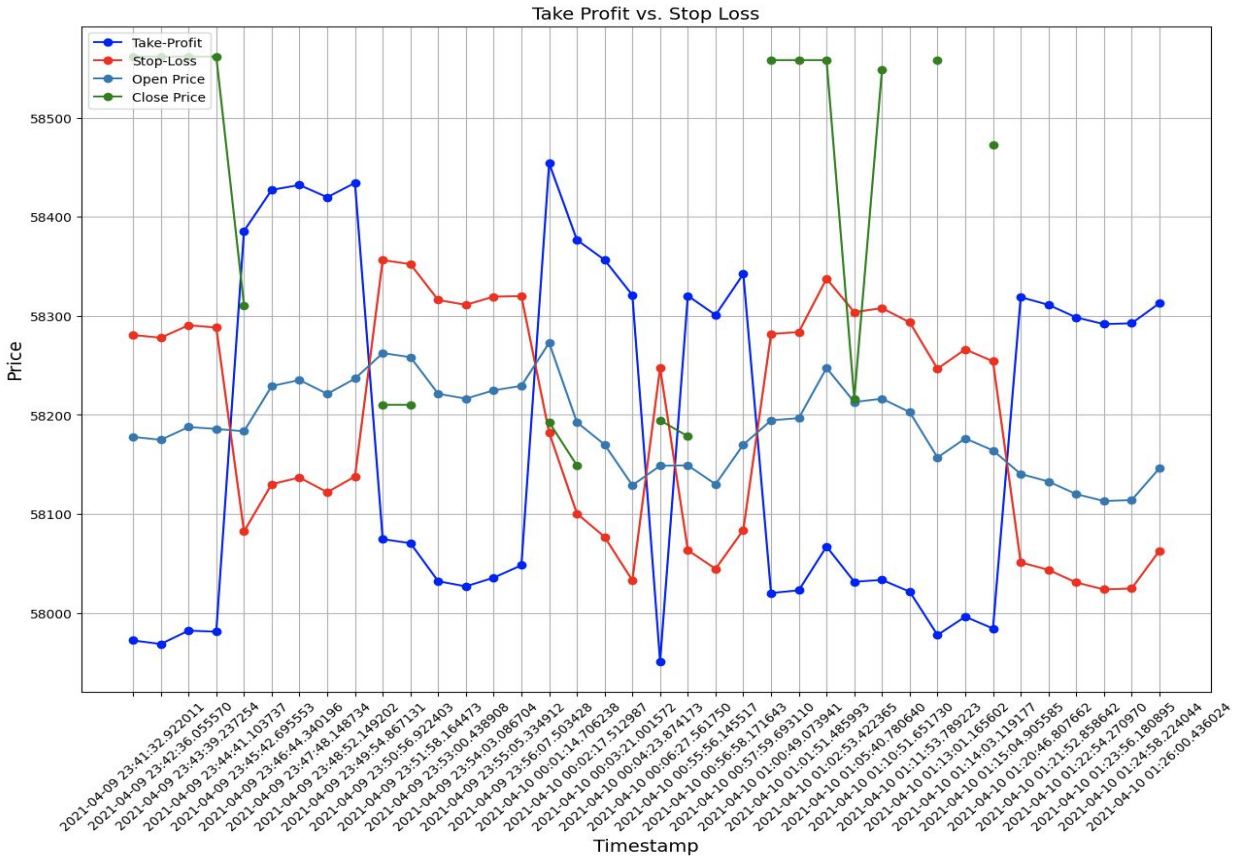
# How to guide

- Demonstration

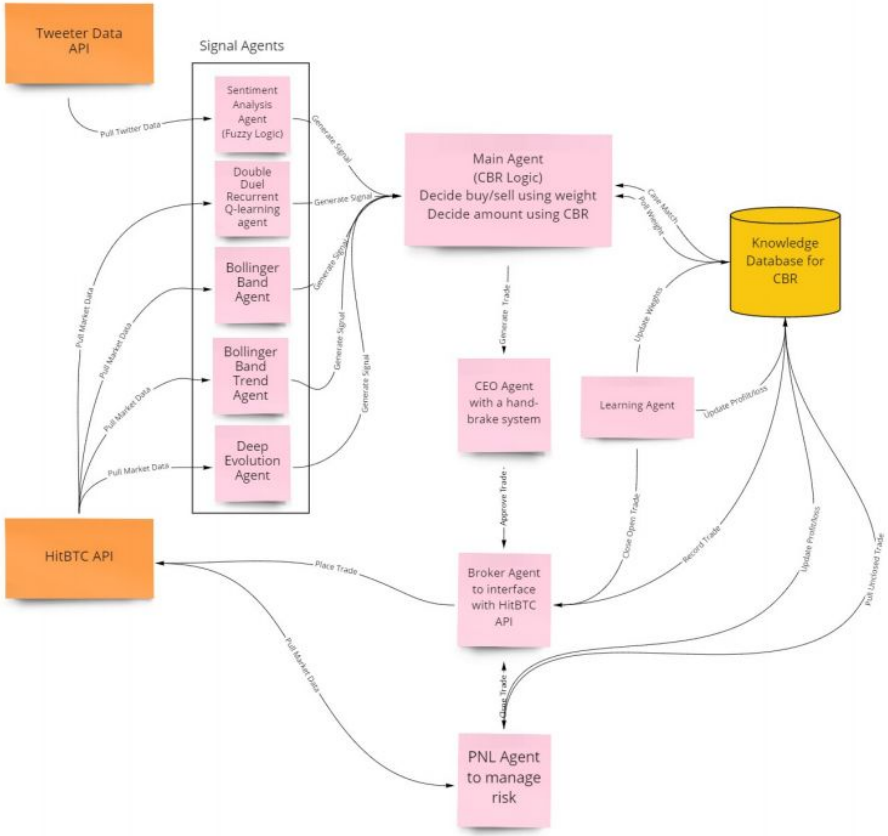
# Visualization of the model results



# Visualization of the model results



# Multi-Agent System(MAS) Model




**Two percepts**: price changes over a period of time and result of previous trades

**A single action**: placement of new trades

**Six core agents:** Signal agents( which contains 5 subagents), Decider agent, CEO agent, Broker agent, PnL agent, Learning agent.

**One database**: stores two sets of information - agent weights and pertinent past cases. It also saves them periodically into disk and google sheets.

# Learning points

### Forward and backward chaining

Our MAS model is able to operate optimally by considering the time taken for various tasks, optimising the decision making process for each agent. Adding relevant heuristics at critical processes allows us to prevent potential major faults in the model.

### Fuzzy logic

Our secondary research shows that cryptocurrency reacts positively/negatively to certain twitter accounts. The use of fuzzy logic on sentiment analysis provides a relevant signal for our model to act upon.

### Case Based Reasoning

Incorporating CBR allows our model to learn from past trades and helps augment the decision making processes.

### Insights from guest speakers

With their insights, we were able to make tweaks that improved the model's performance. One change we made was to have the CEO agent execute limit orders instead of market orders. This allows us to obtain a more favourable price for the trades.

### Importance of documentation

Throughout the course of this final project, we have documented our thought processes and experimentations in GitHub.

# Challenges & Solutions

**Challenges:** Struggling with demo.hitBTC
**Solution:** Let the CEO agent executes limit orders instead of market orders. This allows us to obtain a more favourable price for the trades.

**Challenges:** Issues in installing python environment on MacOS
**Solution:** Controlling python versions and  library version with pyenv and pip respectively, which helps to unify and stabilize the python environment on MacOS.

# Strength & Limitations

### Productization

Our System covers the end-to-end processes, which allows us to create a system that is production ready.

### Thin Volume of Demo Digital Exchange

The price spread for BTC/USDT is usually a few hundreds, which makes it very difficult to perform real time simulation as orders take a while to fill.

### Not real-time

The profit/loss agent is running every minute. In case there is a huge fluctuation of price within the minute, the risk management logic may not kick in timely.

### Not full-time

The system may not be online 24/7. When the system goes down, all the open trades will be subjected to the force of the market without risk control.

# Bonus & Potential Improvements

In our MAS model, we have incorporated more novel techniques such as **BBand** and **BBtrend**. Additionally, we have explored the use of **machine learning** to generate meaningful signals to aid the decision agent.

To incorporate more **advanced CBR** techniques. From our research, CBR techniques such as Dynamic Adaptive Ensemble(DAE) CBR (Chun & Park, 2005) and Regression CBR(RCBR) (Chun & Park, 2006) have been shown to perform better than conventional CBR, using composite neighbours.