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ARTIFICIAL INTELLIGENCE VS HUMAN : WHO WINS THE BOARD GAME?

PRESENTATION BY:

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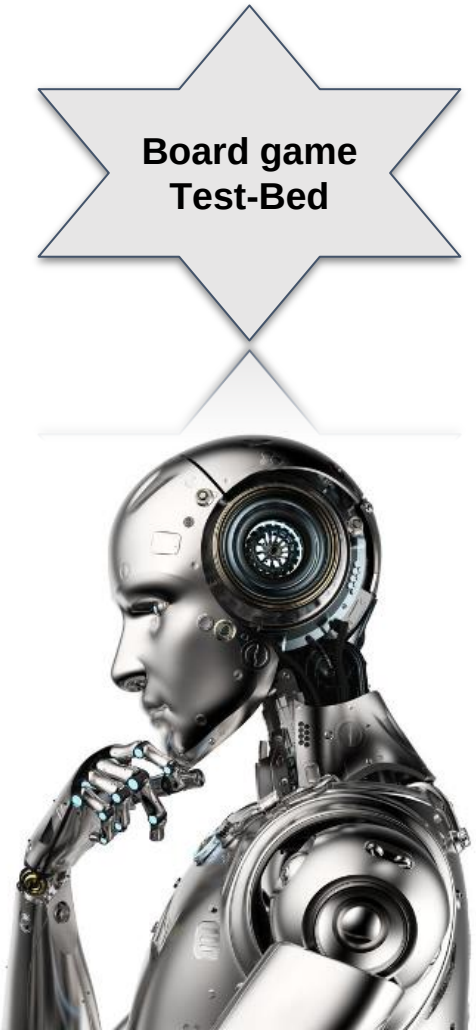
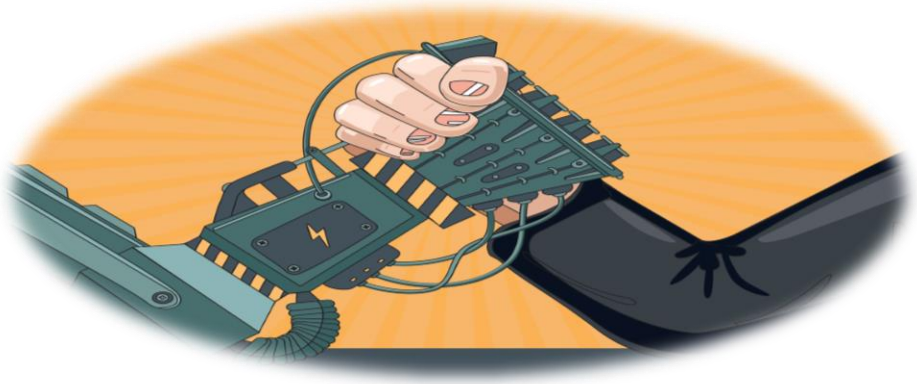
Background

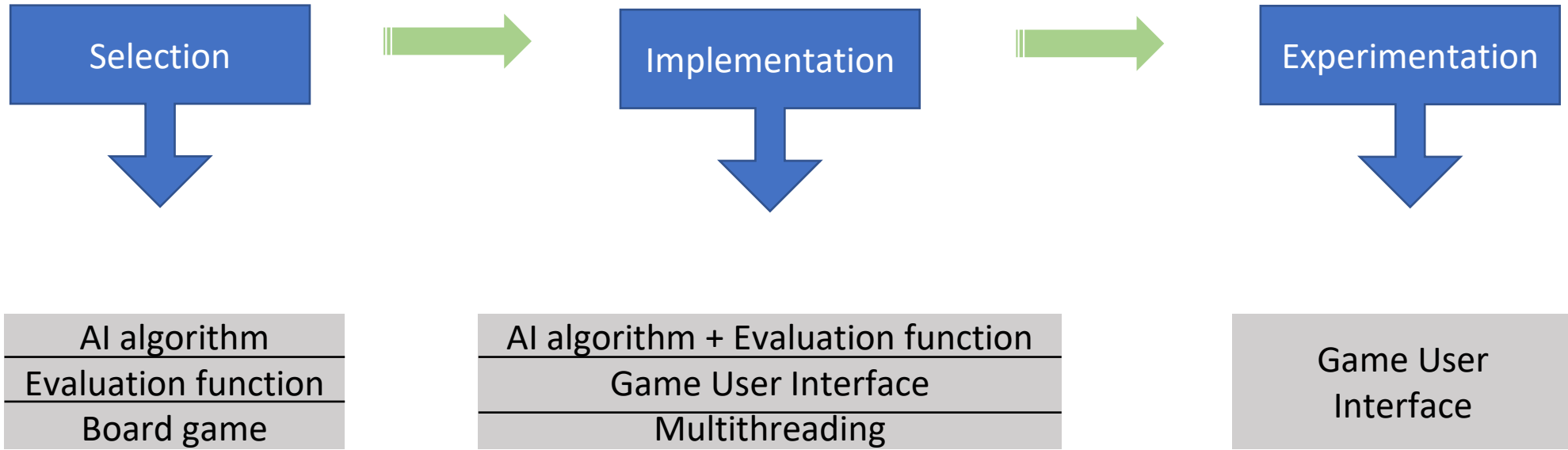
- Artificial Intelligence (AI) simulate and expand human's intelligence
- AI agent will be able to make self-governing decisions and produce AI functions independently
- Example: Robots, License Plate Recognition, etc
- Board game is a test-bed for AI algorithms
- Five in a row: put five pieces in a line



Aim & Objectives



- WHO WINS?, In the Board game battle
- To build a strong algorithm which helps AI but teaches human



Technical Gap

- Other gaming source wins human, does not help
- This project helps human by letting them know their wrong turn/decision
- Aims in developing a pro-player

Approach

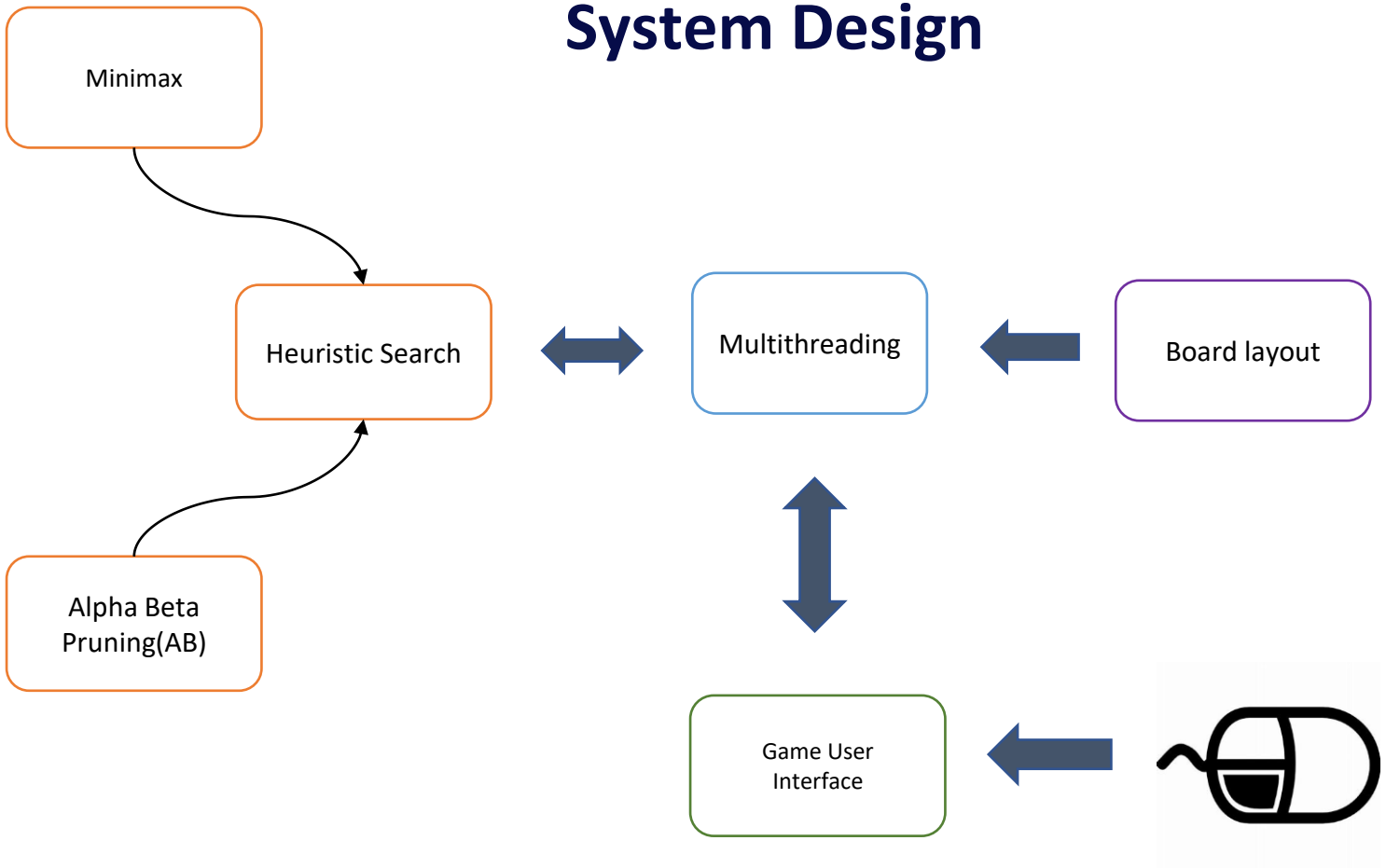
Search algorithms

- Minimax
- Alpha-Beta pruning

Evaluation function

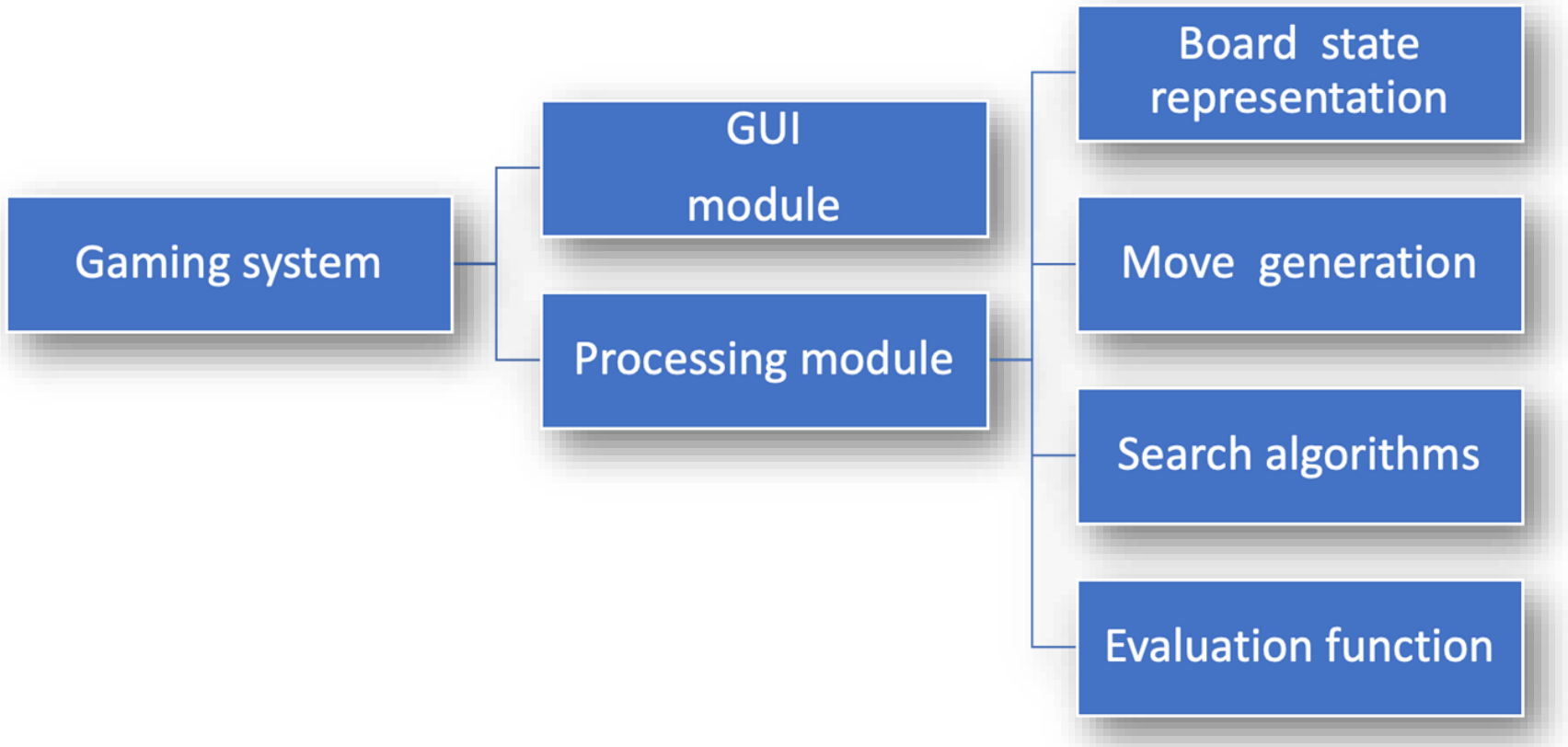
- Heuristics

System Design



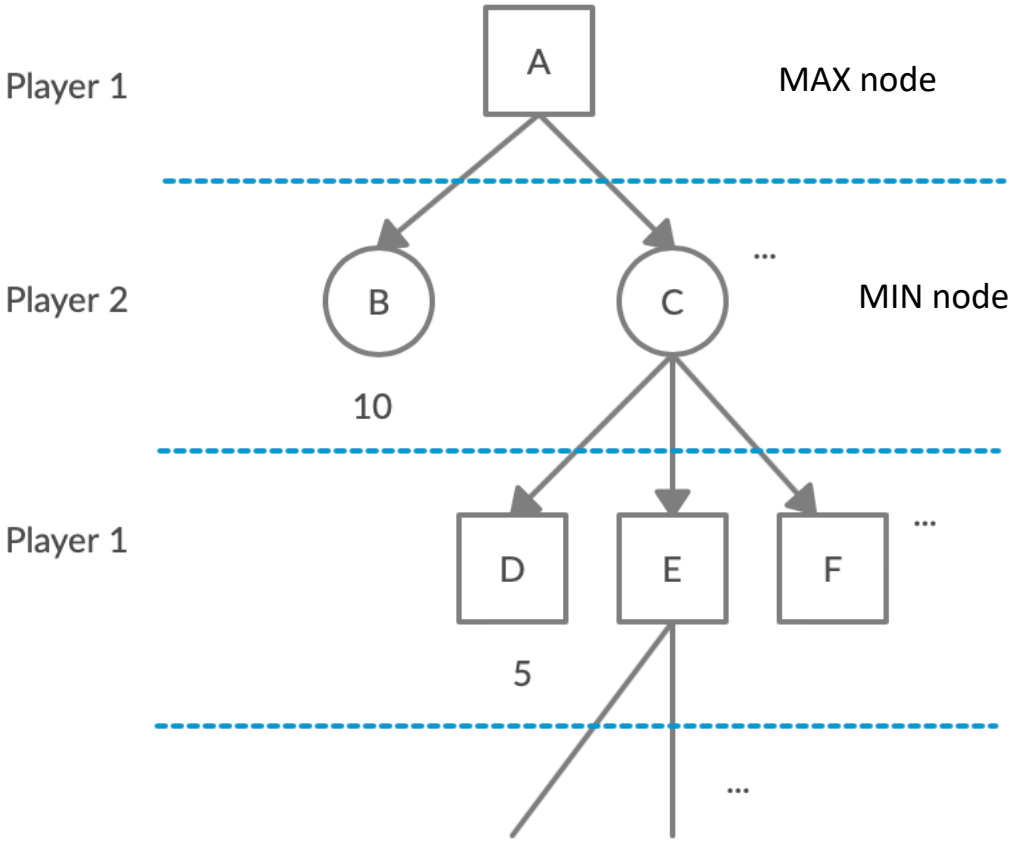
Selection | Implementation | Experimentation

Modules



Selection → Implementation → Experimentation

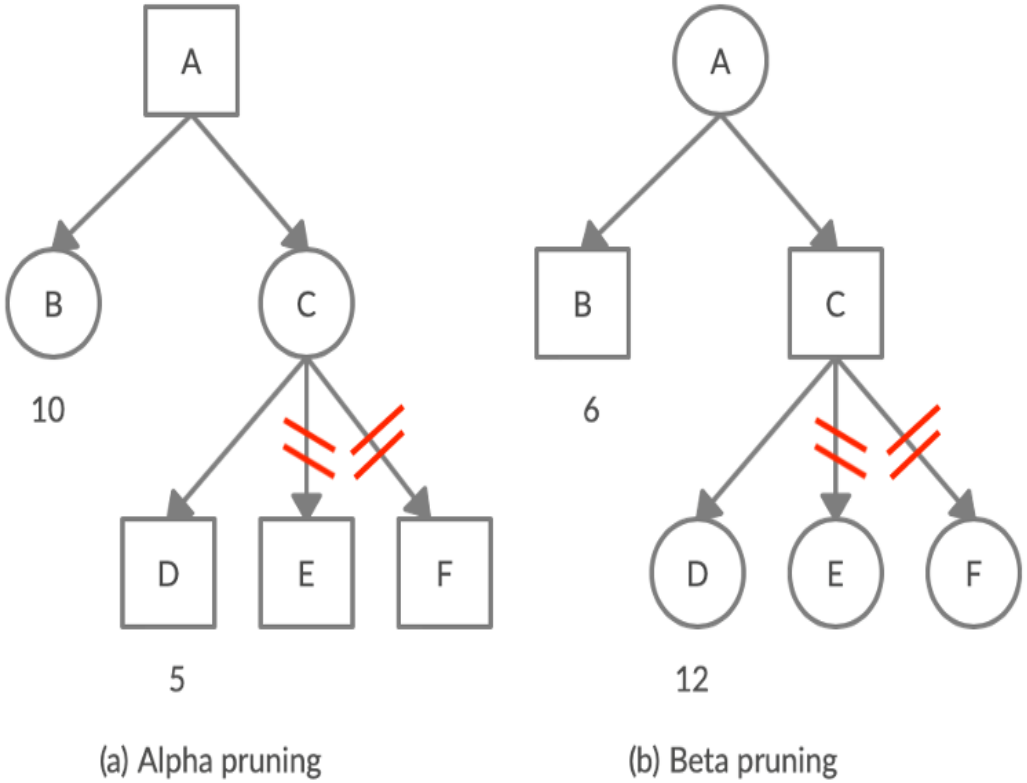
Minimax Algorithm



- Player 1 – AI – Maximizes its score
- Player 2 – Human player – Minimises AI's score
- Drawbacks: contain all possible moves including unnecessary branches.

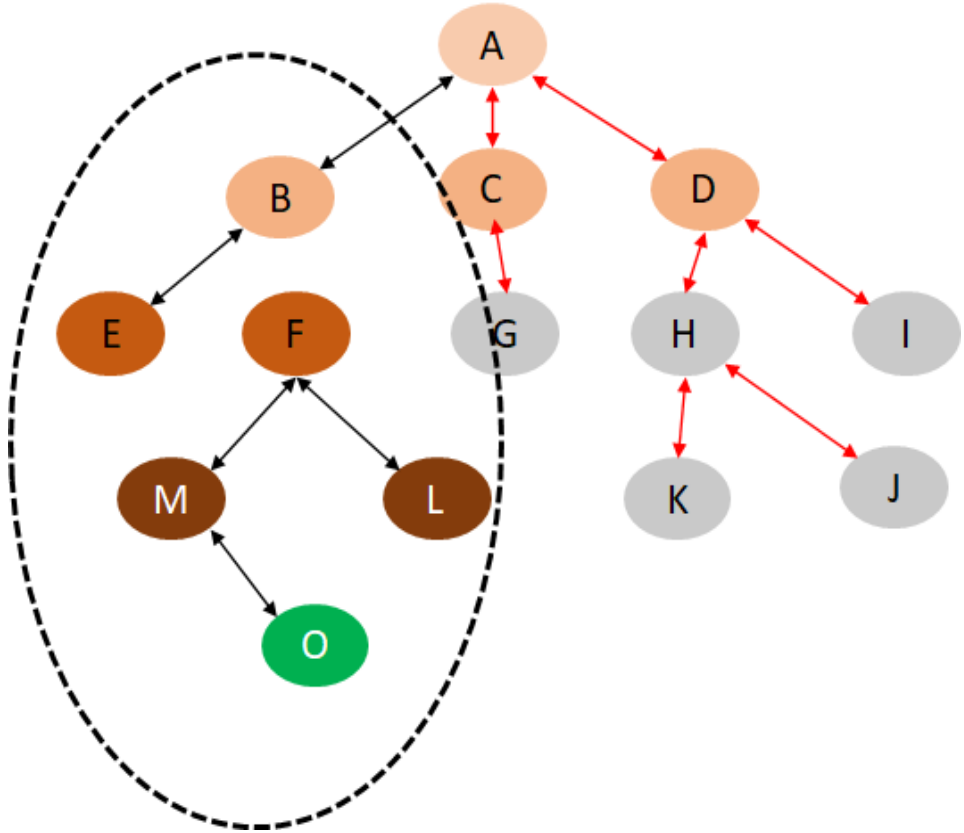
Selection | Implementation | Experimentation

Alpha Beta Pruning



- Alpha pruning
- Beta pruning
- Drawback: the order of nodes greatly determines the efficiency.

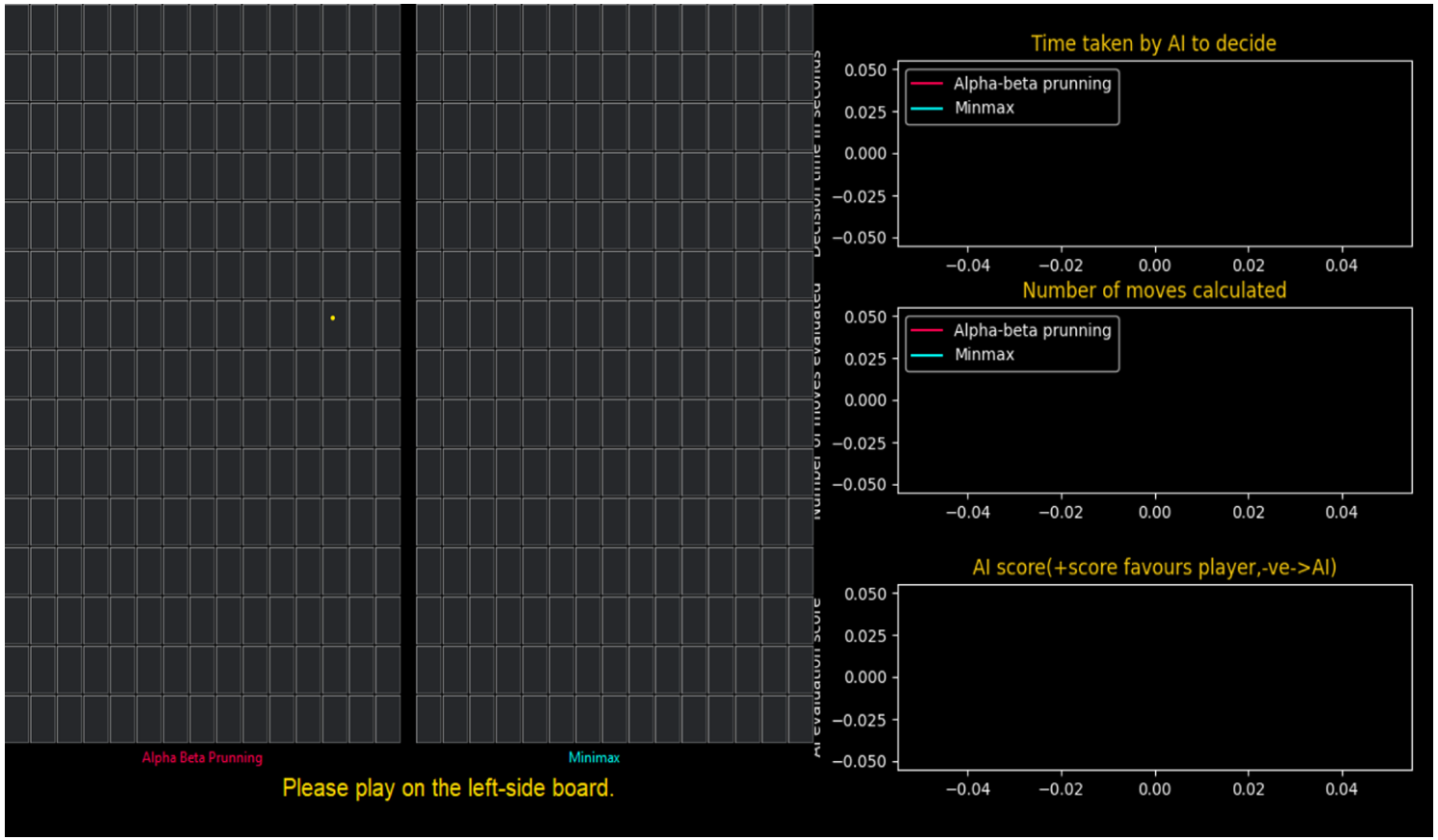
Evaluation Function



- Heuristic Search Function
- Cut down unnecessary nodes
- Reduces Evaluation time
- Node Scorer

Selection | Implementation | Experimentation

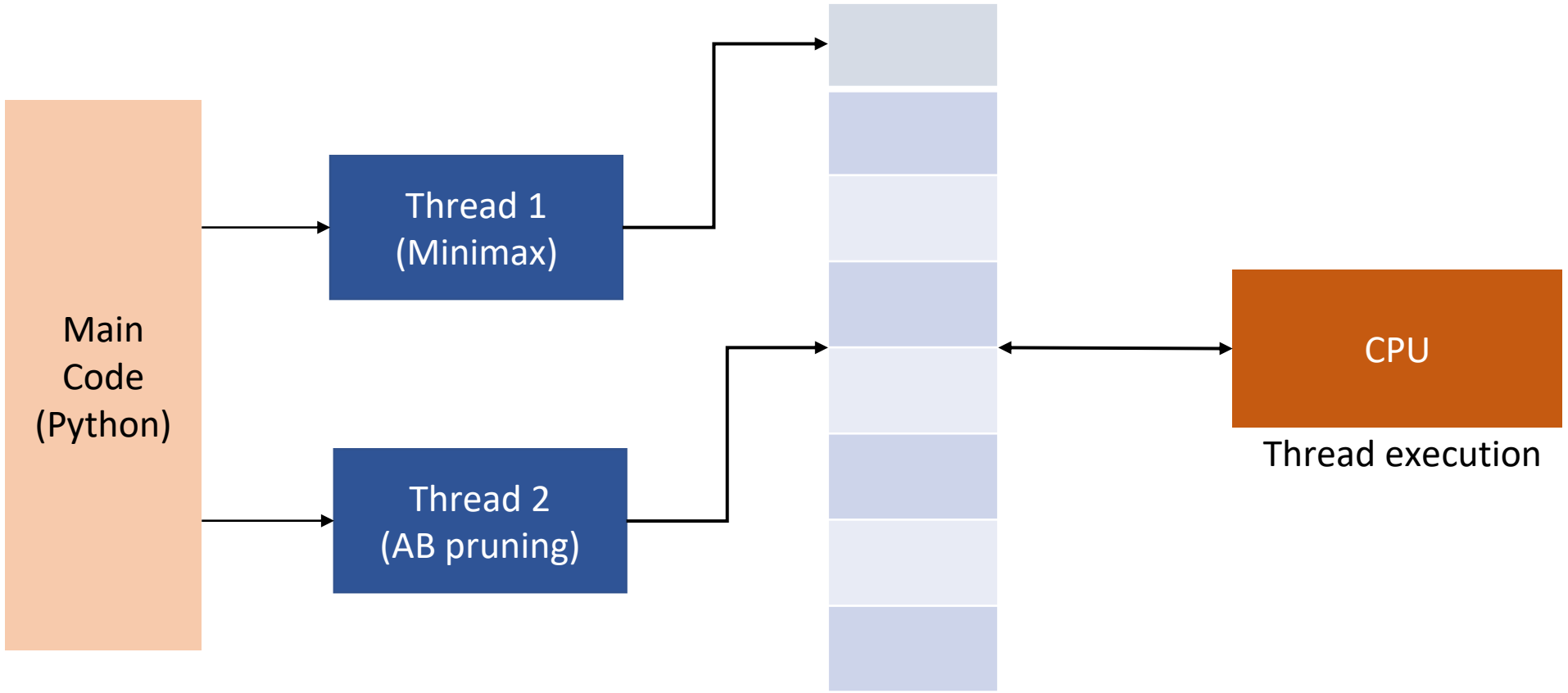
Graphical User Interface



- A computer user interface display by graphic mode.
- Man-machine interaction
- Operability
- Practicability
- Technology

Selection → Implementation → Experimentation

Multithreading



Selection → Implementation → Experimentation

How we experimented?

Use one algorithm

Set the time and record

Ask different people to play

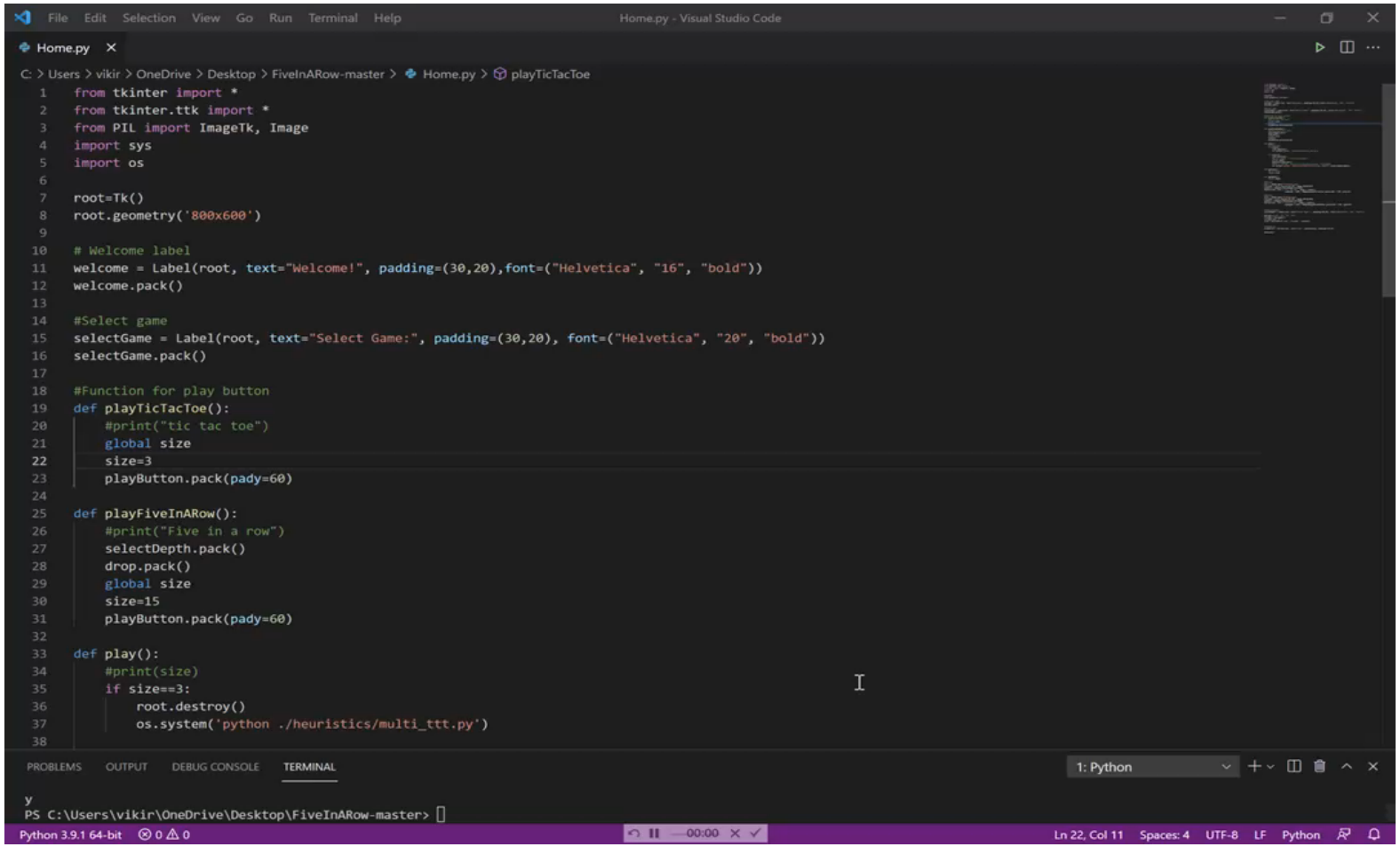
Place on different position

Calculate the time different algorithm used

Compared the time

Selection → Implementation → Experimentation

Result



Selection → Implementation → Experimentation

Evaluation

Minimax:

Average time taken per move= $\frac{0.2 + 0.25 + 0.27 + 0.30 + 0.7}{5}$

$= 0.344\ seconds$

Average no.of moves per best move = $\frac{25+50+50+75+150}{5}$

$= 70 moves$

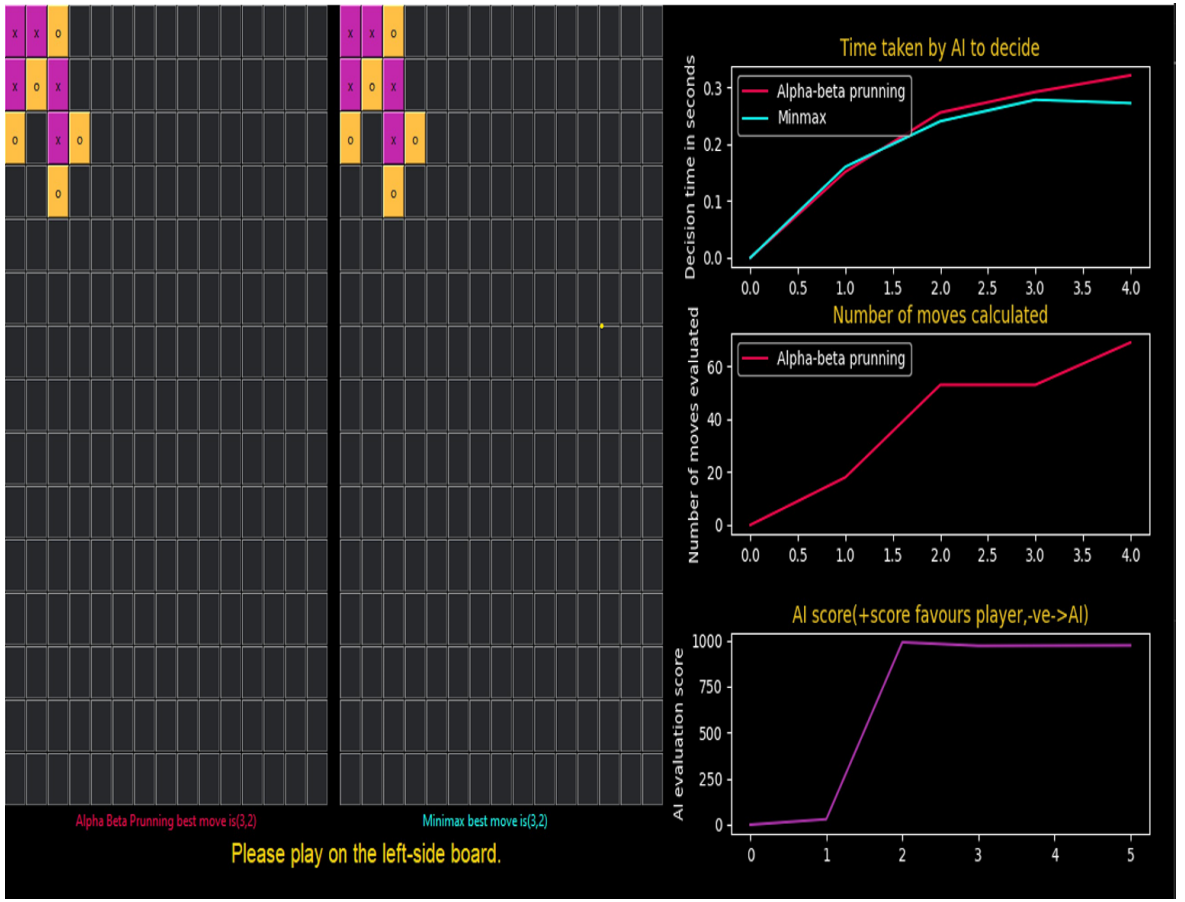
AB Pruning:

Average time taken per move $= \frac{0.15 + 0.25 + 0.3 + 0.35 + 0.7}{4}$

$= 0.4375 seconds$

Average number of moves per best move $= \frac{20+50+50+70}{4}$

$= 47.5$ moves



Selection | Implementation | Experimentation

Conclusion

With the help of Evaluation function, Search algorithms are able to win the Humans in the Five-in-a-row board game.

Selection → Implementation → Experimentation

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