

# Project proposal: Comparative exploration of old and modern AI Methods with Abalone

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**Abstract.** Games provide the perfect environment for artificial agents to navigate in. Especially for the

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## 1 Introduction

Abalone is a fairly new game, that was devised in 1987 by Michel Lalet and Laurent Lévi [1]. It is a two-player game consisting of a hexagonal board with 61 fields and 14 marbles for black and white respectively. The goal of the game is to push six of the opponent's marbles of the playing field.

### 1.1 Rules

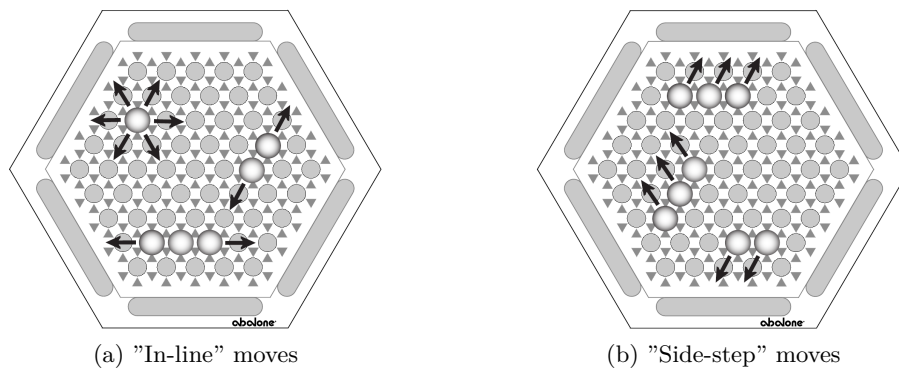


Fig. 1: Basic moves [3]

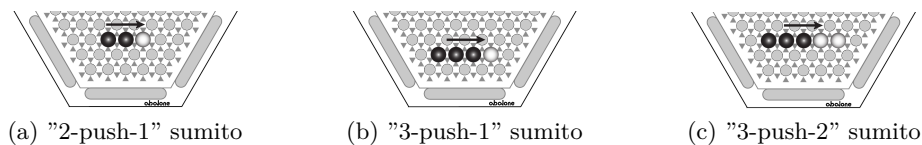


Fig. 2: Sumito positions allow pushing the opponents marbles [3]

## 1.2 Complexity

*State space complexity*

$$\sum_{k=8}^{14} \sum_{m=9}^{14} \frac{61!}{k!(61-k)!} \times \frac{(61-k)!}{m!((61-k)-m)!}$$

*Game tree complexity*

*Comparative complexity*

## 2 Project details

### 2.1 Agent design

Based on the PEAS framework we can analyze the task environment for the agent. [2, p.107]

**Performance measure** Win/loss, number of moves, time to deliberate

**Environment** Digital playing board

**Actuators** Move marbles, display text to CLI

**Sensors** Position of marbles

### 2.2 Algorithm comparison

### 2.3

## 3 Conclusion

## References

1. Abalone (board game). Wikipedia (Dec 2020)
2. Russell, S., Norvig, P.: Artificial Intelligence: A Modern Approach. Pearson Education, Inc, fourth edn. (2021)
3. S.A., A.: Abalone rulebook. <https://cdn.1j1ju.com/medias/c2/b0/3a-abalone-rulebook.pdf>