

# IA pour le jeu d'Othello

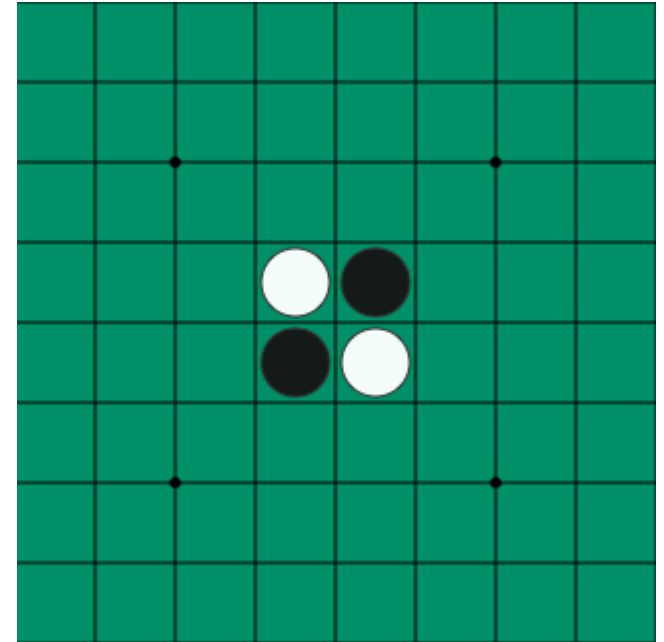
Algorithmique Avancée

L3-B Informatique

*Viet Nguyen - 20006303*

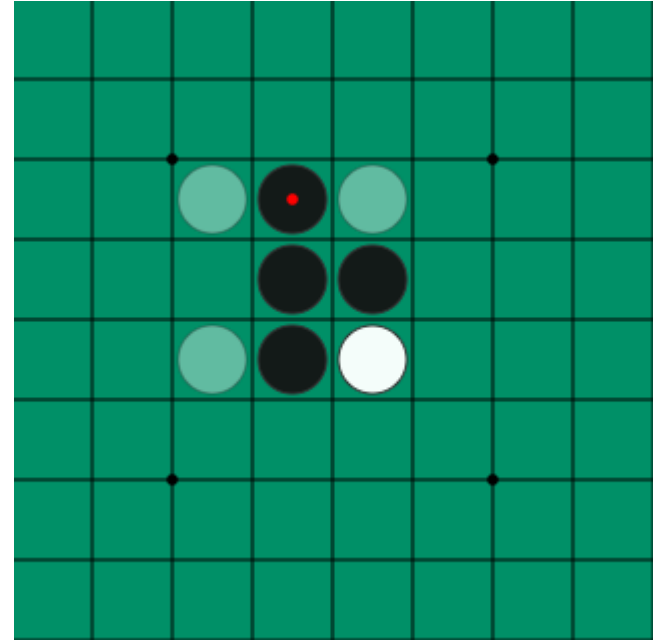
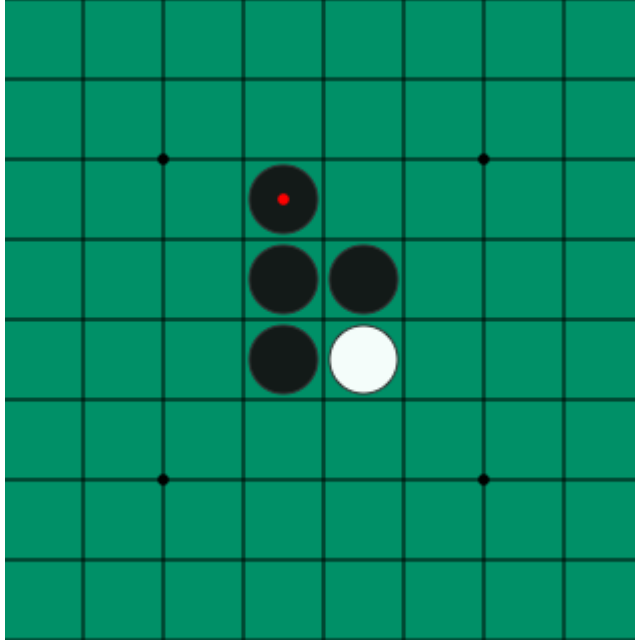
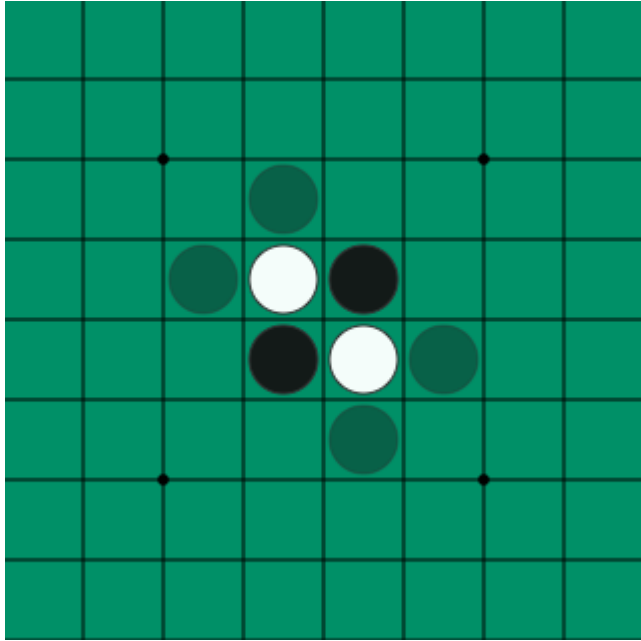
# Introduction

- **Othello (Reversi)**
  - Jeu de stratégie
  - 2 joueurs (Noir & Blanc)
  - Plateau 8x8 cases



# Introduction

- **Comment jouer**



# Introduction des Algorithmes

- **Minimax:**
  - **Réursive** → minimiser la perte maximale potentielle dans les pires scénarios de jeu
  - **Utiliser dans les jeux de stratégie (Échecs, TicTacToe, Othello, etc)**
- **L'élagage Alpha-Beta**
  - **Optimisation de Minimax** → Ignoré les branches faibles
    - Accélérant le processus de prise de décision

# Principes de Fonctionnement

- **Minimax**

- Évalue les mouvements
- Calculer le score des positions des cellules sur l'échiquier
- Choisir le meilleur coup possible
- Exécuter le mouvement sélectionné

```
{ 100, -20, 10, 5, 5, 10, -20, 100 }  
{ -20, -50, -2, -2, -2, -2, -50, -20 }  
{ 10, -2, -1, -1, -1, -1, -2, 10 }  
{ 5, -2, -1, -1, -1, -1, -2, 5 }  
{ 5, -2, -1, -1, -1, -1, -2, 5 }  
{ 10, -2, -1, -1, -1, -1, -2, 10 }  
{ -20, -50, -2, -2, -2, -2, -50, -20 }  
{ 100, -20, 10, 5, 5, 10, -20, 100 }
```

# Principes de Fonctionnement

- **L'élagage Alpha-Beta**

- Élaguer l'arbre de recherche et améliorer les performances

- alpha → maximisant

- beta → minimisant

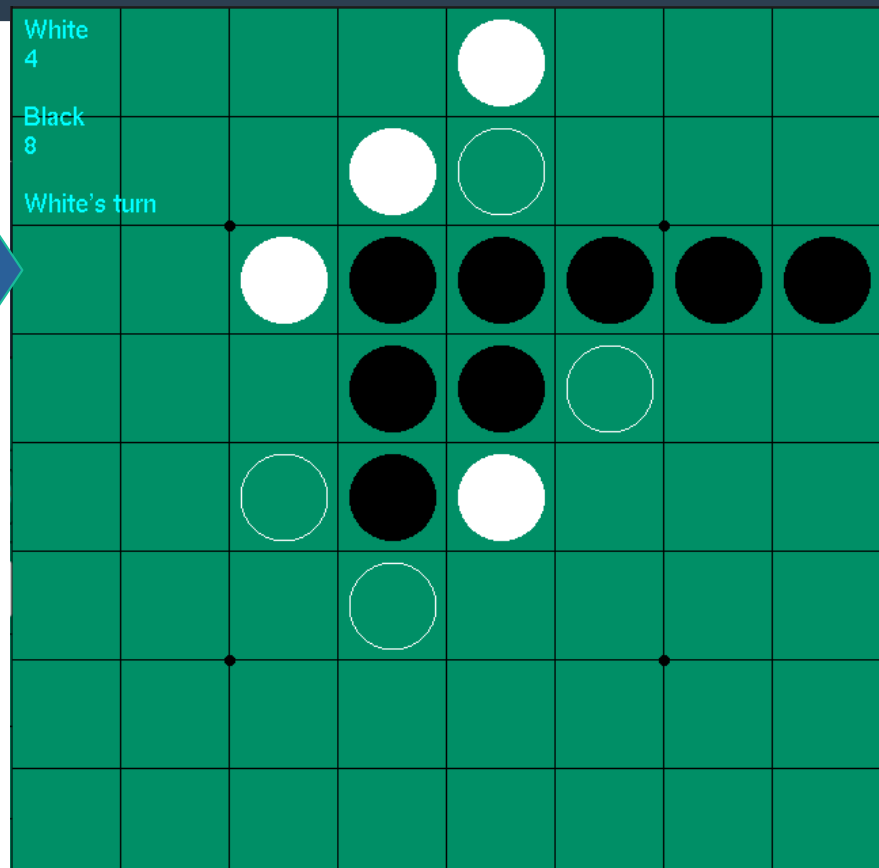
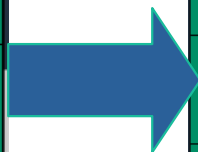
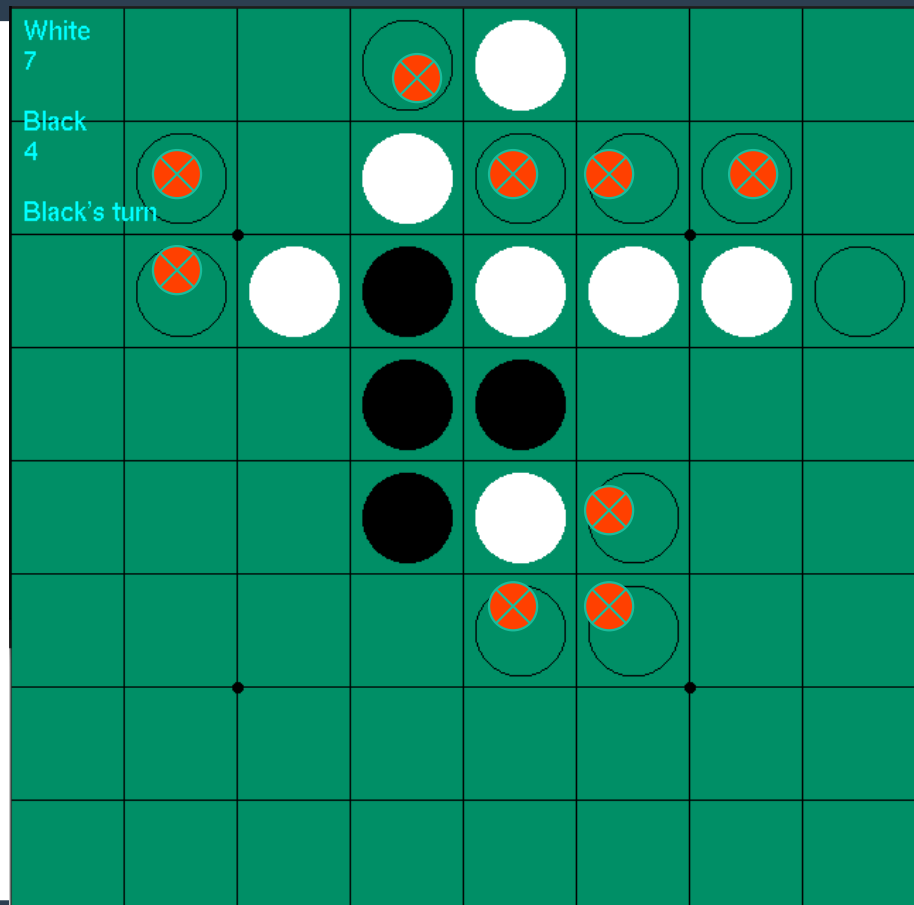
- Si la valeur d'un noeud est inférieure à alpha ou supérieure à beta

- Écarte cette branche elle ne pourra pas influencer le résultat final.

```
//// Alpha-beta pruning
if (score > alpha) {
    alpha = score;
}

if (alpha >= beta) {
    break;
}
```

# Example



# Conclusion

```
You choose to play with AI Minimax
White: 2, Black: 2
Your's turn
Minimax took 0.057761 seconds to execute
White: 3, Black: 3
Your's turn
Minimax took 0.111280 seconds to execute
White: 3, Black: 5
Your's turn
Minimax took 0.309501 seconds to execute
White: 2, Black: 8
Your's turn
Minimax took 0.281949 seconds to execute
White: 2, Black: 10
Your's turn
```



```
You choose to play with AI Minimax with Alpha-Beta Pruning
White: 2, Black: 2
Your's turn
Minimax with Alpha-Beta Pruning took 0.031173 seconds to execute
White: 3, Black: 3
Your's turn
Minimax with Alpha-Beta Pruning took 0.050421 seconds to execute
White: 3, Black: 5
Your's turn
Minimax with Alpha-Beta Pruning took 0.131753 seconds to execute
White: 2, Black: 8
Your's turn
Minimax with Alpha-Beta Pruning took 0.137288 seconds to execute
White: 3, Black: 9
Your's turn
Minimax with Alpha-Beta Pruning took 0.071569 seconds to execute
White: 4, Black: 10
Your's turn
Minimax with Alpha-Beta Pruning took 0.166987 seconds to execute
White: 6, Black: 10
Your's turn
```



# Merci

goodbye