Adversarial Search
or how to avoid losing
MinMax Search

Alpha beta pruning

Evaluation functions

- Use features of the game
Evaluation functions

- Use features of the game
- What if the next move changes everything?
Forward pruning

- Use evaluation function to prune
- What if the next move changes everything?
- Horizon effect
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Diagram showing the horizon effect with colored squares and red dots.
Horizon Effect

Evaluation functions

- Use features of the game
- What if the next move changes everything?
- Horizon effect
- Forward pruning
Lookup and search

• Small numbers of end states
  => Pre-calculate and solve this states in advance
Chances

Incomplete information

• Belief states expand the tree considerably
Incomplete information

• Belief states expand the tree considerably
• We can figure out what our enemy did
Incomplete information

- Belief states expand the tree considerably
- We can figure out what our enemy did
- Optimal play does make use predictable
Conclusion

• Adversarial search needs small trees
Conclusion

- Adversarial search needs small trees
- \(\Rightarrow\) Complete information
Conclusion

- Adversarial search needs small trees
- => Complete information
- => Small branching
Conclusion

- Adversarial search needs small trees
- => Complete information
- => Small branching
- => An good Evaluation function