AlphaZero 1 - Chess 0

How Modern AI is Reshaping Thought

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A Brief History of Computer Chess
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- **Late 2000s** - Chess engines become consistently stronger than Grandmasters

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<th>Rank</th>
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Where are we now?
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- December 2017 - AlphaZero developed by DeepMind
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- **December 2017 - AlphaZero developed by DeepMind**

- Crushed leading chess engine Stockfish with 28 wins and 72 draws from 100 games
How Stockfish Works
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- Previous chess engines relied on **alpha-beta pruning** and **heuristic evaluation**
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- Parameters of heuristic evaluation adjusted by hand - trial and error (Demo)
What’s so special about AlphaZero?
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- AlphaZero uses **Monte Carlo Tree Search (MCTS)**
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- Simulates games and determines probability of winning with a certain move - fundamentally different approach to chess AI
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- Picks better and better moves by updating probability vector with each iteration of MCTS
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● Neural network used to “learn” game

● Picks better and better moves by updating probability vector with each iteration of MCTS

● Self-reinforcement learning
Advantages of AlphaZero Algorithm
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- Scalable to other complete information two-player games
What’s Next for AlphaZero?
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- AlphaZero not feasible on ordinary computers
Reactions from Top Chess Grandmasters

**Fabiano Caruana:** "I was amazed. I don't think any other engine has shown dominance like that. I think it was four hours of learning so who knows what it can do with even more."

**Sergey Karjakin:** “I will pay very much to get access to this program. Maybe $100,000, today!”

**Wesley So:** "Chess isn't yet dead; it's pretty inexhaustible. The main problem is that most of the games are the same for the first 12, 15 moves."
Implications for the Future of AI
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- Moving away from blind search
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● Moving away from blind search

● Neural networks - very close parallel to how humans learn chess
Implications for the Future of AI

- Moving away from blind search
- Neural networks - very close parallel to how humans learn chess
- Ever-increasing computational power
Conclusion

- AlphaZero revolutionary for both chess and AI

- A result of big changes we have already begun to see with machine learning and neural networks - more closely simulating human thought

- Could have a great impact in the future - next step could be applying this to incomplete information games like poker
Thank you!
Citations

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