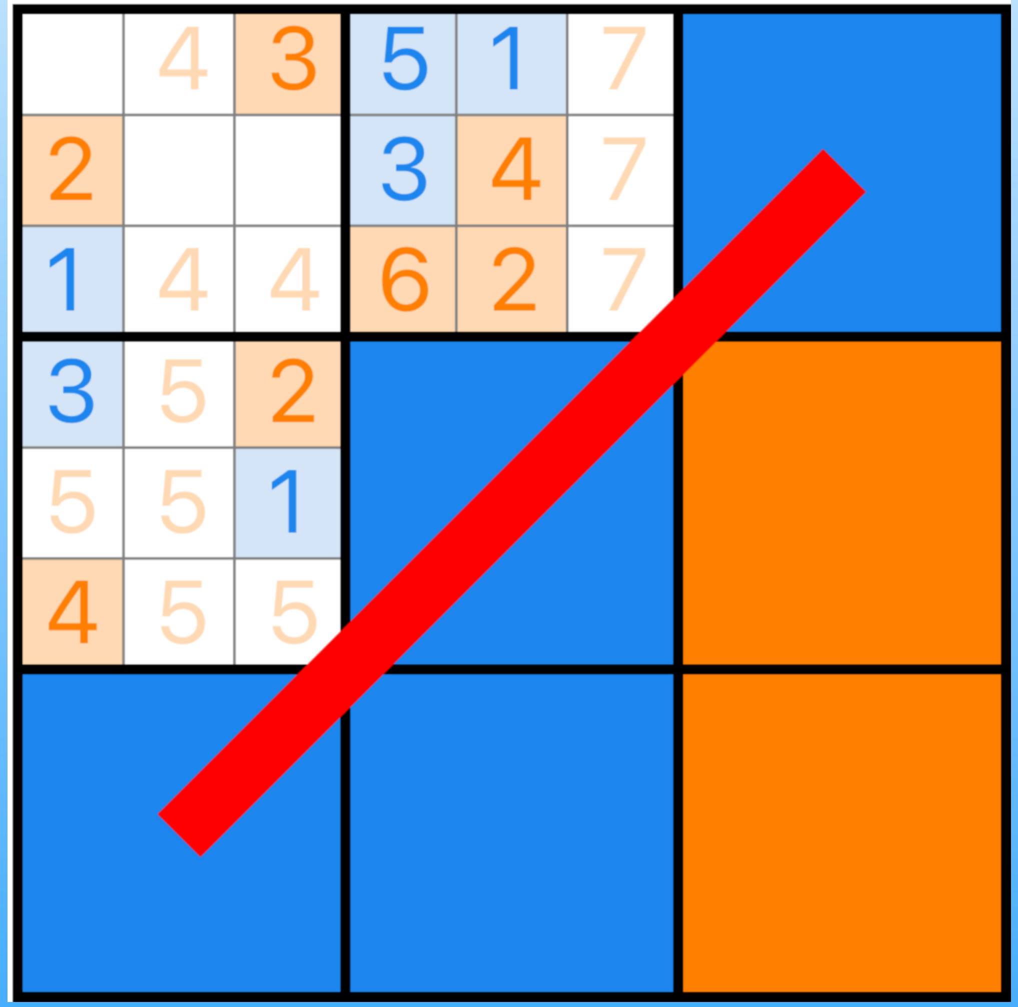
Monte Carlo Tree Search

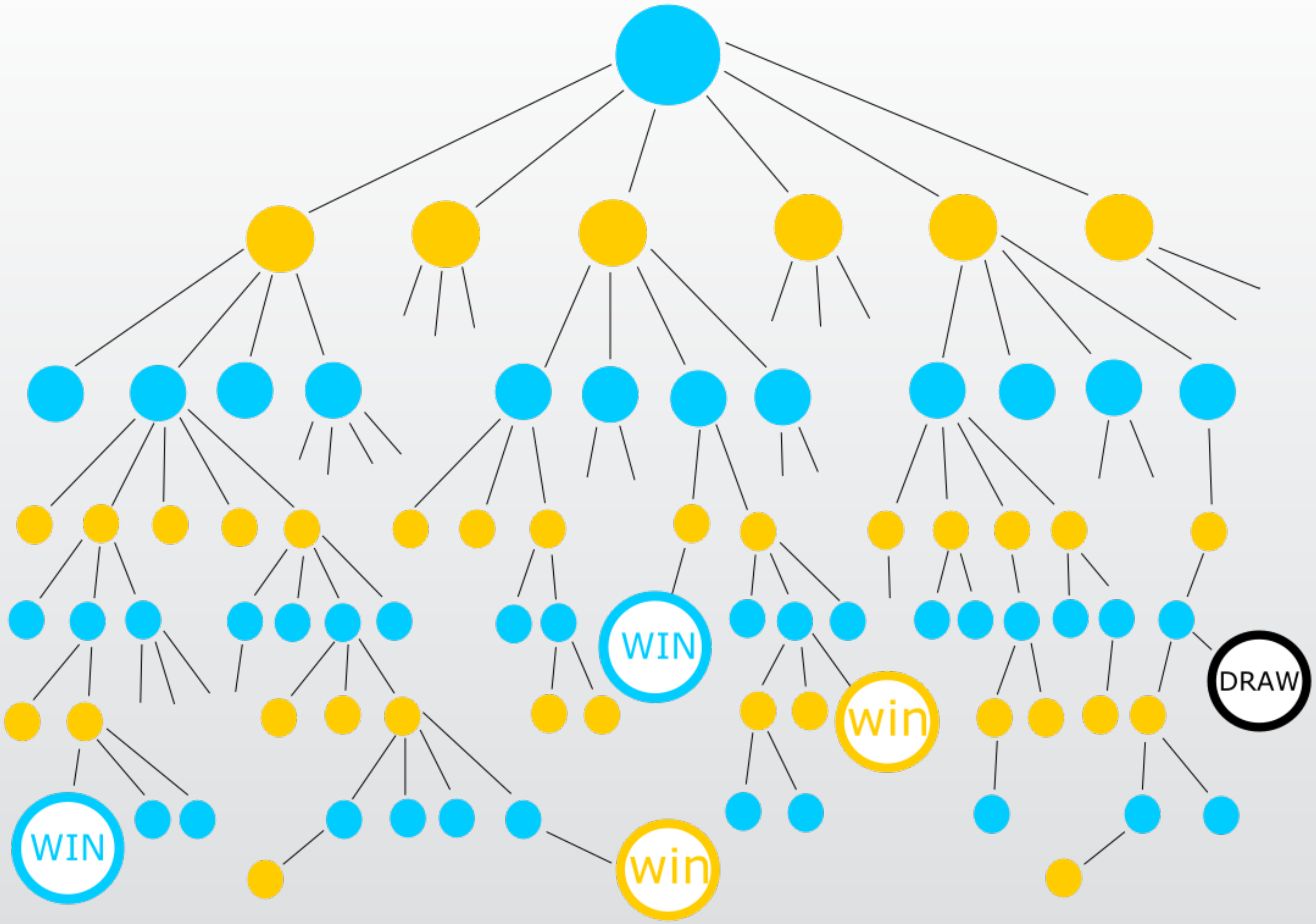
By Max Khrapov

Sansumoku



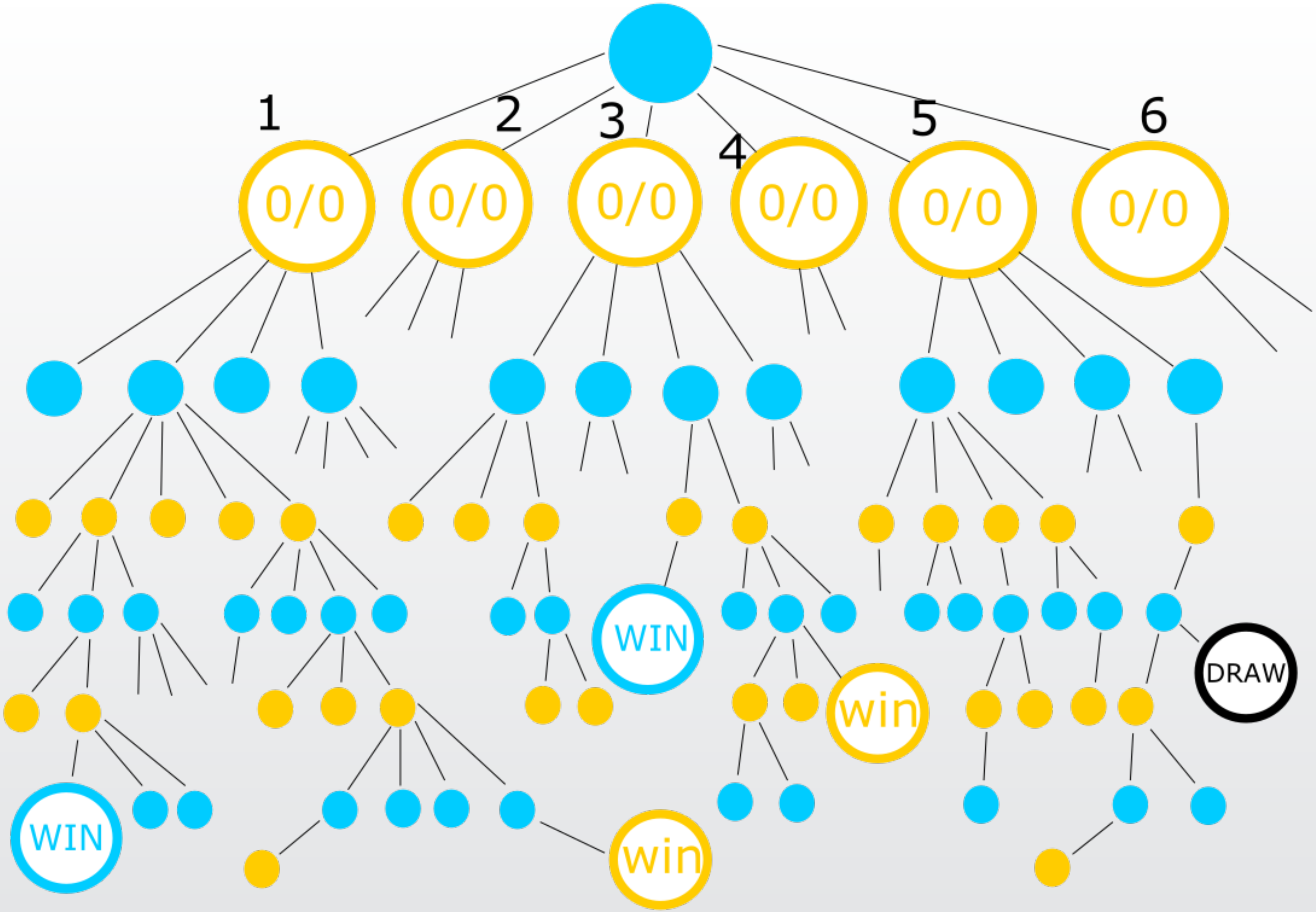
- Two Player Strategy Board Game
- iOS app (working on macOS version)
- https://www.sansumoku.com
- Open Source
- https://github.com/mkhrapov/sansumoku

Game tree search



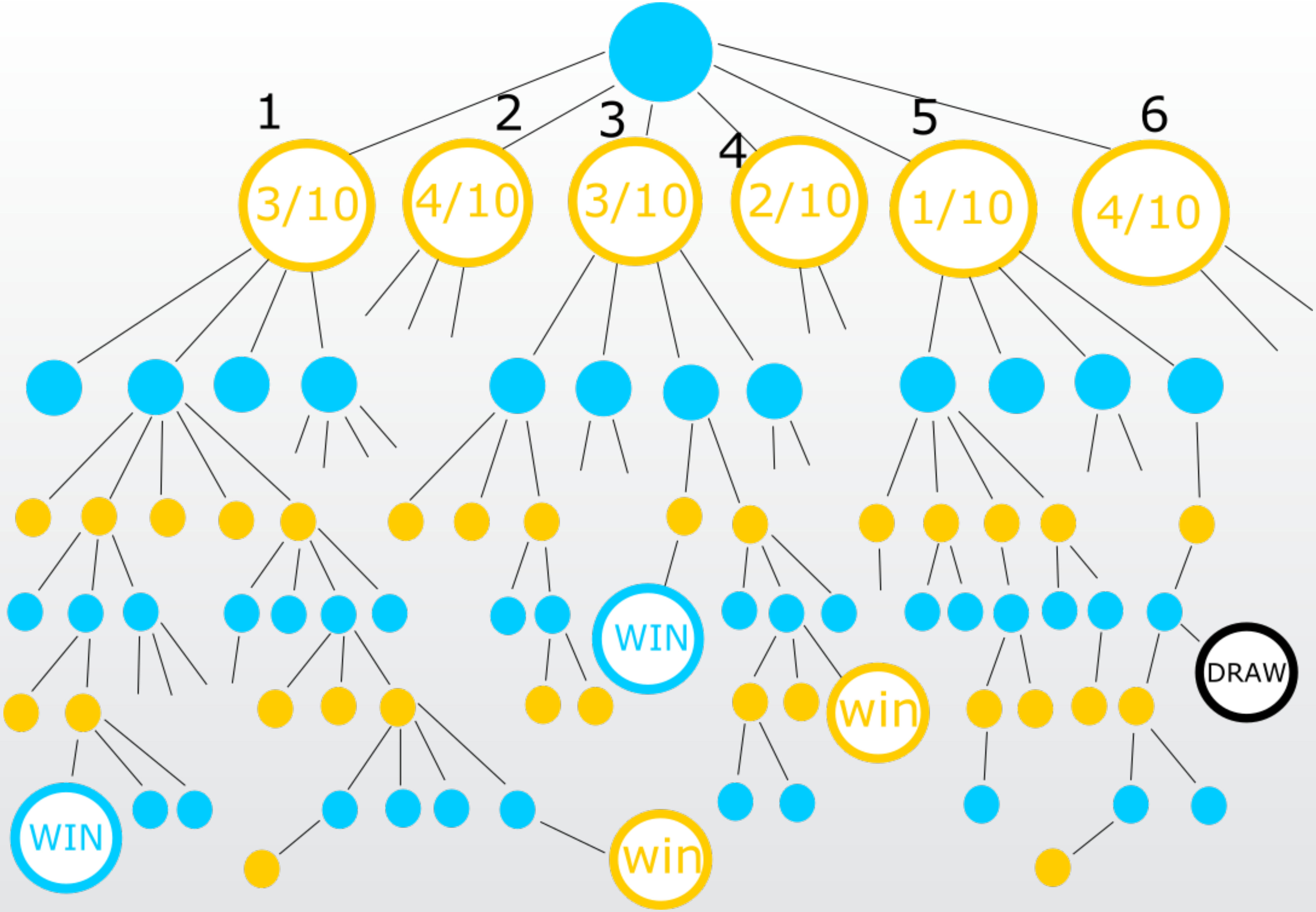
Minimax

- Requires either a brute force search
- Or a position evaluation function
- Neither is applicable to Sansumoku



Monte Carlo Tree Search

Statistical evaluation of the game moves



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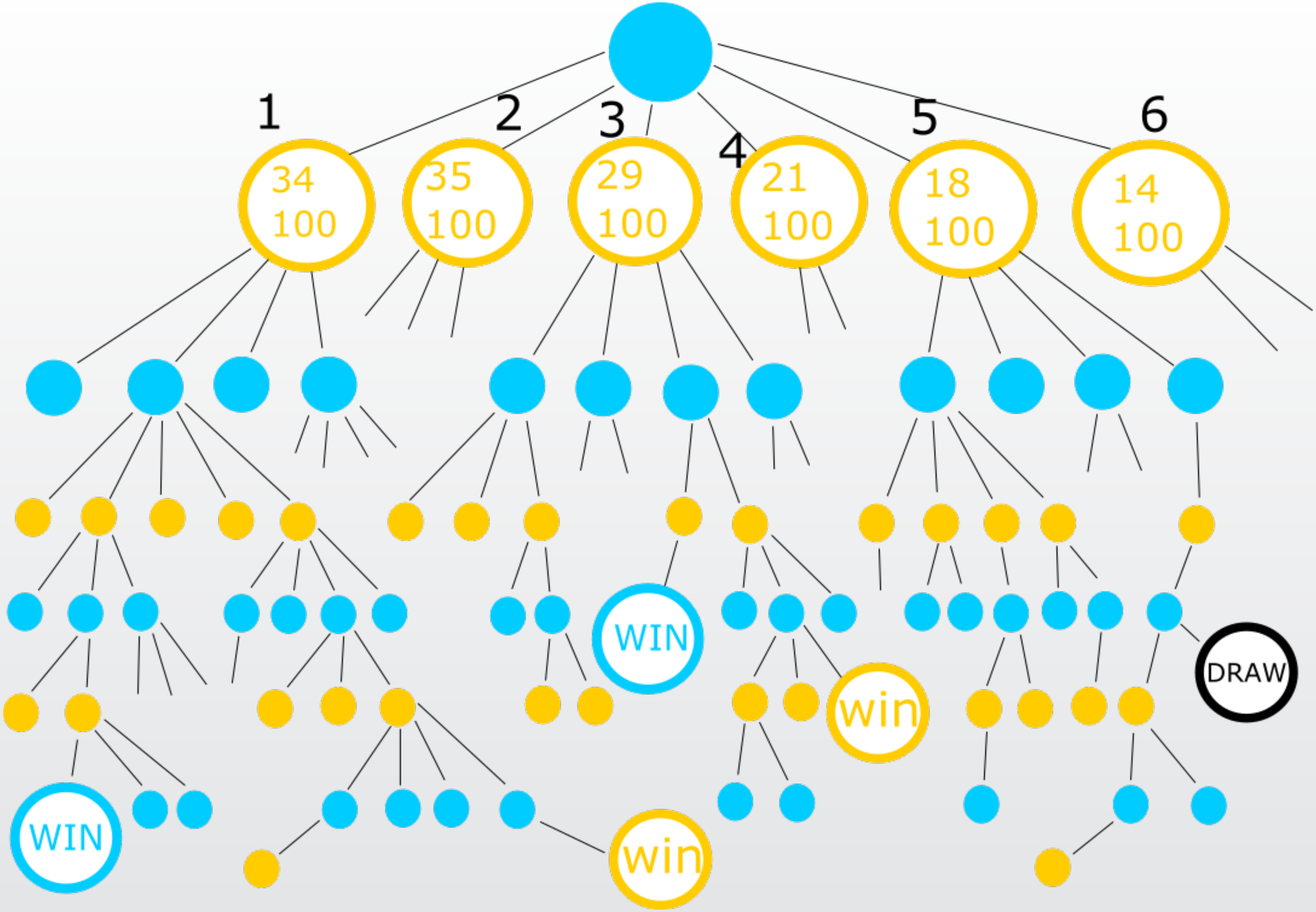


Monte Carlo Tree Search

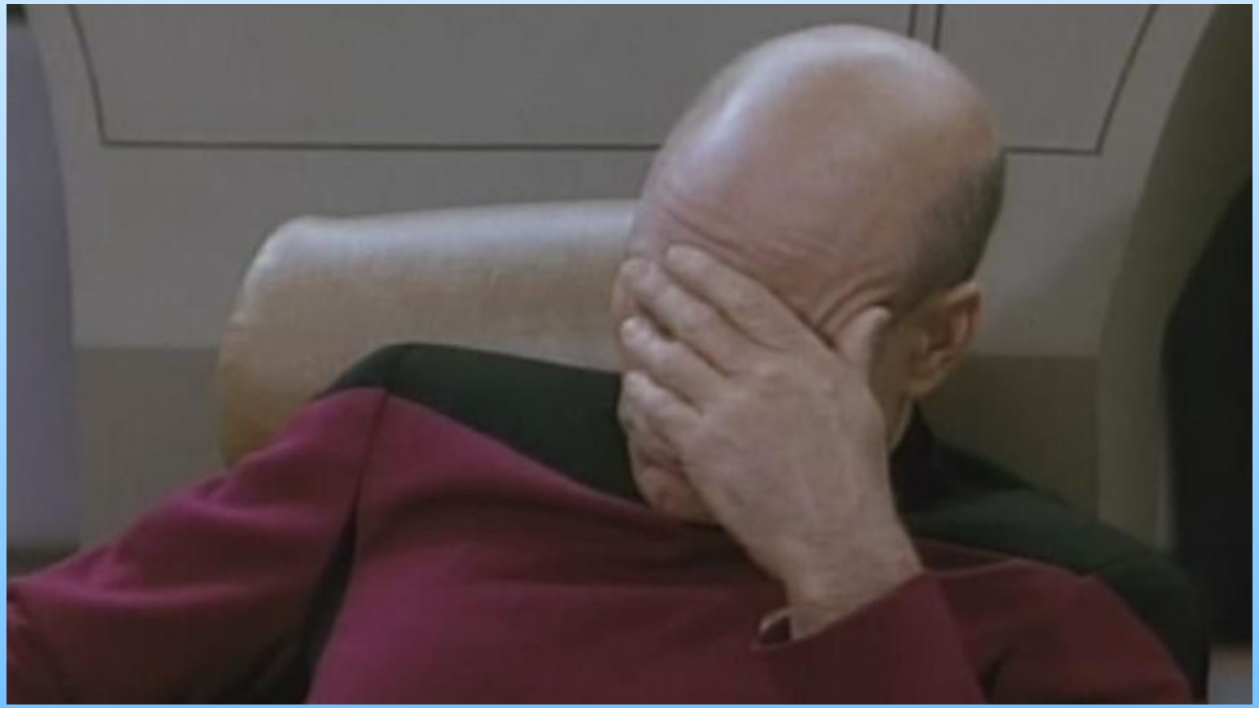
Statistical evaluation of the game moves

How long should I search?

Players	Win	Lose	Draw
1000 iterations vs 100 iterations	65	31	4
2000 iterations vs 1000	55	43	2

Apple GameplayKit on iOS

- GameplayKit https://developer.apple.com/documentation/gameplaykit
- GKMinimaxStrategist
- GKMonteCarloStrategist



Is my implementation better than Apple’s?

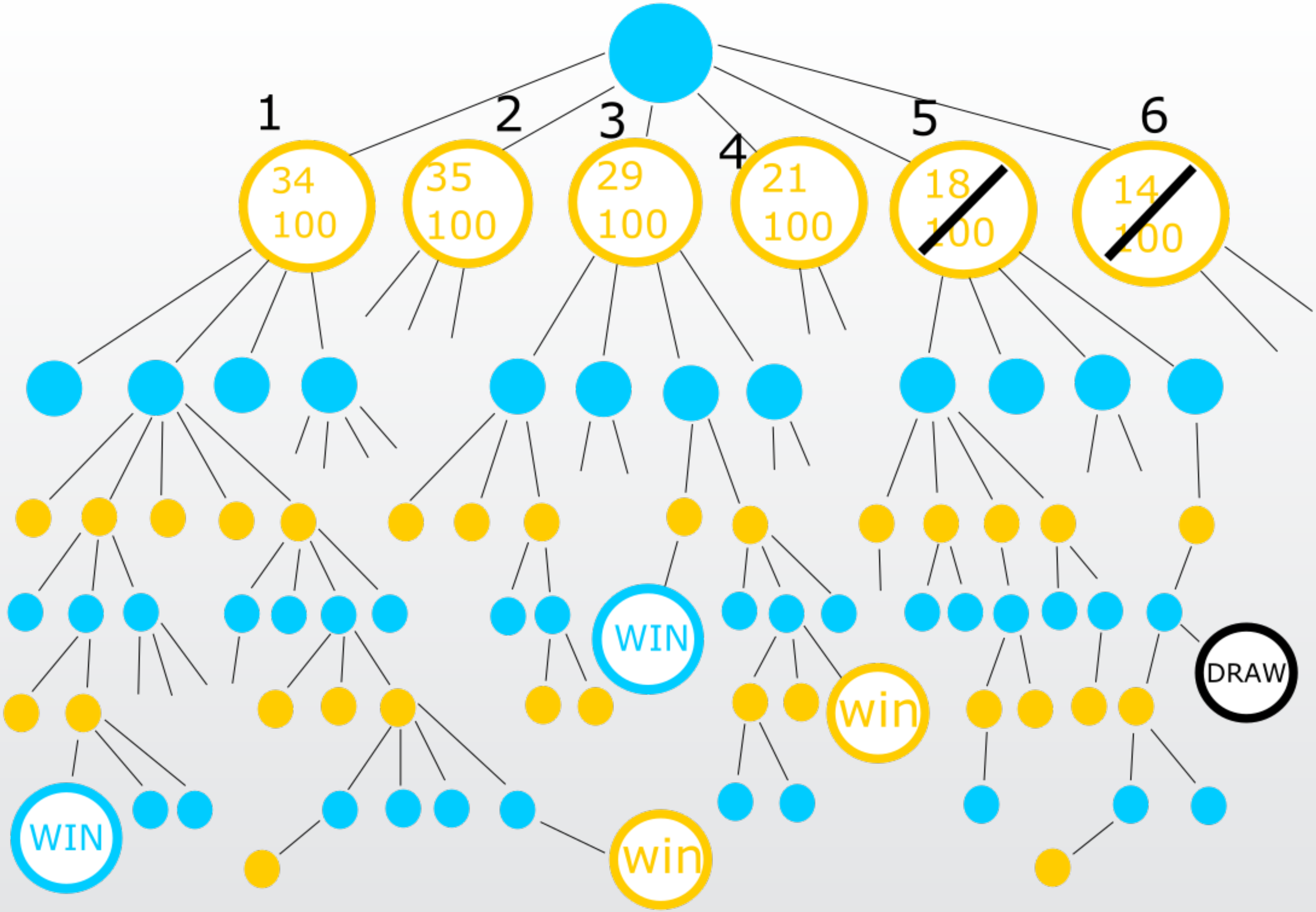
Apple vs	Win	Lose	Draw
Random	95	5	0
Basic	83	11	6
MCTS			

Is my implementation better than Apple’s?

Apple vs	Win	Lose	Draw
Random	95	5	0
Basic	83	11	6
MCTS	6	94	0

Future Improvements

- Multithreaded Search
- Switch to minimax
- Make play out more intelligent
- Spend less time on bad moves



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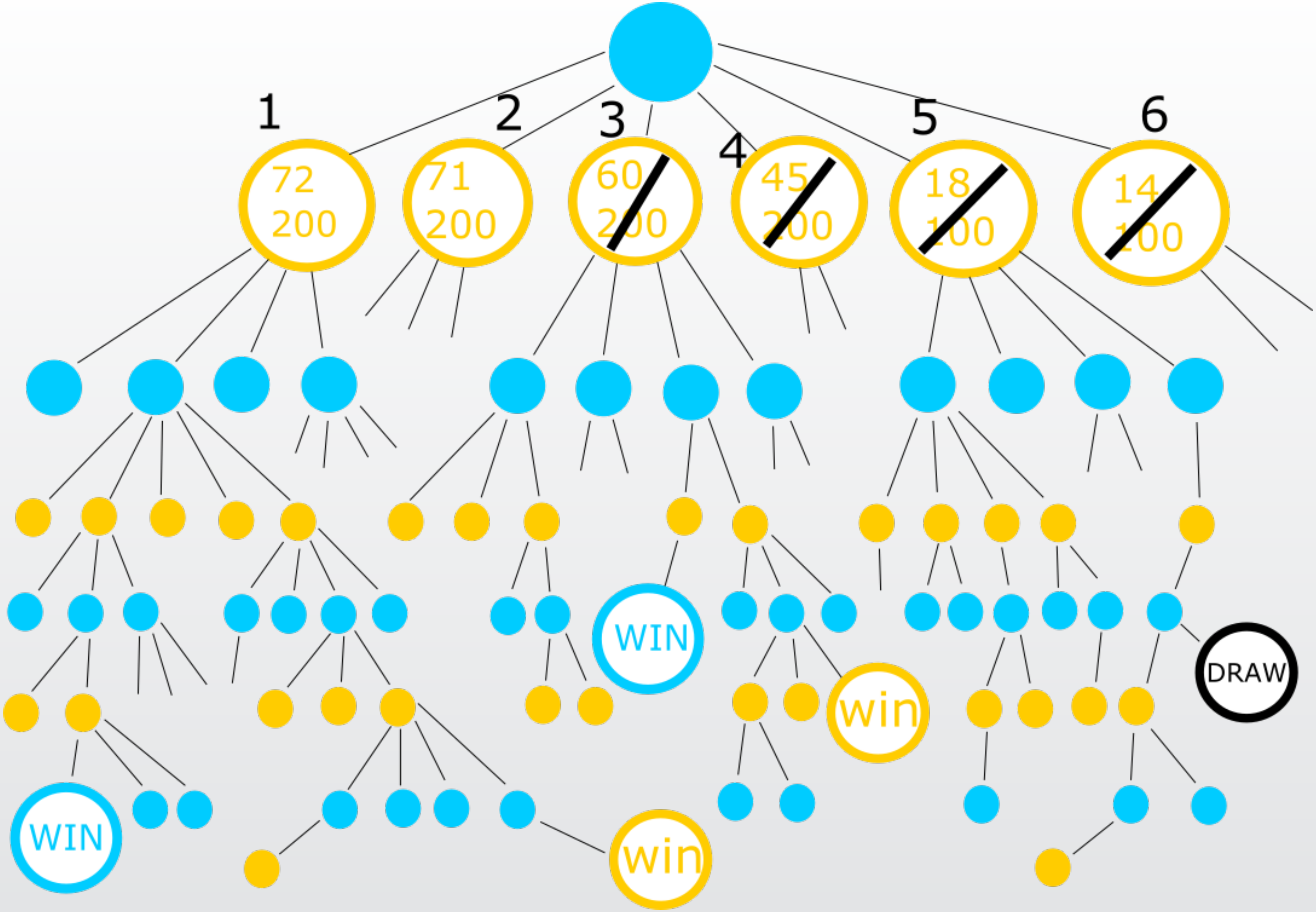

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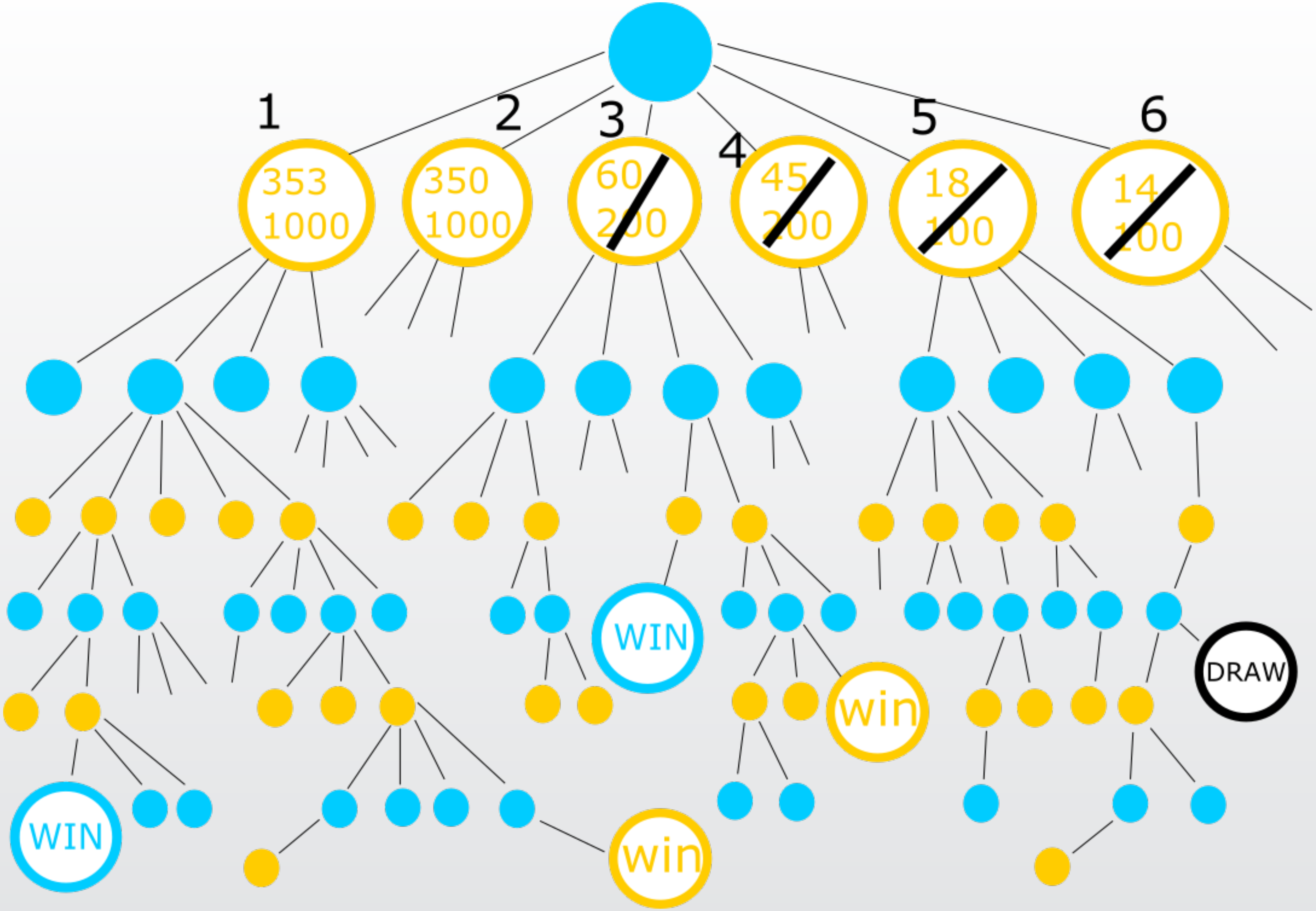

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