Solving N-Queens Problem Using Cell Assemblies on GPU

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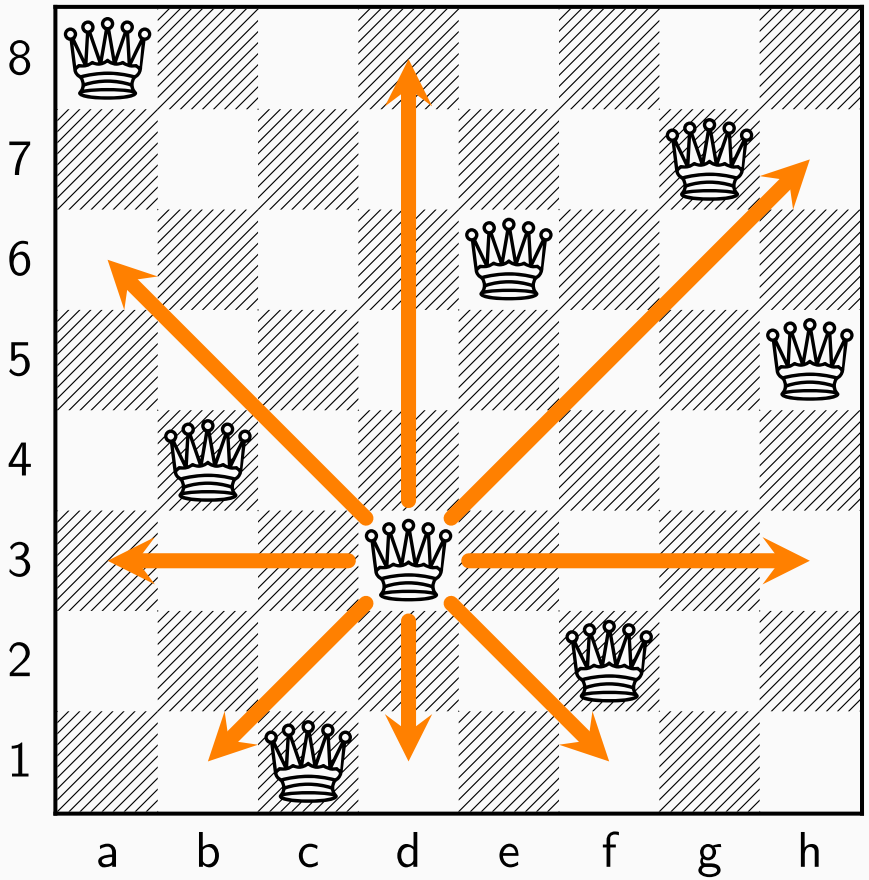
Encoding an 8-queens Solution



(a) An 8-queen Solution

0
6
4
7
1
3
5
2

(b) Chromosome

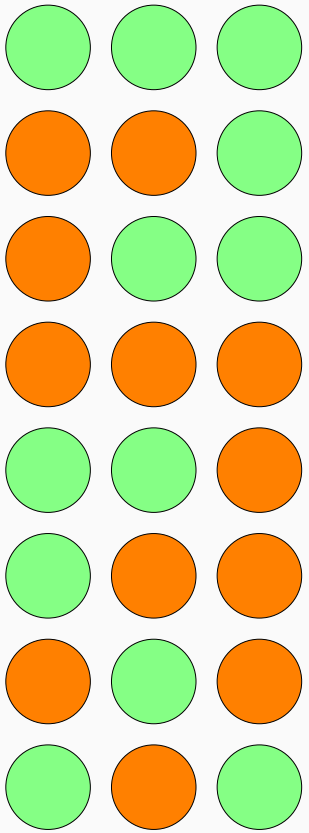
Representing an 8-queen Solution on CA Board

0
6
4
7
1
3
5
2

(a) Decimal

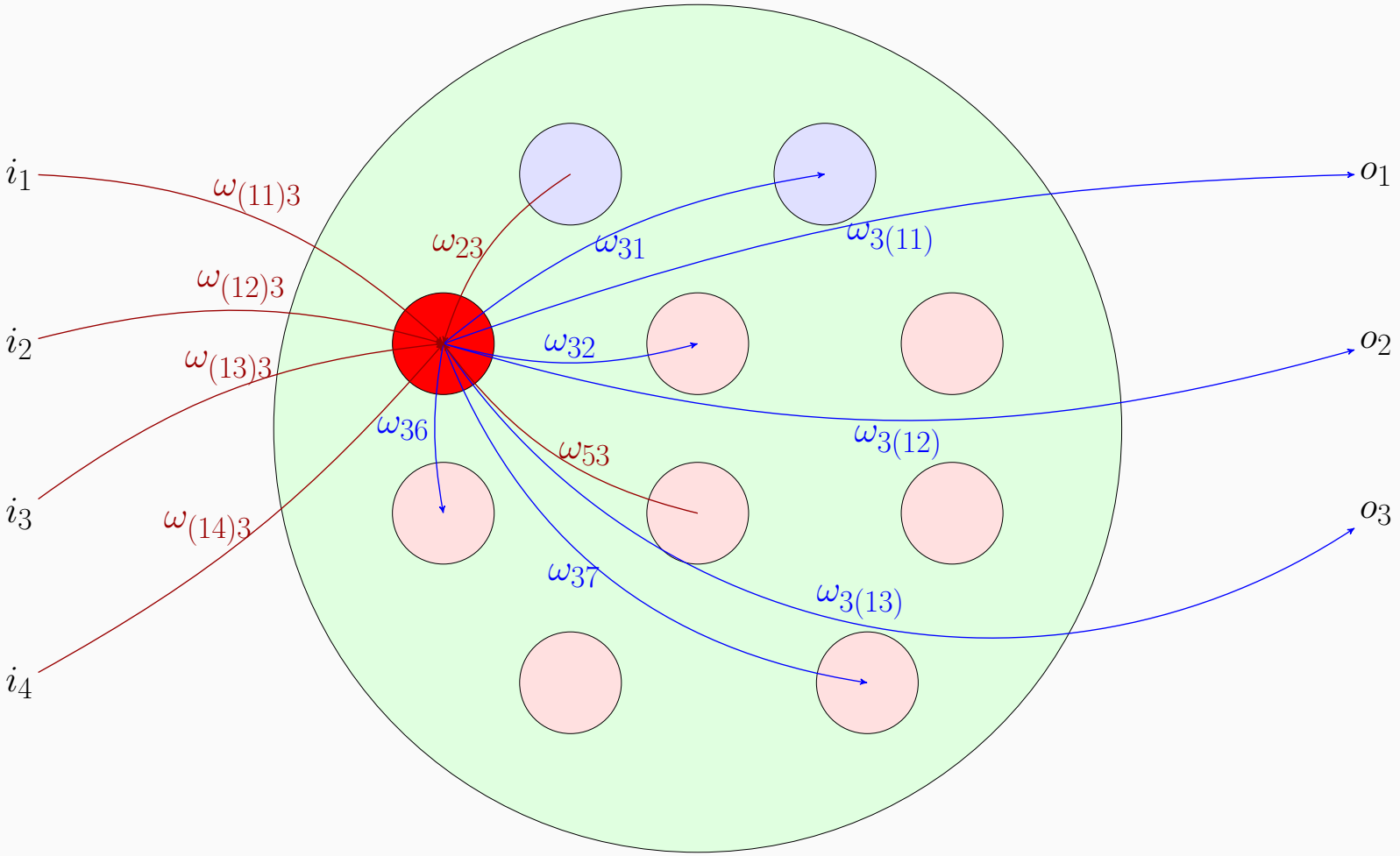
000
110
100
111
001
011
101
010

(b) Binary

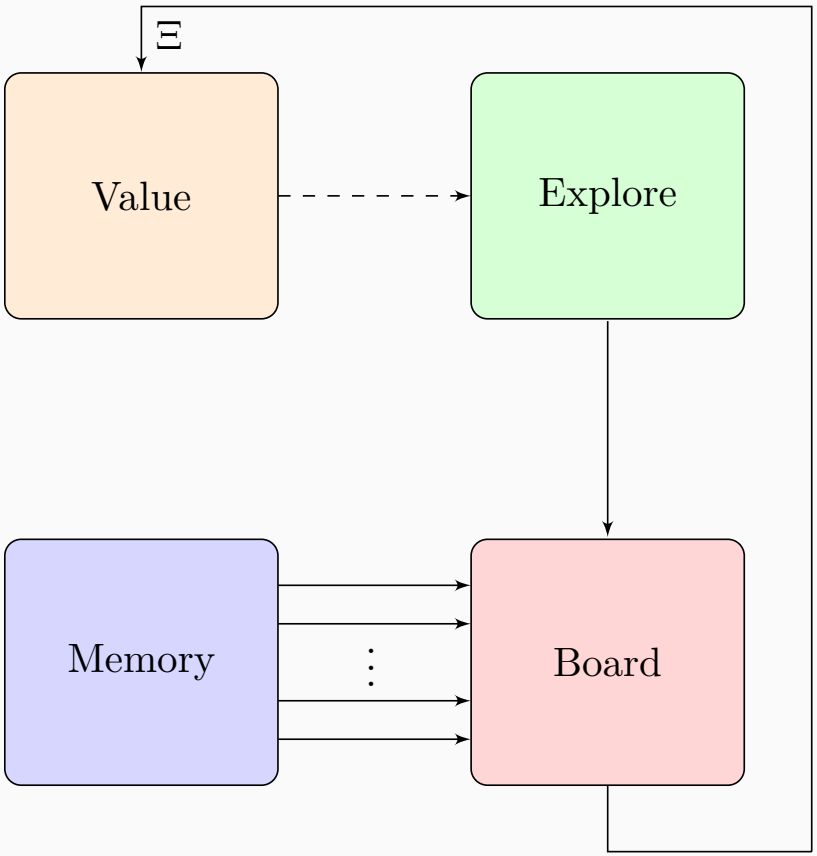


(c) CA Board

Connectivity Map of a Neuron Inside CA



Stochastic Meta-Control of Hebbian Learning [1]



- **Value** $\rightarrow$ Evaluate chromosome.
- **Explore** $\rightarrow$ Randomize activity of Board.

1. High utility value $\rightarrow$ inhibits Explore activity
2. The responsible (m, b) pair persist longer,
3. The $(m \rightarrow b)$ **weight increases** relative to others due to Hebbian learning.

References

[1] R. V. Belavkin and C. R. Huyck, "Conflict resolution and learning probability matching in a neural cell-assembly architecture," *Cognitive Systems Research*, vol. 12, no. 2, pp. 93 – 101, 2011, the 9th International Conference on Cognitive Modeling. Manchester, UK, July 2009. [Online]. Available: http://www.sciencedirect.com/science/article/pii/S1389041710000598