Binary Associative Memories

Br.A.In.

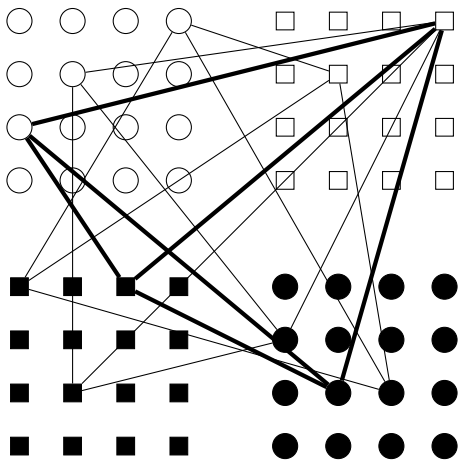
1 Overview

Associative memories are devices that are able to store then retrieve pieces of information from part of their content. Interesting models propose a trade-off between accuracy and computational and memory footprints. The team has specialized in binary associative memories that are among the most competitive models existing as of today.

Today the Br.A.IN. team is mostly interested in:

1. Mathematical analysis of the performance of associative memories,
2. Application to time series and sequences,
3. Combinations of associative memories with (deep) learning,
4. Hardware implementations for search engines.

Keywords: Associative Memories, Binary Neural Networks



2 Professors involved

- Claude Berrou
- Vincent Gripon

References

[1] Vincent Gripon, Judith Heusel, Matthias Löwe, and Franck Vermet. A comparative study of sparse associative memories. *Journal of Statistical Physics*, 164:105–129, 2016.

[2] Bartosz Boguslawski, Vincent Gripon, Fabrice Seguin, and Frédéric Heitzmann. Twin neurons for efficient real-world data distribution in networks of neural cliques. applications in power management in electronic circuits. *IEEE Transactions on Neural Networks and Learning Systems*, 27(2):375–387, 2016.

[3] Xiaoran Jiang, Vincent Gripon, Claude Berrou, and Michael Rabbat. Storing sequences in binary tournament-based neural networks. *IEEE Transactions on Neural Networks and Learning Systems*, 27(5):913–925, 2016.

[4] Hooman Jarollahi, Vincent Gripon, Naoya Onizawa, and Warren J. Gross. Algorithm and architecture for a low-power content-addressable memory based on sparse-clustered networks. *Transactions on Very Large Scale Integration Systems*, 27(2):375–387, 2016.

[5] Hooman Jarollahi, Naoya Onizawa, Vincent Gripon, Noboru Sakimura, Tadahiko Sugibayashi, Tetsuo Endoh, Hideo Ohno, Takahiro Hanyu, and Warren J. Gross. A non-volatile associative memory-based context-driven search engine using 90 nm cmos mtj-hybrid logic-in-memory architecture. *Journal on Emerging and Selected Topics in Circuits and Systems*, 4:460–474, 2014.

[6] Vincent Gripon and Claude Berrou. Sparse neural networks with large learning diversity. *IEEE Transactions on Neural Networks*, 22(7):1087–1096, July 2011.