
Associative Memories - Theory and Applications

Associative memory (AM) refers to the human brain ability to recall by association. For example, one may remember someone special by smelling a perfume. In this situation, the brain associates the perfume to a person. Borrowing the term from psychology, associative memories also refer to a broad class of models designed for the storage and recall by association. Moreover, like the human brain, an associative memory is expected to exhibit some noise tolerance or error correction capability. In other words, an associative memory is expected to retrieve a stored item from a corrupted or incomplete stimulus. Partially motivated by the biological memory, many associative memory models are described by neural networks or learning machines. The famous Hopfield neural network is a classical example of a recurrent neural network, which can be used to implement associative memories. Recent advances in associative memories include, but are not restricted to hypercomplex-valued associative memories such as complex-valued, hyperbolic, and quaternion-valued Hopfield neural networks; lattice-based models such as fuzzy and morphological associative memories; and associative memories designed using deep neural networks. Apart from the development of efficient learning rules, network architectures, and algebraic structures, the selection or synthesis of appropriate association pairs to be stored in the memory also constitutes an active topic of current research. Applications of associative memory models span from classification and pattern recognition to control and time series prediction. This book aims to provide up-to-date researches on associative memory models, including theoretical aspects as well as innovative applications.

Guest Editor

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Short CV: Dr. Marcos Eduardo Valle received his master and Ph.D. degrees in applied mathematics at the University of Campinas in 2005 and 2007, respectively. He previously worked at the University of Londrina, Brazil. Currently, he is an associate professor at the Department of Applied Mathematics of the University of Campinas, Brazil. His research interests include associative memories, fuzzy set theory, lattice theory, mathematical morphology, hypercomplex-valued neural networks, pattern recognition, and data recovery. He is a member of the IEEE Computational Intelligence Society, the Brazilian Society of Computational and Applied Mathematics, and the Mathematical Imaging and Computational Intelligence Laboratory at the Institute of Mathematics, Statistics, and Scientific Computing. He serves as an associate editor of the journal Computational and Applied Mathematics. Marcos has published more than 60 articles; including book chapters, journal manuscripts, and conference proceedings. More details can be found at: <http://www.ime.unicamp.br/~valle>.

Topics of Interest

Original contributions, not currently under review to a journal or a conference, are solicited in relevant areas of *Associative Memories* including, but not limited to, the following

- Complex-valued Hopfield NNs
- Hyperbolic Hopfield NNs
- Quaternion-valued Hopfield NNs
- Classical AMs
- Fuzzy AMs
- Morphological AMs
- Deep learning & AMs
- Learning algorithms
- New architectures
- Algebraic structures
- Association pairs selection
- Association pairs synthesis
- Pattern recognition applications
- Classification applications
- Time series prediction
- Cyber-physical systems
- Software implementations
- Hardware implementations

Important Dates

31 June, 2020	Chapter Proposal Submission (max. 2 pages)
15 July, 2020	Decision Notification
20 October 2020	Full Chapter Submission
20 November, 2020	Notification of Reviews
05 December, 2020	Final Submission
15 December, 2020	Notification of Proofs
27 December, 2020	Online Publication

Instructions for Authors

- The initial chapter proposal should be maximum 2 pages
- The length of the final book chapter should be maximum 24 pages
- The language of the book chapter is English
- No specific formatting guidelines are requested
- The chapter proposal should be submitted in PDF format
- The article processing and publication charges are in accordance with the publisher's [regulations](#)
- Please read the [instructions for authors](#) provided by the publisher
- A free hardcopy of the Edited book will be sent by post to the author(s) of each contributed chapter
- All chapters should be submitted to gcsrbooks@sciencegatepub.com, with subject "Associative Memories"

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