

# Binary Morphological Neural Networks

Theodore Aouad, Hugues Talbot

## References

- [1] Philippe Salembier. Adaptive rank order based filters. *Signal Processing*, 27(1):1–25, April 1992. ISSN 0165-1684. doi: 10.1016/0165-1684(92)90108-9. URL <https://www.sciencedirect.com/science/article/pii/0165168492901089>.
- [2] G.X. Ritter and Peter Sussner. An introduction to morphological neural networks. volume 4, pages 709–717 vol.4, September 1996. ISBN 978-0-8186-7282-8. doi: 10.1109/ICPR.1996.547657.
- [3] Neal R. Harvey and Stephen Marshall. The use of genetic algorithms in morphological filter design. *Signal Processing: Image Communication*, 8(1):55–71, January 1996. ISSN 0923-5965. doi: 10.1016/0923-5965(95)00033-X. URL <https://www.sciencedirect.com/science/article/pii/092359659500033X>.
- [4] Makoto Nakashizuka, Shinji Takenaka, and Youji Iiguni. Learning of structuring elements for morphological image model with a sparsity prior. In *2010 IEEE International Conference on Image Processing*, pages 85–88, September 2010. doi: 10.1109/ICIP.2010.5652588. ISSN: 2381-8549.
- [5] Jonathan Masci, Jesus Angulo, and Jürgen Schmidhuber. A Learning Framework for Morphological Operators using Counter-Harmonic Mean. volume 7883, page 329. Springer, May 2013. doi: 10.1007/978-3-642-38294-9\_28. URL <https://hal-mines-paristech.archives-ouvertes.fr/hal-00834523>.
- [6] Frank Y. Shih, Yucong Shen, and Xin Zhong. Development of Deep Learning Framework for Mathematical Morphology. *International Journal of Pattern Recognition and Artificial Intelligence*, 33(06):1954024, June 2019. ISSN 0218-0014. doi: 10.1142/S0218001419540247. URL <https://www.worldscientific.com/doi/abs/10.1142/S0218001419540247>. Publisher: World Scientific Publishing Co.
- [7] Ranjan Mondal, Sanchayan Santra, and Bhabatosh Chanda. Dense Morphological Network: An Universal Function Approximator. September 2018. URL <https://openreview.net/forum?id=SyxknjC9KQ>.
- [8] Yucong Shen, Xin Zhong, and Frank Y. Shih. Deep Morphological Neural Networks. *arXiv:1909.01532 [cs, eess]*, September 2019. URL <http://arxiv.org/abs/1909.01532>. arXiv: 1909.01532.
- [9] Ranjan Mondal, Deepayan Chakraborty, and Bhabatosh Chanda. Learning 2D Morphological Network for Old Document Image Binarization. In *2019 International Conference on Document Analysis and Recognition (ICDAR)*, pages 65–70, September 2019. doi: 10.1109/ICDAR.2019.00020. ISSN: 2379-2140.
- [10] Yunxiang Zhang, Samy Blusseau, Santiago Velasco-Forero, Isabelle Bloch, and Jesus Angulo. Max-plus Operators Applied to Filter Selection and Model Pruning in Neural Networks. *arXiv:1903.08072 [cs, math, stat]*, April 2019. URL <http://arxiv.org/abs/1903.08072>. arXiv: 1903.08072.
- [11] Going Beyond p-convolutions to Learn Grayscale Morphological Operators | SpringerLink, 2021. URL [https://link.springer.com/chapter/10.1007/978-3-030-76657-3\\_34](https://link.springer.com/chapter/10.1007/978-3-030-76657-3_34).

- [12] Keiller Nogueira, Jocelyn Chanussot, Mauro Dalla Mura, and Jefersson A. Dos Santos. An Introduction to Deep Morphological Networks. *IEEE Access*, 9:114308–114324, 2021. ISSN 2169-3536. doi: 10.1109/ACCESS.2021.3104405. Conference Name: IEEE Access.
- [13] Ranjan Mondal, M. Dey, and B. Chanda. Image Restoration by Learning Morphological Opening-Closing Network. *Math. Morphol. Theory Appl.*, 2020. doi: 10.1515/mathm-2020-0103.
- [14] Philippe Salembier. Structuring element adaptation for morphological filters. *Journal of Visual Communication and Image Representation*, 3(2):115–136, June 1992. ISSN 1047-3203. doi: 10.1016/1047-3203(92)90010-Q. URL <https://www.sciencedirect.com/science/article/pii/104732039290010Q>.