

REFERENCES

- [1] M. Kiselev, “Rate coding vs. temporal coding - Is optimum between?,” *Proc. Int. Jt. Conf. Neural Networks*, vol. 2016-October, no. November, pp. 1355–1359, 2016, doi: 10.1109/IJCNN.2016.7727355.
- [2] Tim Utz Krause, “Rate Coding and Temporal Coding in a Neural Network,” *Thesis Diss.*, 2014, [Online]. Available: <http://www.ini.rub.de/PEOPLE/rolf/articles/krausetim-msc.pdf>.
- [3] E. Hunsberger and C. Eliasmith, “Spiking Deep Networks with LIF Neurons,” pp. 1–9, 2015, [Online]. Available: <http://arxiv.org/abs/1510.08829>.
- [4] T. Iakymchuk, A. Rosado-Muñoz, J. F. Guerrero-Martínez, M. Bataller-Mompeán, and J. V. Francés-Víllora, “Simplified spiking neural network architecture and STDP learning algorithm applied to image classification,” *Eurasip J. Image Video Process.*, 2015, doi: 10.1186/s13640-015-0059-4.
- [5] J. H. Lee, T. Delbruck, and M. Pfeiffer, “Training deep spiking neural networks using backpropagation,” *Front. Neurosci.*, vol. 10, no. NOV, pp. 1–10, 2016, doi: 10.3389/fnins.2016.00508.
- [6] M. Kiselev, “A synaptic plasticity rule providing a unified approach to supervised and unsupervised learning,” *Proc. Int. Jt. Conf. Neural Networks*, vol. 2017-May, no. May 2017, pp. 3806–3813, 2017, doi: 10.1109/IJCNN.2017.7966336.
- [7] A. Tavanaei and A. Maida, “BP-STDP: Approximating backpropagation using spike timing dependent plasticity,” *Neurocomputing*, 2019, doi: 10.1016/j.neucom.2018.11.014.
- [8] H. Paugam-Moisy, R. Martinez, and S. Bengio, “A supervised learning approach

based on STDP and polychronization in spiking neuron networks,” *ESANN 2007 Proc. - 15th Eur. Symp. Artif. Neural Networks*, pp. 427–432, 2007.

- [9] A. Tavanaei, M. Ghodrati, S. R. Kheradpisheh, T. Masquelier, and A. Maida, “Deep learning in spiking neural networks,” *Neural Networks*. 2019, doi: 10.1016/j.neunet.2018.12.002.
- [10] A. Kasiński and F. Ponulak, “Comparison of supervised learning methods for spike time coding in spiking neural networks,” *International Journal of Applied Mathematics and Computer Science*. 2006.
- [11] F. Ponulak and A. Kasiński, “Supervised learning in spiking neural networks with ReSuMe: Sequence learning, classification, and spike shifting,” *Neural Computation*. 2010, doi: 10.1162/neco.2009.11-08-901.
- [12] H. Mostafa, “Supervised learning based on temporal coding in spiking neural networks,” *IEEE Trans. Neural Networks Learn. Syst.*, 2018, doi: 10.1109/TNNLS.2017.2726060.
- [13] S. M. Bohte, H. La Poutre, and J. N. Kok, “Error-Backpropagation in Temporally Encoded Networks of Spiking Neurons,” *Neurocomputing*, 2000.
- [14] S. R. Kheradpisheh, M. Ganjtabesh, S. J. Thorpe, and T. Masquelier, “STDP-based spiking deep convolutional neural networks for object recognition,” *Neural Networks*, 2018, doi: 10.1016/j.neunet.2017.12.005.
- [15] K. S. Burbank, “Mirrored STDP Implements Autoencoder Learning in a Network of Spiking Neurons,” *PLoS Comput. Biol.*, 2015, doi: 10.1371/journal.pcbi.1004566.
- [16] S. Ruder, “An overview of gradient descent optimization algorithms,” pp. 1–14, 2016, [Online]. Available: <http://arxiv.org/abs/1609.04747>.
- [17] S. Sun, Z. Cao, H. Zhu, and J. Zhao, “A Survey of Optimization Methods From a Machine Learning Perspective,” *IEEE Trans. Cybern.*, pp. 1–14, 2019, doi:

10.1109/tcyb.2019.2950779.

- [18] R. Grosse, “Exploding and Vanishing Gradients,” *Cs.Toronto.Edu*, pp. 1–11, 2017, [Online]. Available:
[http://www.cs.toronto.edu/~rgrosse/courses/csc321_2017/readings/L15
Exploding and Vanishing Gradients.pdf](http://www.cs.toronto.edu/~rgrosse/courses/csc321_2017/readings/L15Exploding%20and%20Vanishing%20Gradients.pdf).
- [19] A. Shatnawi, G. Al-Bdour, R. Al-Qurran, and M. Al-Ayyoub, “A comparative study of open source deep learning frameworks,” *2018 9th Int. Conf. Inf. Commun. Syst. ICICS 2018*, vol. 2018-Janua, no. April, pp. 72–77, 2018, doi: 10.1109/IACS.2018.8355444.