Suggested further readings

Pytorch - papers:

automatic differentiation library; some tutorials https://openreview.net/pdf?id=BJJsrmfCZ

Recommended review papers:

Richards, B. A., Lillicrap, T. P., Beaudoin, P., Bengio, Y., Bogacz, R., Christensen, A., … & Kording, K. (2019). A deep learning framework for neuroscience. Nature neuroscience, 22(11), 1761-1770.

Lindsay, G. (2020). Convolutional neural networks as a model of the visual system: past, present, and future. Journal of Cognitive Neuroscience, 1-15.

Intro:

Large list of papers comparing DNNs and the brain:

Heuer, K., Gulban, O. F., Bazin, P. L., Osoianu, A., Valabregue, R., Santin, M., … & Toro, R. (2019). Evolution of neocortical folding: A phylogenetic comparative analysis of MRI from 34 primate species. Cortex, 118, 275-291.

Zhou, B., Khosla, A., Lapedriza, ., Oliva, A., & Torralba, A. (2015). Object Detectors Emerge in Deep Scene CNNs. In ICLR.

Zhou, B., Bau, D., Oliva, A., & Torralba, A. (2018). Interpreting deep visual representations via network dissection. IEEE transactions on pattern analysis and machine intelligence, 41(9), 2131-2145.

Hasson, U., Nastase, S.A. & Goldstein, A. (2020). Direct Fit to Nature: An Evolutionary Perspective on Biological and Artificial Neural Networks. Neuron, 105, 3, 416-434.

Cichy, R. M., Khosla, A., Pantazis, D., Torralba, A., & Oliva, A. (2016). Comparison of deep neural networks to spatio-temporal cortical dynamics of human visual object recognition reveals hierarchical correspondence. Scientific reports, 6, 27755.

Tutorials:

Dataset:

Stringer, C., Michaelos, M., Pachitariu, M. (2019). High precision coding in visual cortex. bioRxiv. (figshare link)

Deep learning used for encoding models:

McIntosh, L., Maheswaranathan, N., Nayebi, A., Ganguli, S., & Baccus, S. (2016). Deep learning models of the retinal response to natural scenes. In Advances in neural information processing systems (pp. 1369-1377).

Batty, E., Merel, J., Brackbill, N., Heitman, A., Sher, A., Litke, A., … & Paninski, L. (2016). Multilayer recurrent network models of primate retinal ganglion cell responses. ICLR.

Cadena, S. A., Denfield, G. H., Walker, E. Y., Gatys, L. A., Tolias, A. S., Bethge, M., & Ecker, A. S. (2019). Deep convolutional models improve predictions of macaque V1 responses to natural images. PLoS computational biology, 15(4),e1006897.

Walker, E. Y., Sinz, F. H., Cobos, E., Muhammad, T., Froudarakis, E., Fahey, P. G., … & Tolias, A. S. (2019). Inception loops discover what excites neurons most using deep predictive models. Nature neuroscience, 22(12), 2060-2065.

Comparing deep networks and the brain:

Contents

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Kriegeskorte, N., Mur, M., & Bandettini, P. A. (2008). Representational similarity analysis-connecting the branches of systems neuroscience. Frontiers in systems neuroscience, 2, 4.

Mohsenzadeh, Y., Mullin, C., Lahner, B., & Oliva, A. (2020). Emergence of Visual center-periphery Spatial organization in Deep convolutional neural networks. Scientific Reports, 10(1), 1-8.

Yamins, D. L., Hong, H., Cadieu, C. F., Solomon, E. A., Seibert, D., & DiCarlo, J. J. (2014). Performance-optimized hierarchical models predict neural responses in higher visual cortex. Proceedings of the National Academy of Sciences, 111(23), 8619-8624.

Khaligh-Razavi, S. M., & Kriegeskorte, N. (2014). Deep supervised, but not unsupervised, models may explain IT cortical representation. PLoS computational biology, 10(11),e1003915.

Gü lü, U., & van Gerven, M. A. (2015). Deep neural networks reveal a gradient in the complexity of neural representations across the ventral stream. Journal of Neuroscience, 35(27), 10005-10014.

Deep learning:

Nielsen, M. (2019). A visual proof that neural nets can compute any function.

Olah, C. Conv Nets: A Modular Perspective.

Goh, G. (2017). Why momentum really works.

Li, H., Xu, Z., Taylor, G., Studer, C., & Goldstein, T. (2018). Visualizing the loss landscape of neural nets. In Advances in Neural Information Processing Systems (pp. 6389-6399).

He, K., Zhang, X., Ren, S., & Sun, J. (2016). Deep residual learning for image recognition. In Proceedings of the IEEE conference on computer vision and pattern recognition (pp. 770-778).

Ioffe, S., & Szegedy, C. (2015). Batch normalization: Accelerating deep network training by reducing internal covariate shift. arXiv preprint arXiv:1502.03167.

Outro 1

Schrimpf, M., Kubilius, J., Hong, H., Majaj, N. J., Rajalingham, R., Issa, E. B., ... & Yamins, D. L. (2018). Brain-score: Which artificial neural network for object recognition is most brain-like?. BioRxiv, 407007.

Jozwik, K. M., Kriegeskorte, N., Storrs, K. R., & Mur, M. (2017). Deep convolutional neural networks outperform feature-based but not categorical models in explaining object similarity judgments. Frontiers in psychology, 8, 1726.

Nili, H., Wingfield, C., Walther, A., Su, L., Marslen-Wilson, W., & Kriegeskorte, N. (2014). A toolbox for representational similarity analysis. PLoS computational biology, 10(4),e1003553.

Storrs, K. R., Kietzmann, T. C., Walther, A., Mehrer, J., & Kriegeskorte, N. (2020). Diverse deep neural networks all predict human IT well, after training and fitting. bioRxiv.

Kriegeskorte, N., & Douglas, P. K. (2018). Cognitive computational neuroscience. Nature neuroscience, 21(9), 1148-1160.

Kietzmann, T. C., Spoerer, C. J., S rensen, L. K., Cichy, R. M., Hauk, O., & Kriegeskorte, N. (2019). Recurrence is required to capture the representational dynamics of the human visual system. Proceedings of the National Academy of Sciences, 116(43), 21854-21863.

Lillicrap, T. P., Santoro, A., Marris, L., Akerman, C. J., & Hinton, G. (2020). Backpropagation and the brain. Nature Reviews Neuroscience, 1-12.

Tang, H., Schrimpf, M., Lotter, W., Moerman, C., Paredes, A., Caro, J. O., ... & Kreiman, G. (2018). Recurrent computations for visual pattern completion. Proceedings of the National Academy of Sciences, 115(35), 8835-8840.

Kubilius, J., Schrimpf, M., Kar, K., Rajalingham, R., Hong, H., Majaj, N., ... & Nayebi, A. (2019). Brain-like object recognition with high-performing shallow recurrent ANNs. In Advances in Neural Information Processing Systems (pp. 12805-12816).

Spoerer, C. J., Kietzmann, T. C., Mehrer, J., Charest, I., & Kriegeskorte, N. (2020). Recurrent networks can recycle neural resources to flexibly trade speed for accuracy in visual recognition. BioRxiv, 677237.

Outro 2

Chambers, C., Seethapathi, N., Saluja, R., Loeb, H., Pierce, S., Bogen, D., Prosser, L., Johnson, M.J. and Kording, K.P. (2019). Computer vision to automatically assess infant neuromotor risk. BioRxiv, 756262.

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