

# A Survey on Deep Learning Concepts and Techniques

Vysakh V Mohan<sup>1</sup>, Pradeep Prakash<sup>2</sup>, Resmi K R<sup>3</sup>

Student, Computer Science, Santhigiri College of Computer Sciences, Thodupuzha<sup>1,2</sup>

Assistant Professor, Computer Science, Santhigiri College of Computer Sciences, Thodupuzha<sup>3</sup>

**Abstract:** For the last few decades, the deep learning (DL) computing paradigm has been held to be the benchmark in the machine learning (ML) community. As well, it has gradually become the most widely used computational approach in the field of ML, thus achieving outstanding results on several complex cognitive tasks, matching or even beating those provided by human performance. One of the benefits of DL is the ability to learn massive amounts of data. The DL field has grown fast in the last few years and it has been extensively used to successfully address a wide range of traditional applications. This review paper represents the major concepts in deep learning and the use of the neural network, the major applications of deep learning such as in object detection, visual object recognition, speech recognition, face recognition, vision for driverless cars, virtual assistants, and many other fields such as genomics and drug discovery. Finally, this paper also showcases the current developments and challenges in deep neural networks training.

**Keywords:** Deep Learning, Machine Learning, Convolution Neural Network (CNN), Deep Neural Network Architectures, Deep Learning Applications, Image Classification, Transfer Learning, Medical Image Analysis, Supervised Learning, etc.

## REFERENCES

- [1] A. Krizhevsky, I. Sutskever, and G. Hinton, "ImageNet classification with deep convolutional neural networks," in Proceedings of the Advances in Neural Information Processing Systems, vol. 25, pp. 1090–1098, Lake Tahoe, NV, USA, December 2012.
- [2] C. Farabet, C. Couprie, L. Najman, and Y. LeCun, "Learning hierarchical features for scene labeling," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 35, no. 8, pp. 1915–1929, 2013.
- [3] J. Tompson, A. Jain, Y. LeCun, and C. Bregler, "Joint training of a convolutional network and a graphical model for human pose estimation," in Proceedings of the Advances in Neural Information Processing Systems, vol. 27, pp. 1799–1807, Montreal, Canada, December 2014.
- [4] C. Szegedy, W. Liu, Y. Jia et al., "Going deeper with convolutions," 2014, <http://arxiv.org/abs/1409.4842>.
- [5] T. Mikolov, A. Deoras, D. Povey, L. Burget, and J. Cernocky, "Strategies for training large scale neural network language models," in Proceedings of the Automatic Speech Recognition and Understanding, pp. 196–201, Waikoloa, HI, USA, December 2011.
- [6] G. Hinton, L. Deng, D. Yu et al., "Deep neural networks for acoustic modeling in speech recognition: the shared views of four research groups," IEEE Signal Processing Magazine, vol. 29, no. 6, pp. 82–97, 2012.
- [7] T. Sainath, A.-R. Mohamed, B. Kingsbury, and B. Ramabhadran, "Deep convolutional neural networks for LVCSR," in Proceedings of the Acoustics, Speech and Signal Processing, Vancouver, Canada, May 2013.
- [8] J. Ma, R. P. Sheridan, A. Liaw, G. E. Dahl, and V. Svetnik, "Deep neural nets as a method for quantitative structure-activity relationships," Journal of Chemical Information and Modeling, vol. 55, no. 2, pp. 263–274.
- [9] T. Ciodaro, D. Deva, J. de Seixas, and D. Damazio, "Online particle detection with neural networks based on topological calorimetry information," Journal of Physics: Conference Series, vol. 368, 12030, 2012.
- [10] K. Higgs, Boson Machine Learning Challenge, Kaggle, San Francisco, CA, USA, 2014, <https://www.kaggle.com/c/higgsboson>.

- [11] M. Helmstaedter, K. L. Briggman, S. C. Turaga, V. Jain, H. S. Seung, and W. Denk, "Connectomic reconstruction of the inner plexiform layer in the mouse retina," *Nature*, vol. 500, no. 7461, pp. 168–174.
- [12] M. K. K. Leung, H. Y. Xiong, L. J. Lee, and B. J. Frey, "Deep learning of the tissue-regulated splicing code," *Bioinformatics*, vol. 30, no. 12, pp. i121–i129, 2014.

#### BIOGRAPHY



**Resmi K R**, received PhD degree in computer science from Mahatma Gandhi university Kerala, India in 2021. She is currently working as Asst. Professor, Computer Science, Santhigiri College of Computer Sciences, Thodupuzha, India. Her research interests include biometric, pattern recognition, image processing and computer vision.



**Vysakh V Mohan** is studying Master of Computer Applications in Santhigiri College of Computer Sciences, Vazhithala, Idukki, Kerala. He has completed his Bachelor of Computer Applications from Mahatma Gandhi University, Kerala.



**Pradeep Prakash** is studying Master of Computer Applications in Santhigiri College of Computer Sciences, Vazhithala, Idukki, Kerala. He has completed his Bachelor of Computer Applications from Mahatma Gandhi University, Kerala.