

Deep Learning using Neural Networking

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Abstract: Deep learning using neural networks has emerged as a dominant paradigm in machine learning, revolutionizing various domains with its ability to learn intricate patterns from large-scale data. This paper provides a comprehensive overview of deep learning principles, methodologies, and applications within the context of neural networks.

The paper begins by elucidating the fundamental concepts of neural networks, elucidating their architecture comprising interconnected nodes organized into layers. It highlights the significance of deep neural networks (DNNs), characterized by multiple hidden layers enabling the extraction of hierarchical features from input data. The training process, involving iterative adjustment of connection weights to minimize loss, is delineated, along with optimization algorithms like gradient descent.

Subsequently, the paper delves into essential components of deep learning, including activation functions that introduce non-linearity, popular architectures such as Convolutional Neural Networks (CNNs) for image processing and Recurrent Neural Networks (RNNs) for sequential data analysis. Transfer learning, a pivotal technique for leveraging pre-trained models, is discussed for its efficacy in reducing data requirements and enhancing model performance across tasks..

Keywords: Deep learning

REFERENCES

- [1]. Image recognition method based on deep learning, Tianjin University of Technology, Tianjin, DOI10.1109/CCDC.2017.7979332
- [2]. An introduction to deep learning, Francis Quinta Lauzon DOI 10.1109/ISSPA.2012.6310529
- [3]. Overview of deep learning, Xuedan Du, Yinghao Cai, Shuo Wang, Leijie Zhang DOI 10.1109/YAC.2016.7804882
- [4]. Deep Learning Applications, Longbing Cao DOI 10.1109/MIS.2022.3184260
- [5]. An Integrated Deep Learning Framework for Fruits Diseases Classification, Abdul Majid HITEC University Taxila Pakistan, DOI10.32604/cmc.2022.017701 Lin Q, Wenming C, He Z, et al
- [6]. Mask cross-modal hashing networks. IEEE Trans Multimedia, 2020, 23: 550–558 Hamilton W L, Ying R, Leskovec J.
- [7]. Semi-supervised classification with graph convolutional networks. 2016. ArXiv:1609.02907
- [8]. Battaglia P W, Hamrick J B, Bapst V, et al.
- [9]. A survey of heterogeneous information network analysis. IEEE Trans Knowl Data Eng, 2017, 29: 17–37
- [10]. Convolutional neural networks based on reduced geometric algebra. Sci China InfSci, 2021, 64: 129101
- [11]. Multi-view convolutional neural networks for 3D shape recognition. In: Proceedings of the IEEE International Conference on Computer Vision, 2015. 945–953
- [12]. Chen M, Wei Z, Huang Z, et al. Simple and deep graph convolutional networks. 2020. ArXiv:2007.02133 veličković P, Cucurull G, Casanova A, et al. Graph attention networks. 2017. ArXiv:1710.10903
- [13]. Inductive representation learning on large graphs. In: Proceedings of the 31st International Conference on Neural Information Processing Systems, 2017. 1025–1035
- [14]. Relational inductive biases, deep learning, and graph networks. 2018. ArXiv:1806.01261

