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**Hypercomplex neural networks**

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This presentation will cover the foundational principles of deep learning[1], emphasizing representation learning and inductive biases in real-valued neural networks, before extending to hypercomplex neural network architectures. We present theoretical and experimental results demonstrating the enhanced representational capabilities of hypercomplex networks for complex-valued data and multidimensional signal processing[2]. The theoretical framework encompasses proper activation function design, Wirtinger calculus applications, and its extensions to hypercomplex domains. Various methodological approaches to hypercomplex network architectures are examined. The work provides a comprehensive foundation for understanding and implementing hypercomplex neural networks across different application domains, such as RF spectroscopy.

**Bibliografia**

[1] M. Telgarsky. "Benefits of depth in neural networks". In: 29th Annual Conference on Learning Theory 49 (2016), pp. 1517-1539. 7531. doi: <https://doi.org/10.48550/arXiv.1602.04485>

[2] C. Trabelsi et al. "Deep Complex Networks". In: 6th International Conference on Learning Representations (2018).. doi: <https://doi.org/10.48550/arXiv.1705.09792>