

# Deep Neural Networks

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## 1 Introduction

Deep neural networks (DNNs) is a class of machine learning algorithms similar to the artificial neural network, inspired by the structure and function of the human brain, designed to learn complex patterns through multiple layers of transformations.[1] DNNs consist of multiple layers of interconnected neurons, each layer transforming its input into an output through a nonlinear function.[2]

## 2 Neural Network Architecture

A deep neural network consists of an input layer, multiple hidden layers, and an output layer. Let  $\mathcal{L}$  denote the total number of layers in the network, including the input and output layers. Each layer  $l$  (where  $l = 1, 2, \dots, \mathcal{L}$ ) consists of a set of neurons that apply transformations to the data passed from the previous layer.

## References

- [1] A. R. Aouichaoui, R. Al, J. Abildskov, and G. Sin. Comparison of group-contribution and machine learning-based property prediction models with uncertainty quantification. In M. Türkay and R. Gani, editors, *31st European Symposium on Computer Aided Process Engineering*, volume 50 of *Computer Aided Chemical Engineering*, pages 755–760. Elsevier, 2021.
- [2] I. Goodfellow, Y. Bengio, and A. Courville. *Deep Learning*. MIT Press, Cambridge, MA, 2016.