Understanding of Artificial Neural Networks (ANNs)
An Introduction

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Outline

Artificial Neural Networks (ANNs)

- ANNs are computational models inspired by the human brain.
- They are used in machine learning and deep learning for various tasks.
- ANNs consist of interconnected nodes or neurons.

Neurons and Operations

Neuron Operation

- Each neuron processes input signals and performs operations.
- The weighted sum of inputs is computed:

$$Z = \sum_{i=1}^{n} (w_i \cdot x_i) + b$$

- Activation functions introduce non-linearity:

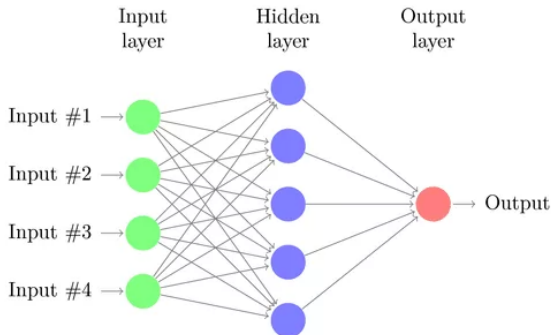$$A = f(Z)$$

Neural Network Structure

Figure: Structure of an Artificial Neural Network

Feedforward and Training

- In a feedforward process, input data propagates through the network.
- Training adjusts weights to minimize a loss function.
- Backpropagation is used for weight updates.

Deep Learning

- Deep learning extends ANNs to have multiple hidden layers.
- Deep networks can learn hierarchical features and handle complex tasks.

Applications of ANNs

- ANNs find applications in various domains, including:
  - Image Recognition
  - Natural Language Processing
  - Autonomous Vehicles
  - Healthcare
  - Finance
  - ...

Conclusion

- ANNs consist of interconnected neurons that perform weighted sum and activation operations.
- Training ANNs involves minimizing a loss function using techniques like backpropagation.
- Deep learning extends ANNs to handle complex tasks with multiple layers.
- ANNs find applications in various domains, making them a powerful tool in machine learning and deep learning.

Questions?