Mathematical Foundations of Artificial Intelligence

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I Introduction

I-I Artificial Intelligence

What is Artificial Intelligence?

This template is modified from the original FSU template by Rafiq Islam[1] to create an NJU AI School presentation template[2]. Here is how you use plain text. Here is how you can use a block to write some important information.

Artificial Intelligence

Artificial Intelligence is the study and design of intelligent agents that can perceive their environment and take actions to maximize their chances of success. Modern AI encompasses machine learning, deep learning, natural language processing, computer vision, and robotics.

[1] Rafiq Islam. *FSU Mathematics General Poster Design*. Tech. rep. Version 1. Florida State University, 2025.

[2] Eric Li. "Nanjing University Beamer Presentation Design (Unofficial)". In: *Department of Artificial Intelligence* (2025).

Example of itemize and enumerate

AI Research Areas

- Machine Learning and Deep Learning
- Natural Language Processing (NLP)
- Computer Vision and Pattern Recognition
- Robotics and Autonomous Systems
- 人工智能算法与理论 (Chinese example)

Key Technologies

1. Neural Networks and Deep Learning
2. Reinforcement Learning
3. Knowledge Representation and Reasoning
4. Computer Vision Systems

I-II Why Artificial Intelligence

Why Artificial Intelligence?

This template is modified from the original FSU template[3]. Artificial Intelligence is transforming industries and society by enabling machines to perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation.

[3]Based on FSU Mathematics template by Rafiq Islam

II Methodology

Mathematical Foundations

This section covers the mathematical background of AI.
The fundamental equation for neural networks is the forward propagation:

$$a^{(l)} = \sigma(W^{(l)} a^{(l-1)} + b^{(l)})$$

where σ is the activation function, $W^{(l)}$ are the weights, and $b^{(l)}$ are the biases at layer l.

1. Backpropagation uses gradient descent to optimize network parameters.
2. Convolutional Neural Networks (CNNs) excel in image processing tasks.
3. Recurrent Neural Networks (RNNs) handle sequential data effectively.

Neural Network Architecture

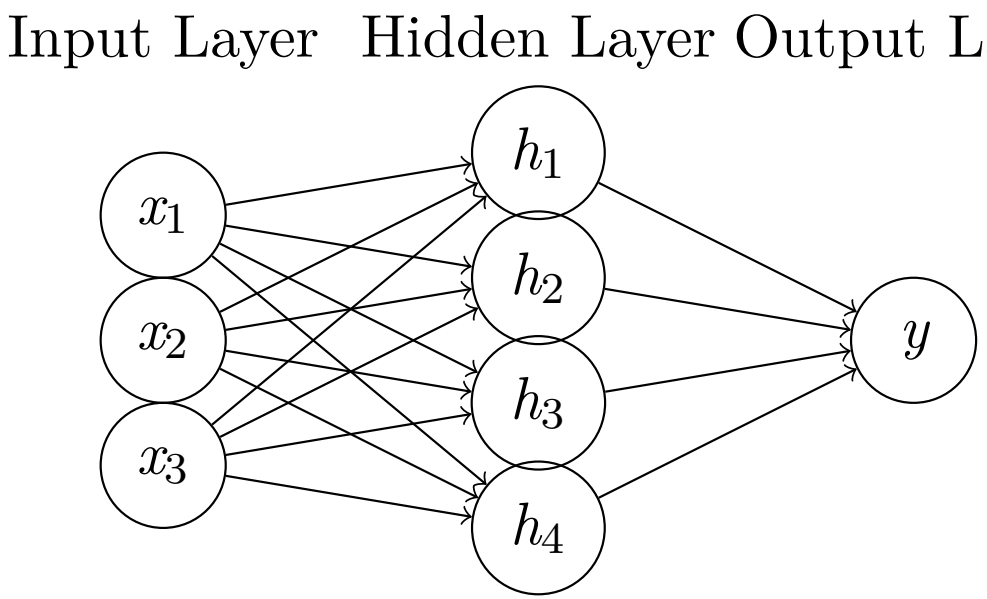

图 1: Basic Neural Network Architecture with 3 input neurons, 4 hidden neurons, and 1 output neuron

AI Applications

图 2: Nanjing University LAMDA Research Team (Photo credit: LAMDA)

- Healthcare: Medical image analysis and diagnosis
- Transportation: Autonomous vehicles and traffic optimization
- Education: Personalized learning systems
- Finance: Fraud detection and algorithmic trading

III Reference

Bibliography I

- Islam, Rafiq. *FSU Mathematics General Poster Design.* Tech. rep. Version 1. Florida State University, 2025.
- Li, Eric. "Nanjing University Beamer Presentation Design (Unofficial)". In: *Department of Artificial Intelligence* (2025).