

# Deep Learning for Intelligent Decision-Making: Models, Methods, and Applications

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## ABSTRACT

Making the right decision in uncertain and dynamic environments is one of the most significant challenges faced in science, engineering, and industry today. From predicting market trends to guiding autonomous vehicles, decision-making systems must process vast amounts of data, handle ambiguity, and adapt quickly to changing conditions. Traditional rule-based approaches often fall short when dealing with such complexity, and this is where Deep Learning comes into play.

Deep Learning has revolutionized the way machines learn from data by uncovering hidden patterns and relationships that are not easily visible through conventional methods. Its ability to process large-scale, high-dimensional data makes it an ideal candidate for building intelligent decision-making systems. This special session will dive into how deep learning techniques can support robust, accurate, and efficient decision-making across multiple domains.

The symposium will explore the mathematical foundations of deep learning, covering neural architectures, activation functions, and optimization methods vital for reliable decision-making. It would also address probabilistic models and uncertainty quantification, essential for handling incomplete or noisy data. Real-world applications in healthcare, finance, autonomous systems, IoT, and energy optimization would be presented. Beyond technical aspects, the session would also seek contributions addressing ethical, security, and privacy concerns associated with decision-making systems powered by AI.

The goal of this symposium is to bridge theory and practice, offering a platform where researchers, practitioners, and industry experts can share their insights, discuss challenges, and explore innovative solutions. By focusing on the intersection of artificial intelligence, numerical optimization, and decision science, this session aims to spark collaborations that drive the next wave of intelligent systems capable of making better, safer, and more informed decisions in an uncertain world.

**Keywords:** Deep Learning; Intelligent Decision-Making; Optimization Algorithms; Artificial Intelligence Applications; Data-Driven Decision Systems