

Theory Problems of Intelligent Control

The seminar tackles the theoretical hurdles of intelligent control with neural networks and fuzzy logic. We'll dissect the structure and learning algorithms of neural networks, focusing on limitations in control tasks and how backpropagation can impact stability. We'll then explore the theoretical challenges of using neural networks for system modeling, including accuracy-interpretability trade-offs.

We'll delve into the theory of fuzzy set representations for uncertainty and analyze how to ensure stability in fuzzy control systems despite inherent vagueness. A critical look will be taken at designing fuzzy rule bases, exploring knowledge acquisition and the impact of rule complexity on control performance. Also, we'll bridge the gap by examining the theoretical challenges of fuzzy-neuro systems, including network architecture selection and maintaining interpretability alongside learning. By the end, you'll have a deep theoretical understanding of these intelligent control techniques, allowing you to analyze limitations and contribute to the future of this field.

Content

- Neural networks for control
 1. Structure of neural network: Feedforward, Recurrent
 2. Learning methods: Backpropagation, Stability
 3. Modeling with neural networks
 4. Control based on neural network model
- Fuzzy control
 1. Fuzzy System
 2. Fuzzy-neuro systems
 3. Neuro-fuzzy control
- Reinforcement Learning