- Introduction
  - Evolution of Reinforcement Learning
    - Reinforcement Learning
    - Inverse Reinforcement Learning
    - Meta Reinforcement Learning
    - Hierarchical Reinforcement Learning
    - Multi-Task Reinforcement Learning
    - Multi-agent Reinforcement Learning
  - Deep Reinforcement Learning
  - Applications of Reinforcement Learning
  - Summary
  - References
- Reinforcement Learning Foundations
  - Basic Concepts and Algorithms
    - BasicConcepts
    - Model-based vs Model-free Methods
    - Tabular vs Approximate Methods
    - Value-based vs Policy-based Methods
    - Basic Reinforcement Learning Methods
  - Advanced Reinforcement Learning Branches
    - Inverse Reinforcment Learning
    - Meta Reinforcement Learning
    - Hierarchical Reinforcement Learning
    - Multi-Task Reinforcement Learning
    - Multi-agent Reinforcement Learning
    - Deep Learning Foundations
      - Basic Concepts
      - Network Structures
    - Advanced Neural Network Components

- Deep Embeddings
- Attentions
- Transformers
- Trust Region Policy Optimization
- Deep Reinforcement Learning Foundations
  - Value Networks
  - Policy Networks
- References

– Deep Reinforcement Learning Models
- Value Function Approximation
  - Deep Q-learning
  - Double DQN
  - More Advanced DQN Methods
- Policy Approximation
  - Deep Policy Gradient Method
  - Deep Actor-Crtitic Method
  - Asynchronous Advantage Actor-Critic
- Deep Inverse Reinforcement Learning
  - fu2017learning
  - imani2021scalable
- Deep Meta Reinforcement Learning
  - finn2017model
  - yu2020meta
- Deep Hierarchical Reinforcement Learning
  - kulkarni2016hierarchical
  - vezhnevets2017feudal
  - nachum2018data
- Deep Multi-task Reinforcement Learning
  - DISTRAL
  - IMPALA

- PopArt
- Deep Multi-agent Reinforcement Learning
  - foerster2016learning
  - foerster2017stabilising
  - gupta2017cooperative
  - rashid2020monotonic
- References

– Empirical Deep Reinforcement Learning Systems
- Reinforcement Learning In Robotics
- Reinforcement Learning In Commerce
- Reinforcement Learning In Medications
- Reinforcement Learning In Education
- Reinforcement Learning In Civilization
- Reinforcement Learning In Simulations
- References

– Performance Evaluations
- Evaluation Metrics
- Offline Performance Evaluation
- Online Performance Evaluation
  - A/BTesting
  - Interleaving
- References

– Advanced Topics
- Memorization
- AlignmentofTargetNetwork
- PolicyDriftandtheSolutions
- SocialityandTrust
- AttackResistance
- PrivacyPreservation
- Generalization

- Personalization
- Advanced Optimization Methods
- Exploitation and Exploration Tradeoff
- Learning Speedup
- References

- Empiriccal Researches On going
  - Adversarial Reinforcement Learning
  - Adoptations of Neuro science
  - Future of Deep Reinforcement Learning
  - Hardware Optimization
  - Reference

- Glossary