Intelligent Agent Development with Deep Reinforcement Learning and OpenAI Gym

11 - 15 Aug 2025
Amsterdam

AGILE LEADERS
Training Center

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Intelligent Agent Development with Deep Reinforcement Learning and OpenAI Gym

Ref.: 71_38619 **Date:** 11 - 15 Aug 2025 **Location:** Amsterdam **Fees:** 5700 **Euro**

Course Overview:

The course is an immersive, hands-on training designed for professionals who wish to build AI systems using OpenAI Gym and deep reinforcement learning techniques. Based on the comprehensive book *Hands-On Intelligent Agents with OpenAI Gym*, this course offers a step-by-step practical journey through developing intelligent agents that solve real-world tasks such as game playing, robotics simulation, and autonomous driving. Key topics include Q-learning, Deep Q-Learning, experience replay, actor-critic methods, and environment customisation. Covering essential platforms like PyTorch, TensorBoard, CARLA, Roboschool, Gym-Retro, and MuJoCo, participants will acquire the skills to implement agents for both discrete and continuous action spaces.

Target Audience:

- AI/ML Engineers and Developers
- Robotics Engineers
- Data Scientists interested in RL
- Software Engineers exploring AI agents
- Game Developers

Targeted Organizational Departments:

- AI Research and Development Units
- Robotics and Automation Teams
- Innovation Labs
- Software Engineering Departments
- Simulation and Gaming Divisions

Targeted Industries:

- Automotive autonomous vehicles
- Robotics and Industrial Automation
- Gaming and Simulation
- Aerospace and Defence
- Healthcare Tech for training intelligent diagnostics agents

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Course Offerings:

By the end of this course, participants will be able to:

- Set up and use OpenAI Gym and custom environments
- Apply Q-learning and Deep Q-learning using PyTorch
- Train agents using experience replay and epsilon-greedy policies
- Customise gym environments, including CARLA and MuJoCo
- Visualise training progress with TensorBoard
- Understand and apply policy gradients, actor-critic, PPO, and Rainbow RL
- Build and test agents on Atari games and Gym-Retro environments
- Monitor and optimise performance with reward shaping and preprocessing techniques

Training Methodology:

This course employs an applied, project-based methodology combining theoretical foundations with real-world practice. Learners will engage in interactive tutorials, group-based agent-building exercises, live demonstrations, and guided reinforcement learning projects. Emphasis is placed on practical implementation using PyTorch, JSON config files, CUDA acceleration, and OpenAI Gym. Case studies on Mountain Car, Cart Pole, Atari games, and CARLA simulations will illustrate key learning principles. Feedback sessions, breakout discussions, and reflective reviews ensure retention and hands-on mastery.

Course Toolbox:

- OpenAI Gym Environments Library
- PyTorch Deep Learning Framework
- Conda and CUDA Setup Guides
- TensorBoard for monitoring
- JSON templates for hyperparameters
- Atari and Gym-Retro emulators
- CARLA autonomous driving simulator
- Sample agent architectures DQN, PPO, DDPG, Rainbow
- Pre-built notebooks and implementation guides

Course Agenda:

Day 1: Foundations of Intelligent Agents & Reinforcement Learning

- **Topic 1:** Introduction to Intelligent Agents and Learning Environments
- **Topic 2:** Exploring the Capabilities and Interface of OpenAI Gym
- **Topic 3:** Categories of Gym Tasks: From Classic Control to Robotics
- **Topic 4:** Setting Up Your Python, Conda, CUDA, and PyTorch Environments
- **Topic 5:** Deep Dive into Reinforcement Learning and MDPs
- **Topic 6:** Understanding the Policy, Value Functions, and Exploration Strategies
- **Reflection & Review:** Fundamentals of AI Agents and Environment Interaction

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Day 2: Hands-On with Q-Learning and Deep Q-Learning

- **Topic 1:** Solving the Mountain Car Problem Using Q-Learning
- **Topic 2:** Implementing Q-learning with NumPy and Hyperparameter Tuning
- **Topic 3:** Transition to Deep Q-Learning using PyTorch
- **Topic 4:** Applying Experience Replay and Epsilon-Greedy Policies
- **Topic 5:** Stabilizing Learning with Target Networks
- **Topic 6:** Visualizing Agent Performance Using TensorBoard
- **Reflection & Review:** Comparing Traditional and Deep Q-Learning Approaches

Day 3: Custom Environments and Real-World Applications

- **Topic 1:** Creating Custom Gym Environments with Templates and Registration
- **Topic 2:** Building the CARLA Driving Simulator as a Gym-Compatible Environment
- **Topic 3:** Implementing Reset, Step Functions, and Sensor Integration
- **Topic 4:** Managing Discrete vs Continuous Action Spaces in CARLA
- **Topic 5:** Real-Time Testing and Visualization of Simulation-Based Environments
- **Topic 6:** Techniques for Accessing and Using Camera/Sensor Data
- **Reflection & Review:** Environment Design for Reinforcement Learning Agents

Day 4: Advanced Agents with Actor-Critic Algorithms

- **Topic 1:** Fundamentals of Policy Gradients and Actor-Critic Architectures
- **Topic 2:** Implementing n-Step Advantage Actor-Critic Algorithms
- **Topic 3:** Designing Actor and Critic Networks for Autonomous Agents
- **Topic 4:** Logging, Monitoring, and Saving Model Progress
- **Topic 5:** Training Actor-Critic Agents in the CARLA Simulator
- **Topic 6:** Exploring Synchronous vs Asynchronous Implementations
- **Reflection & Review:** From Theory to Practice in Actor-Critic Training

Day 5: The Learning Landscape – PPO, DDPG, Rainbow & Beyond

- **Topic 1:** Proximal Policy Optimization PPO – Concepts and Use Cases
- **Topic 2:** Deep Deterministic Policy Gradient DDPG and Continuous Control
- **Topic 3:** The Rainbow Algorithm: Integrating Value-Based Enhancements
- **Topic 4:** Implementing Prioritized Replay, Dueling Nets, and Distributional RL
- **Topic 5:** Roboschool, Gym-Retro, DeepMind Lab, and StarCraft II Environments
- **Topic 6:** Comparative Insights Across Algorithms and Environment Suites
- **Reflection & Review:** Capstone Discussion on Agent Development and Deployment

FAQ:

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What specific qualifications or prerequisites are needed for participants before enrolling in the course?

A working knowledge of Python and basic understanding of machine learning principles is recommended. Familiarity with NumPy and neural networks will help but is not mandatory.

How long is each day's session, and is there a total number of hours required for the entire course?

Each day's session is generally structured to last around 4-5 hours, with breaks and interactive activities included. The total course duration spans five days, approximately 20-25 hours of instruction.

Why does Deep Q-Learning use a target network and experience replay?

Target networks stabilise learning by keeping a fixed Q-target during updates. Experience replay improves sample efficiency and breaks temporal correlations in the training data, which helps avoid divergence in Q-learning.

How This Course is Different from Other Intelligent Agent Development Courses:

Unlike generic AI courses, this program is uniquely grounded in the proven methodologies and real-world examples from the *Hands-On Intelligent Agents with OpenAI Gym* book. It emphasises practical, code-level implementations of OpenAI Gym tutorial-based environments like Mountain Car and Cart Pole, uses PyTorch RL agent implementation techniques, and incorporates TensorBoard for reinforcement learning progress visualisation. By covering a diverse algorithm landscape, including Rainbow RL, PPO, and DDPG, it ensures a holistic skill set.

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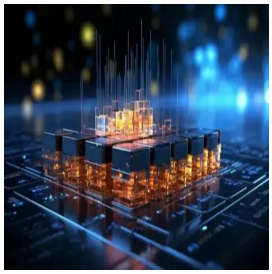

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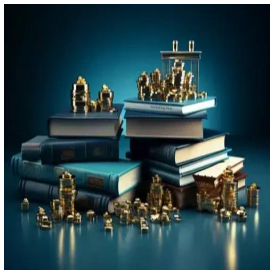

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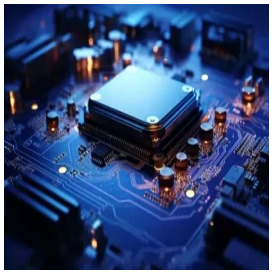

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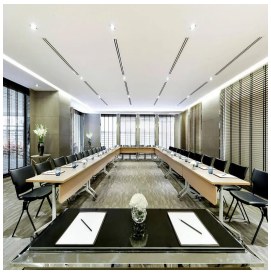

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WHO WE ARE

Agile Leaders is a renowned training center with a team of experienced experts in vocational training and development. With 20 years of industry experience, we are committed to helping executives and managers replace traditional practices with more effective and agile approaches.

OUR VISION

We aspire to be the top choice training provider for organizations seeking to embrace agile business practices. As we progress towards our vision, our focus becomes increasingly customer-centric and agile.

OUR MISSION

We are dedicated to developing value-adding, customer-centric agile training courses that deliver a clear return on investment. Guided by our core agile values, we ensure our training is actionable and impactful.

WHAT DO WE OFFER

At Agile Leaders, we offer agile, bite-sized training courses that provide a real-life return on investment. Our courses focus on enhancing knowledge, improving skills, and changing attitudes. We achieve this through engaging and interactive training techniques, including Q&As, live discussions, games, and puzzles.

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