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AI Demystified for Engineers

Bridging the Gap for Experienced Engineers in 2 days

FA-0058 · 2 days

Data & Analytics

Introduction

Artificial Intelligence (AI) is transforming industries across the globe, from automating routine tasks to providing insights from massive datasets. However, for seasoned engineers who have spent decades mastering traditional engineering methods, AI can often seem like a mysterious, even intimidating field.

This two-day training program is designed specifically for "old school" engineers, who possess extensive industry experience but are new to AI concepts and tools.

The course will demystify AI, bridging the gap between traditional engineering practices and modern AI applications, using practical, real-world examples relevant to their domain. With an emphasis on industry-demanded skills, this course will empower participants to understand and leverage AI technologies to stay competitive in an evolving technological landscape.

Learning outcomes

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

- Understand the fundamental concepts and terminologies of AI and Machine Learning.
- Recognize the key differences and synergies between traditional engineering problem-solving and AI-driven approaches.
- Identify real-world applications of AI in their specific engineering fields.
- Navigate the basics of AI tools and frameworks, including data preparation and model training.
- Implement basic AI models using accessible tools to solve relevant engineering problems.

Prerequisites

- Basic understanding of engineering principles and practices.
- Familiarity with basic programming concepts (no specific language required).
- Openness to learning new, technology-driven approaches to traditional problems.

Training outline

1. Introduction to Artificial Intelligence

1. Definition and History of AI
2. Key Concepts: Machine Learning, Deep Learning, Neural Networks
3. AI vs. Traditional Programming: How AI "Learns"
4. Overview of the AI Landscape: Current Trends and Future Directions

2. Fundamentals of Machine Learning

What is Machine Learning?

1. Types of Machine Learning: Supervised, Unsupervised, and Reinforcement Learning
2. Key Terminologies: Models, Algorithms, Training, and Testing

The Machine Learning Process

1. Data Collection and Preparation
2. Feature Engineering: Turning Raw Data into Useful Inputs
3. Model Selection: Choosing the Right Algorithm
4. Model Training and Evaluation
5. Deployment and Monitoring of Models

3. AI in Engineering: Real-World Applications

Predictive Maintenance

1. Using AI to Predict Failures and Optimize Maintenance Schedules

Quality Control and Defect Detection

1. Automating Inspection Processes with Machine Vision

Process Optimization

1. Enhancing Efficiency in Manufacturing and Production

Design and Simulation

1. Using AI for Optimizing Design Processes and Simulating Complex Systems

4. Hands-On with AI Tools

Introduction to Popular AI Frameworks and Tools

1. Scikit-learn, TensorFlow, and PyTorch: Overview and Use Cases

Getting Started with Python for AI

1. Basic Syntax and Libraries for Data Science

Building a Simple Machine Learning Model

1. Data Preparation and Preprocessing
2. Training a Model with Scikit-learn
3. Evaluating Model Performance

Introduction to Deep Learning

1. What is a Neural Network?
2. Building a Basic Neural Network with TensorFlow/Keras

5. Bridging the Gap: Integrating AI into Traditional Engineering Workflows

Overcoming Common Challenges in AI Adoption

1. Data Availability and Quality
2. Understanding and Trusting AI Outputs

Collaboration Between Domain Experts and Data Scientists

1. The Role of Engineers in AI Projects
2. Enhancing AI Models with Domain Knowledge

3. Case Studies of Successful AI Integration in Engineering Projects

6. Ethical and Practical Considerations in AI

1. Understanding Bias in AI Models
2. Ethical AI: Ensuring Fair and Responsible Use
3. Data Privacy and Security Concerns
4. Practical Limitations and Pitfalls of AI in Engineering

7. Future Directions and Learning Pathways

1. Emerging AI Technologies: What's Next?
2. Continuous Learning: Resources and Communities for Engineers
3. Identifying Opportunities for AI in Your Field

8. Q&A and Interactive Discussion

1. Addressing Specific Concerns and Questions from Participants
2. Group Discussion: Potential AI Projects in Participants' Organizations
3. Feedback and Course Wrap-Up

This course will be facilitated by an instructor with over 30 years of industry experience, ensuring that the content is not just theoretical but rooted in practical, real-world applications. This hands-on and approachable introduction to AI will enable experienced engineers to confidently explore and leverage AI technologies in their own work.

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