



AI and ML Fundamentals for Refinery Engineers

Potential PDH: 12

Description:

Learning Objectives

- Understand core AI and ML concepts relevant to refining.
- Ingest, clean, and join datasets for modeling.
- Build and interpret baseline models for common refinery use cases.
- Solution Development Best Practices
- Create an action list to pilot one to two use cases after the course.

Outline:

Day 1

- AI and ML in refining: terminology, model types, and where they fit in the plant. Data landscape and governance: data quality, data policy, cybersecurity
- Tools crash course: See below.
- Lab: Import time-series, resample, handle missing values, engineer simple features aligned to process physics.
- Feature engineering
- Lab: Supervised training – Corrosion or Mass Balance use case dependent on client preference
- LLM Wrangling – Accuracy vs Creativity
- Lab: LLM Summarization and Searching in Industry – Inspection History Summarization

Day 2

- Versioning, Monitoring, and Packaging of Solutions
- Lab: Machine Vision OCR of non-uniform historical records
- DTOs and the agentic approach – linking solutions together
- Lab: Collaborative development connecting solutions together.
- Use Case Discussion
- Wrap up

Tools Emphasized:

Excel, SQL, VS Code, Python (XgBoost, OpenCV, SciKit), AI coding assistants (Open AI SDK)

BECHT LEARNING AND DEVELOPMENT

Course Content



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Who Should Attend:

Process, reliability, other engineers, application support specialists. Attendees should have a background in programming fundamentals.

Subject Matter Expert (SME):

Mr. Mark Fronek is Manager, Digital Solutions at Becht and an instructor of applied artificial intelligence and machine learning for the refining industry. He brings over 20 years of experience in leveraging technology to solve global energy sector problems. His background spans software engineering, systems integration and automation, cybersecurity, and infrastructure. At Becht he leads digital solutions consulting, including workshop facilitation, digital transformation strategy, implementation assurance, and owner's representation. He also founded Becht's software solutions business and serves as architect and solutions designer for platforms such as BechtCONNECT and BechtPRACTICES, as well as calculation tools including CorrExpert-Crude, Becht HTHA, Becht Stream Compatibility, Becht CokeDrum, and CorrExpert-eCCD. Earlier roles include IT Manager at FPS and IT Specialist at Shaw Stone & Webster. He studied Electrical Engineering at RIT and Management of Information Systems at NJIT.

Mr. Orion Burl is Software Engineer, Corrosion, Materials, and Inspection at Becht and an instructor of applied artificial intelligence and machine learning for the refining industry. He has over 7 years of experience between refining control systems, automation, and software development. At Becht, he is responsible for the development of the CorrExpert-Crude, CorrExpert-eCCD, and Stream Compatibility software tools. He also implements custom machine learning models for clients and develops internal AI tools for efficiency improvements. Previous roles include Process Control Engineer at Marathon and SIS & Control Systems Engineer at Valero. He studied Chemical Engineering at UCLA and Computer Science at Georgia Tech.