IA · CENTER

Quality 4.0
Specialization

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WHY
Quality 4.0

Smart Manufacturing processes exhibit rapidly increasing complexity. Traditional quality control techniques and paradigms are not up to the task of handling all these dynamics. Therefore, for the last decade, quality engineers went into stagnation stage with little innovation to offer to the manufacturing industry.

If you work in the manufacturing industry, you are most likely aware of the extraordinary potential of applying artificial intelligence (AI) to drive innovation. Today, the industrialization of AI is a major megatrend, and its application for quality control is one of the most cited priorities. Therefore, manufacturing companies can competitively position themselves among the most advanced and influential companies by successfully implementing Quality 4.0. However, this is not an easy task because quality professionals often have difficulty developing a vision for Quality 4.0; they need to learn the new technologies and paradigms to keep innovating and achieving professional growth. According to Forbes , the lack of powerful people is one of the biggest challenges facing these technologies in business.

The Fourth Industrial Revolution is an excellent opportunity for the quality movement to become relevant again and for us, the quality professionals, to leverage our quantitative reasoning and problem-solving strategies to return to lead roles again.

"The manufacturing companies to first implement a Quality 4.0 innovation system will be among the most advanced and influential companies in the world. Quality 4.0 combines the traditional methods and paradigms with the Fourth Industrial Revolution technologies, such as AI, to create innovation in manufacturing. The first professionals to learn and deploy a Quality 4.0 initiative, will be leaders and advance rapidly to more important roles."

Carlos A. Escobar, PhD.
Founder, Quality 4.0 Institute

ABOUT
The Program

IA.Center is thrilled to collaborate with professionals dedicated to find new ways to integrate and combine new technologies, such as Artificial Intelligence, to innovate in manufacturing. Dr. Carlos Escobar, our instructor, is a world class author in Quality 4.0. This new quality paradigm combines a set of skills on quality control and machine learning. Q4.0 brings quality of products and services to the next level. We invite you to take this opportunity to learn Q4.0 from Dr. Escobar. After successfully completing our series of courses in Q4.0, you will be able to lead innovation in your company, transition to more important roles, and finally, increase our regional competitiveness.

APPROACH

Our Quality 4.0 initiative combines six areas of knowledge (Quality, statistics, programming, optimization, learning, and manufacturing) and an evolved problem solving strategy that combines them in an effective way. Our initiative is based on theory, empirical evidence, and our vast experience studying complex manufacturing systems.

EXPECTED BENEFITS

Upon completion of these courses, you will learn new technologies of the Fourth Industrial Revolution. Engineers will learn how to solve complex problems and managers will develop a vision for AI.

IDEAL CANDIDATES

Manufacturing engineers, managers and directors. Professionals interested in smart manufacturing. Professionals interested in learning how to apply machine learning and its applications to drive innovation.

Quality 4.0 Institute

We help professionals and organizations worldwide harness technologies of the Fourth Industrial Revolution. We offer robust comprehensive training and certification programs in Quality 4.0.

Center for Artificial Intelligence

We develop programs and projects for learning, innovation and entrepreneurship focused on generating applied knowledge using technologies in the area of Artificial Intelligence to promote the technological competitiveness of our region and public welfare through a link with the industrial, academic, social and public sectors.

COURSES
and certifications

Yellow Belt

Green Belt

Black Belt

Master Black Belt

LEVEL I

Yellow Belt

ABOUT THE COURSE

Enhance your strategic decision making around the use of key AI technologies.

By completing this course, you will learn:

- How AI tools are applied to solve complex problems.
- How to drive innovation in manufacturing.
- Understand the challenges posed by manufacturing big data.
- Limitations of quality control systems.
- Advantages of learning Quality 4.0.

IDEAL CANDIDATES

- Manufacturing technicians, engineers, managers and directors.
- Professionals interested in smart manufacturing.
- Professionals interested in learning how machine learning can be applied to drive innovation.

Requirements:

- Manufacturing background. No programming or machine learning background is required.

DETAILS

- Duration - 3 hours
- In order to receive a certificate for this course you must work with an assigned mentor on a project.

COURSE HIGHLIGHTS

Smart Manufacturing
Manufacturing Big Data
Evolution of Modern Quality Control
Breakdown of Traditional Quality Control Methods
The Rise of Quality 4.0
The Technologies
Introduction to Project Selection

LEVEL II

Green Belt

ABOUT THE COURSE

Master fundamental technical competences in machine learning, enabling you to develop a quality control learning system.

By completing this course, you will learn:

- Address the challenges posed by manufacturing big data.
- Identify features containing the quality pattern and how this information is used for process redesign.
- Identify which problems can be solved using AI and how to evaluate their likelihood of success.

REQUIREMENTS

- Yellow Belt, basic understanding of statistics, probability, linear algebra. No programming experience is required.

DETAILS

- Duration - 9 hours
- In order to receive a certificate for this course you must work with an assigned mentor on a project.

COURSE HIGHLIGHTS

Binary Classification of Quality
Learning Quality Systems
Evolved Problem Solving Strategy
Python Installation
Public Data Sets Access
Linear Classification
Project Selection Advise

LEVEL III

Black Belt

ABOUT THE COURSE

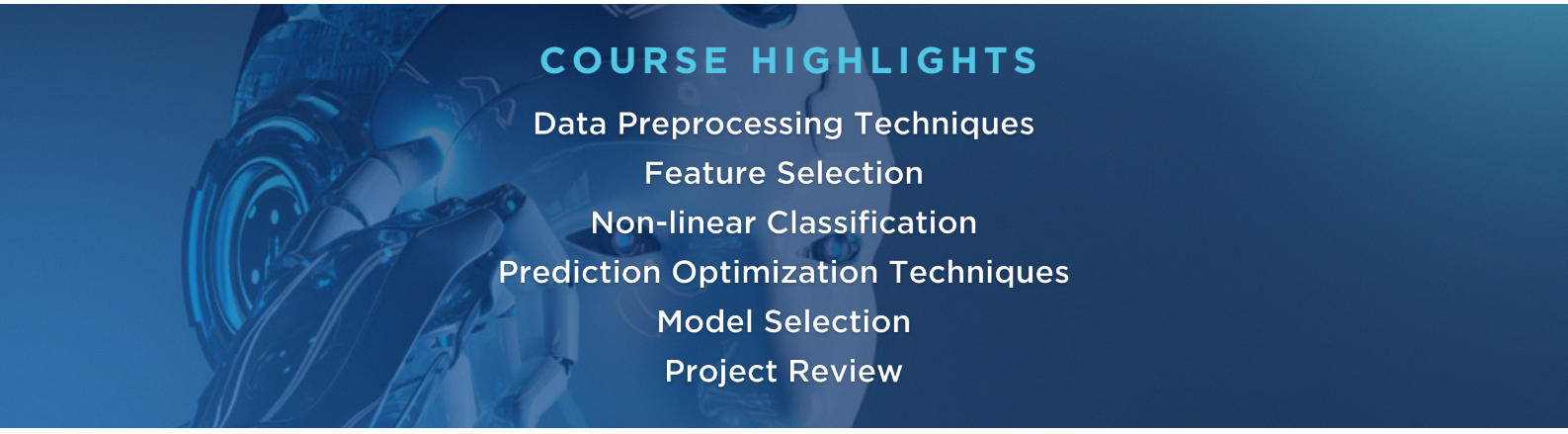
Upon completion of the course, you will gain advanced technical competences to solve more complex problems using the random forest and XGBoost algorithms. You will learn how to develop a sustainable solution with the capacity to automatically learn new and transient sources of variation. Overall, you will gain skills to solve complex problems and drive innovation.

REQUIREMENTS

- Green Belt, basic understanding of probability, statistics, linear algebra and programming.

DETAILS

- Duration - 9 hours
- In order to receive a certificate for this course you must work with an assigned mentor on a project.



COURSE HIGHLIGHTS

Data Preprocessing Techniques
Feature Selection
Non-linear Classification
Prediction Optimization Techniques
Model Selection
Project Review

LEVEL IV

Master Black Belt

ABOUT THE COURSE

Upon completion of the course, you will master the fundamentals of machine learning. You will be ready to design and write your own algorithms to develop customized solutions. Overall, you will have the technical and managerial skills to champion Quality 4.0 in your organization.

REQUIREMENTS

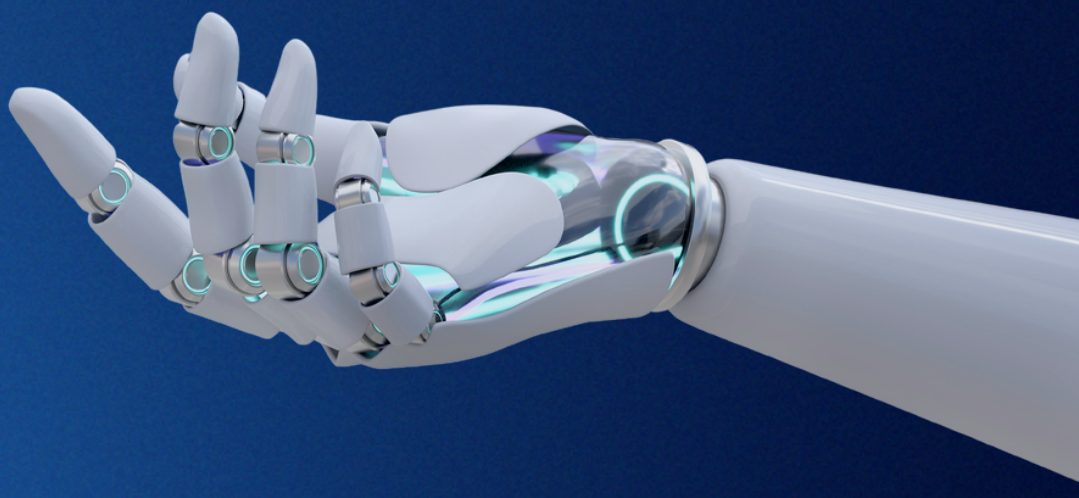
- Black Belt, basic understanding of probability, statistics, linear algebra and programming.

DETAILS

- Duration - 9 hours
- In order to receive a certificate for this course you must work with an assigned mentor on a project.

COURSE HIGHLIGHTS

Deep Learning
Meta-Learning
Managerial Implications
Project Preliminary Results Analysis
Algorithm Development (optional)
Publication Support (optional)



CONTENTS

By Belt

Yellow Belt (3 hrs)

Smart Manufacturing
- Technologies
- Building blocks
- Characteristics
- Research areas

Manufacturing Big Data
- 10V's
- Data sets for binary classification of quality

Evolution of Modern Quality Control
- Problem solving strategies and paradigms

Breakdown of Traditional Quality Control Methods
- Trends
- Case study
- Limitations

The Rise of Quality 4.0
- Definitions
- Objectives
- Areas of knowledge

The Technologies
- Artificial intelligence
- Cloud storage and computing
- Industrial internet of things and cyber physical systems

Introduction to Project Selection

Green Belt (9 hrs)

Binary Classification of Quality
- Machine learning theory
- Pattern analyses

Learning Quality Systems
- Definition
- Applications

Evolved Problem Solving Strategy
- Identify
- Instrument
- Extract
- Learn
- Optimize
- Relearn
- Redesign

Python Installation
Public Data Sets Access
linear Classification
- Support vector machine

Project Selection Advise

CONTENTS

By Belt

Black Belt (9 hrs)

Data Preprocessing Techniques
Feature Selection
- Filter methods
- Wrapper
- Embedded

Non-linear Classification
- Xgboost
- Random forest

Prediction Optimization Techniques
Model Selection
Project Review

Master Black Belt (9 hrs)

Deep Learning
Meta-learning
Managerial Implications
Project Preliminary Results Analysis
Algorithm development (optional)
Publication support (optional)

ABOUT
the instructor

Carlos A. Escobar Ph. D.

RESEARCH SCIENTIST
QUALITY 4.0 INSTITUTE

Dr. Carlos Escobar obtained his PhD in Engineering Sciences with Concentration in AI from Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM). He worked for GM for over seven years as a Senior Researcher at the Manufacturing Systems Research Lab, Global R&D. He conducted research in Quality 4.0; applied and developed algorithms aimed at rare quality event detection.

Dr. Escobar is certified in Artificial Intelligence: Implications for Business Strategy from Massachusetts Institute of Technology; black belt in six sigma and design for six sigma (DFSS) from Arizona State University and University of Michigan respectively; and DFSS master black belt from GM University.

With more than 30 publications in top Journals (Journal of Intelligent Manufacturing, Journal of Manufacturing Science and Engineering, International Journal of Lean Six Sigma) and Conferences (ASQ Quality 4.0 Summit, North American Manufacturing Research Conference, IEEE International Conference on Big Data), his research work interest lies within the 98% percentile as compared with the cohort of researchers registered in the ResearchGate platform and it has been recognized as one of the most innovative and high impact research topics by the TecReview magazine.

He was ranked in the top 3% in TEXATA, the Big Data Analytics World Championships. Because of his technical contributions in the field, Dr. Escobar was recognized as the Star of Today (i.e., Hispanic Scientific of the Year) by SHPE, the biggest association in the US for Hispanics in STEM. Currently, he is pursuing his third master's degree in Management at Harvard Extension School.

Visit: www.quality4.com

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For more information feel free to contact us:

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