Artificial Intelligence Expert: Mastering Advanced Techniques - IABAC

Date and duration

Training code : IA013EN
Duration : 5 days
Nombre d'heures : 35 heures

Training with certification

Certified Artificial Intelligence Expert (CAIE-AI3050)

Body

Artificial Intelligence Expert is a professional certification from IABAC that validates your mastery of AI concepts, techniques, and tools in Machine Learning and Deep Learning. It also demonstrates your ability to apply them to real-world problems, giving you professional recognition and the essential skills to **succeed in the fast-evolving field of AI**.
This intensive 5-day training fully prepares you for the IABAC AI Expert certification by equipping you with the knowledge and skills required for success. You will explore the **foundations of AI, Machine Learning, and Deep Learning** in depth before advancing to key topics such as computer vision (CNNs, object detection), natural language processing (NLP, Transformers, LLMs), and reinforcement learning (Deep RL, OpenAI Gym). You will also learn to **develop advanced generative models** (GANs, diffusion models, autoencoders), leverage LangChain and vector databases to enhance LLMs through RAG, and master **prompt engineering to optimize interactions** with language models.
Throughout the AI Expert course, particular emphasis is placed on **AI ethics and optimizing modern architectures** for real-world applications across domains such as healthcare, finance, and industry. You will alternate between theory, hands-on exercises, and real case studies to gain practical experience and build directly applicable skills. You will also benefit from **complete preparation for the CAIE–AI3050 exam**, including review sessions, a mock exam, and personalized guidance to maximize your chances of success.
For more details about the CAIE certification and the AI3050 exam, please refer to the Certification section.

Objectifs

By completing the AI Expert training, you will be able to:

- Master the fundamentals of Artificial Intelligence (AI), Machine Learning, and Deep Learning by understanding their core principles and applications
- Design, train, and optimize AI models using TensorFlow and Keras, implementing different types of neural networks (ANN, CNN, RNN, LSTM, and Transformers)
- Develop advanced AI applications in domains such as computer vision (object detection and image classification) and natural language processing (NLP) using models such as BERT, GPT, and LangChain
- Apply reinforcement learning (Deep RL) to complex environments and build advanced generative models (GANs, autoencoders, diffusion models) for synthetic content creation
- Use LangChain and vector databases (RAG) to enhance LLM capabilities, and master prompt engineering to optimize interactions with these models
- Integrate AI ethics and bias mitigation principles into the design and deployment of AI solutions, understanding the challenges and responsibilities associated with this technology

- Analyze AI model performance and fine-tune parameters to optimize transparency, reliability, and trustworthiness
- Effectively prepare for the Artificial Intelligence Expert (CAIE–AI3050) certification exam

As a Gold Authorized Training Partner (ATP) accredited by IABAC under registration number 100476, Oo2 provides certifying programs that meet the association's rigorous quality standards.

Points forts

- **IABAC-Accredited Expert Trainer**: Learn from an IABAC-certified instructor, an AI expert specifically trained to guide you toward certification success.
- **Practical, Real-World Approach:** Apply your knowledge through hands-on labs and real case studies designed to prepare you for real-world AI challenges.
- **Master Key Skills**: The training content is fully aligned with the competency areas assessed in the IABAC CAIE–AI3050 certification exam, giving you the tools needed to succeed.
- **Comprehensive Exam Preparation**: Benefit from complete exam preparation, including review sessions, a mock exam, and personalized guidance to maximize your chances of success.
- **Exam Included with Free Retake**: The Artificial Intelligence Expert exam is included in our program, and if unsuccessful, you will have the opportunity to retake it at no additional cost.

Certification

This training prepares you for the Artificial Intelligence Expert professional certification exam. At the end of the course, you will receive a voucher code to schedule your exam online via the IABAC website.

AI Expert (AI3050) Exam Details:

- Format: Multiple-choice questions with scenarios and code-based questions
- Duration: 1 hour 20 minutes
- Delivery: Online
- Language: English
- Passing score: 60%

After completing the exam, if successful, IABAC will send you the official CAIE–AI3050 certification confirmation by email within 7 days.
Important to know: *The Artificial Intelligence Expert certification is valid for 3 years. To keep your certification current and maintain its recognition, you must earn 30 CPD (Continuing Professional Development) credits. Certification renewal is free of charge.*
Learn more about the renewal process in the Certification section

Modalités d'évaluation

Practical Work
Case study

Pré-requis

Prerequisites for Attending this Training:

- **Basic programming knowledge**, ideally in Python, the reference language for AI. This will help you apply concepts and build your own models
- **Prior knowledge of Machine Learning** is a plus (but not mandatory). It will help you better understand the concepts covered, progress faster, and deepen certain topics
- **Foundations in applied mathematics** (linear algebra, probability, and statistics). These skills are essential to understand how algorithms work and to analyze data
- **Experience in data handling**, while not required, can facilitate your learning
- **Ability to read and understand English**, as the AI Expert exam (AI3050) is delivered in English

Public

This training is intended for the following audiences:

- **Developers and software engineers** who want to acquire AI skills to integrate this technology into their applications and develop new products
- **Data scientists and analysts** seeking to deepen their knowledge of AI, particularly in Deep Learning, and master tools such as TensorFlow to build and train models
- **IT project managers and managers** who want to understand AI challenges in order to lead projects, allocate resources, and make informed decisions about adopting AI solutions
- **Decision-makers and entrepreneurs** aiming to leverage AI to drive innovation, transform their businesses, and seize new market opportunities

Programme

Module 1: Mastering the Foundations of Artificial Intelligence

- The concept of intelligence, from human to machine
- History and evolution of artificial intelligence
- Reasons behind the current rise of AI
- Different domains of AI applications
- Distinction between AI, Data Science, and Machine Learning.

Module 2: Mastering the Basics of Machine Learning and Deep Learning

- Fundamental differences between Machine Learning and Deep Learning
- Architecture and functioning of deep neural networks
- Feature learning in deep networks
- Real-world applications of Deep Learning networks

Module 3: Getting Started with TensorFlow

- Overview of the open-source tool TensorFlow
- TensorFlow structure and modules
- Tensors, operations, graphs, variables, and functions
- Building and training simple models
- Dynamic execution (Eager Execution) and compilation (XLA)

Hands-on Lab:

- Building a Machine Learning model with TensorFlow using the Keras API

Module 4: Studying Artificial Neural Networks (ANNs)

- Structure and organization of neural networks

- Core concepts (weight initialization, optimizers, activation, MSE and RMSE)
- Forward propagation algorithm
- Gradient backpropagation for learning

Module 5: Exploring Computer Vision

- Introduction to computer vision and its applications
- Basics of image processing and related techniques
- Convolutional Neural Networks (CNNs): architecture and functioning
- Object detection (concepts, methods, and metrics)
- Bounding Box Regression for localization
- Advanced object detection models (R-CNN, Fast R-CNN, Faster R-CNN, SSD, and YOLO)
- Implementation with OpenCV (CV2) for practical applications
- Transfer learning in CNNs
- Image classification with the Flowers dataset (TF 2.x)

Case Study:

- Analyzing anomaly detection in medical X-rays

Hands-on Lab:

- Image classification with a CNN (e.g., cats vs. dogs)

Module 6: Mastering Natural Language Processing (NLP)

- Introduction to NLP and its challenges
- Core NLP concepts (tokenization, lemmatization, and syntactic analysis)
- Bag of Words (BoW) models for text representation
- Word embeddings and vector word representations
- Handling and processing text and PDF files
- Advanced regex techniques
- Using Transformers and BERT for NLP
- Using GPT models for text generation
- State-of-the-art techniques and advanced NLP projects

Hands-on Lab:

- Applying the BERT algorithm to text processing

Module 7: Discovering Reinforcement Learning (RL)

- Markov Decision Processes (MDP) for RL
- Core RL equations (Bellman equations and key concepts)
- Differences between model-based and model-free RL
- Dynamic programming and model-free methods

Module 8: Advancing into Deep Reinforcement Learning (Deep RL)

- Deep Q-Learning architectures
- Deep Q-Learning and advanced algorithms
- Reinforcement learning projects with OpenAI Gym

Module 9: Mastering Prompt Engineering and Interacting with LLMs

- Importance and challenges of prompt engineering
- The role of prompts in AI systems

- Principles of effective prompt design
- Prompt optimization techniques
- Applying prompts in NLP

Module 10: Studying Autoencoders and Generative Models

- How autoencoders work (structure and types: Vanilla, Denoising, Variational, Sparse, and Convolutional)
- Training and optimizing autoencoders
- Using autoencoders for dimensionality reduction, anomaly detection, and image restoration
- Generative AI fundamentals
- Key concepts and applications of GANs (Generative Adversarial Networks)
- Building a GAN model with TensorFlow 2.x
- Using GPT models
- Building a Q&A chatbot with Hugging Face

Module 11: Mastering Diffusion Models and Image Generation

- How diffusion models work (types: DDPM, Latent Diffusion Models, and Score-Based Generative Models)
- Training and optimizing diffusion models
- Applications (ultra-realistic image generation, super-resolution, video generation, and molecular biology)

Module 12: Leveraging LangChain and Large Language Models (LLMs)

- Introduction to LangChain and its ecosystem
- Key components of LangChain
- Text ingestion and chunking techniques
- Embeddings and vector databases
- LangChain Expression Language
- Building a simple RAG-based chatbot (Retrieval-Augmented Generation)

Module 13: Addressing AI Ethics

- General issues related to AI
- Specific ethical concerns in AI (bias, discrimination, etc.)
- The importance of ethics, bias mitigation, and building trust in AI

Module 14: Preparing for the AI Expert Exam (AI3050)

- Review of key course points
- Mock exam with corrections and explanations
- Exam strategies and tips for success (time management, reading techniques, and stress management)