# Professional Master's Degree

## Artificial Intelligence in Marketing and Communication

tech global university

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# Professional Master's Degree
## Artificial Intelligence in Marketing and Communication

- Modality: **online**
- Duration: **12 months.**
- Certificate: **TECH Global University**
- Accreditation: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/artificial-intelligence/professional-master-degree/master-artificial-intelligence-marketing-communication**

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01

# Introduction

Artificial Intelligence (AI) is one of the latest trends that have revolutionized areas such as Marketing and Communication. This technology provides professionals with advanced tools to optimize their relationships with consumers. Its importance lies in the fact that it allows the analysis of large amounts of data about the behavior and preferences of the audience. In this way, institutions use this information to personalize their messages and content. In this way, they improve their customers' experience, while increasing conversion rates. In this context, TECH has created a pioneering university program on the analysis of communication data to facilitate strategic decision making. In addition, it is taught in a 100% online mode for the convenience of students.

*Optimize Advertising Campaigns in the best digital university in the world according to Forbes"*

To differentiate themselves from their competitors, companies engaged in Digital Marketing seek to implement the most advanced Machine Learning tools to improve their websites. In this sense, companies make it a top priority to personalize user experiences in order to establish relationships based on trust and loyalty. One of the most effective tools in this regard is *Chatbots* or Virtual Assistants. These intelligent systems provide personalized attention to customers throughout the day. They help to resolve consumer queries globally and to maintain a constant online presence.

In view of this, TECH launches an innovative program that will offer experts the most effective AI strategies in online advertising. Designed by experts in the field, the syllabus will delve into Predictive Analytics and *Big Data*. In line with this, the syllabus will emphasize *Email Marketing* for campaign personalization. Likewise, the didactic materials will delve into the application of Machine Learning in market research and for the visualization of significant data. On the other hand, the program will address specific techniques for *Leads* generation with AI and the integration of Autonomous Systems in competitive analysis.

In addition, the academic itinerary is designed with a theoretical-practical perspective and has numerous complementary didactic materials to strengthen learning in a dynamic way (including interactive summaries, detailed videos or case studies). Students will be able to access the Virtual Campus at any time of the day. The only requirement is that students have a digital device capable of accessing the Internet. This is a university program that does not require attendance at centers and does not have pre-set class schedules. Professionals will thus have greater freedom to self-manage their access time and reconcile their daily activities with top-quality teaching.

This **Professional Master's Degree** in **Artificial Intelligence in Marketing and Communication** contains the most complete and up-to-date program on the market. The most important features include:

- The development of case studies presented by experts in Artificial Intelligence in Marketing and Communication
- The graphic, schematic and practical contents of the book provide technical and practical information on those disciplines that are essential for professional practice
- Practical exercises where the self-assessment process can be carried out to improve learning
- Its special emphasis on innovative methodologies
- Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- Content that is accessible from any fixed or portable device with an Internet connection

*You will be able to eliminate the noise of automatic coders to improve users' digital experiences"*

*You will acquire the most effective skills to incorporate Machine Learning resources into sales management"*

*You will optimize the effectiveness of your marketing strategies by fostering a closer and more personalized relationship with customers.*

*Take advantage of all the benefits of the Relearning methodology: it will allow you to organize your time and study pace, adapting to your schedule.*

The program's teaching staff includes professionals from the sector who contribute their work experience to this specializing program, as well as renowned specialists from leading societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the course. For this purpose, students will be assisted by an innovative interactive video system created by renowned and experienced experts.

02

# Objectives

This program will provide graduates with a comprehensive understanding of how AI is capable of transforming the Marketing and Communication industry. Students will also be highly qualified to design innovative strategies based on accurate data and predictive analytics. Thanks to this, experts will drive campaigns defined by both their personalization and optimization of relationships with the public. In addition, they will take advantage of Machine Learning mechanisms to anticipate user needs and learn about the latest trends in AI.

*TECH puts the most innovative multimedia resources in the academic landscape at your fingertips so that you can achieve success in Marketing and Communication"*

## General Objectives

- Understand the fundamentals of how AI is transforming Digital Marketing strategies
- Develop, integrate and manage chatbots and virtual assistants to improve customer interactions
- Delve into the automation and optimization of online ad buying through programmatic advertising with AI
- Interpret large volumes of data for strategic decision making in Digital Marketing
- Apply AI to email marketing strategies for personalization and campaign automation
- Explore emerging trends in AI for Digital Marketing and understand their potential impact on the industry

*The skills you will gain after this Professional Master's Degree will raise your professional horizons and allow you to differentiate yourself from the rest"*

## Specific Objectives

### Module 1. Fundamentals of Artificial Intelligence

- Understand the fundamental concepts of Artificial Intelligence applied to Digital Marketing, including its evolution and impact on business strategies
- Apply specific AI tools for search engine optimization, improving the visibility and effectiveness of digital campaigns
- Develop skills to implement *chatbots* and virtual assistants, improving customer interaction and personalization of experiences

### Module 2. Data Types and Life Cycle

- Perform the most descriptive statistics, taking into account factors ranging from the population to its sources
- Properly differentiate the data life cycle, taking into account the FAIR Principles
- Employ the Gantt Chart tool to manage both projects and communication of planning and scheduling tasks
- Perform data collection and data cleansing functions
- Acquire an extensive knowledge of regulatory issues such as the Data Protection Act

### Module 3. Data in Artificial Intelligence

- Implement advanced automation techniques, such as advertising campaign optimization and efficient CRM management with AI-based tools
- Develop skills in lead identification and qualification using AI, improving effectiveness in both lead generation and lead management
- Apply sentiment analysis with AI in social networks and customer *feedback*, optimizing interaction to improve brand perception

### Module 4. Data Mining. Selection, Pre-Processing and Transformation

- Gaining extensive insight into statistical inference
- Perform effective treatments of missing values, applying maximum likelihood imputation methods
- Select data based on major perspectives and criteria
- Drive data preprocessing work in *Big Data* environments

### Module 5. Algorithm and Complexity in Artificial Intelligence

- Understand the fundamentals of algorithmics and computational complexity in the context of AI
- Become familiar with the key concepts of algorithms, data structures and algorithm design techniques used in applications
- Study and apply search, optimization and Machine Learning algorithms in AI problems
- Explore how existing algorithms can be improved and new algorithms developed to address AI challenges
- Develop practical skills in the implementation and evaluation of algorithms

### Module 6. Intelligent Systems

- Analyze in depth the Theory of Agents, to know what factors influence AI and software engineering
- Perform an effective evaluation of data quality, keeping in mind the distinction between information and knowledge
- Build domain ontologies at a higher level and master their respective languages
- Delve into the current and future state of the semantic web in order to carry out innovation processes

### Module 7. Machine Learning and Data Mining

- Delve deeply into the key concepts of Machine Learning discovery processes
- Explore data processing, visualization and exploration of variables
- Master the mechanisms of Neural Networks, using the *Backpropagation* Algorithm appropriately
- Analyze text mining and natural language processing

### Module 8. Neural Networks, the Basis of *Deep Learning*

- Obtain a comprehensive view on Deep Learning and its various applications in the communication domain
- Design architectures taking into account the connection between layers and forward propagation
- Build Neural Networks establishing both weights and training
- Apply the basic principles of Neural Networks, adjusting parameters as necessary
- Implement MLP with Keras

### Module 9. Deep Neural Networks Training

- Identify Gradient problems and perform techniques to optimize them
- Perform learning rate scheduling by applying smoothing terms
- Acquire practical guidelines in model design, selection of metrics and evaluation parameters
- Execute maximum entropy regularization procedures

### Module 10. Model Customization and Training with TensorFlow

- Conduct model training with *TensorFlow*, performing operations with graphs
- Effectively customize models and training algorithms
- Gain a broad understanding of *TensorFlow* functions and graphs
- Use the *tfdata* API for data processing
- Elaborate *Deep Learning* applications with the most advanced *TensorFlow* tools

### Module 11. *Deep Computer* Vision with Convolutional Neural Networks

- Master the *Cortex*Visual Architecture, taking into account the functions of the visual cortex and the theories of computer vision
- Implement a CNN *ResNet* using Keras
- Perform transfer learning processes, knowing its advantages
- Execute object detection methods and tracking techniques

### Module 12. Natural Language Processing (NLP) with Recurrent Neural Networks (RNN) and Attention

- Generate texts using RNN and handle their natural language in an optimal way
- Create training data sets and perform the corresponding cleaning and transformation of the information
- Use encoder-decoder networks for machine translation
- Employ Transformer Models for language vision
- Develop NLP applications with RNN and Attention

### Module 13. Autoencoders, GANs and Diffusion Models
- Represent data in an efficient way, reducing dimensionality through deep learning
- Perform PCA processes with an incomplete linear autoencoder
- Eliminate noise from automatic encoders by applying filters and regularization techniques
- Generate fashion MNIST images
- Understand generative adversarial networks and diffusion models

### Module 14. Bio-Inspired Computing
- Efficiently employ social adaptation algorithms using ant colony and particle cloud-based computing
- Apply space exploration-exploitation strategies for genetic algorithms
- Delve into the different models of evolutionary computation
- Understand the various uses of Neural Networks in fields such as medical research, economics or computer vision

### Module 15. Artificial Intelligence: Strategies and Applications
- Address the implications of AI in financial services, to overcome challenges and take advantage of opportunities
- Understand the implications of Machine Learning in healthcare services, *Retail*, Education and Public Administrations
- Analyze the latest trends in this field and analyze their challenges for the future

### Module 16. Artificial Intelligence in Digital Marketing Strategies
- Perform Digital Marketing transformation processes with AI
- Control the most advanced tools of Machine Learning for customer communication
- Personalize users' experiences on websites and social media
- Develop *chatbots* and virtual assistants in Digital Marketing

### Module 17. Content Generation with AI
- Master AI systems for SEO and SEM optimization
- Execute Predictive Analytics and using *Big Data* in Digital Marketing
- Use *Email Marketing* for Personalization and Automation in Campaigns
- Analyze future trends in AI for Digital Marketing

### Module 18. Automation and Optimization of Marketing Processes with AI
- Develop Marketing Automation Processes with AI
- Optimize Advertising Campaigns through Machine Learning
- Optimize advertising campaigns through Machine Learning
- Analyze sentiment with AI on social networks, leveraging customer *feedback*

### Module 19. Communication and Marketing Data Analysis for Decision Making
- Master specific technologies for the analysis of Communication and Marketing data
- Apply AI to the analysis of large volumes of data
- Develop Predictive Analytics for Informed Decision Making
- Improve Marketing strategies with AI

### Module 20. Sales and *Leads* Generation with Artificial Intelligence
- Nurture *Leads* generation tools and procedures with AI
- Implement Virtual Assistants in Sales Processes
- Predict consumer needs through Machine Learning
- Learn about the main innovations and predictions in the sales field

03

# Skills

This program will prepare students to lead cutting-edge projects in the world of Digital Marketing. In this way, graduates will develop specialized competencies in Artificial Intelligence to revolutionize the communication landscape. In addition to obtaining advanced knowledge in content generation with AI, they will implement the most modern technologies in their daily procedures. They will therefore be highly prepared to anticipate obstacles that may arise and take advantage of emerging trends to provide competitive advantages in a booming job market.

*You will be fully qualified to implement Artificial Intelligence in business environments, generating tangible and rapid impact"*

## General Skills

- Apply AI tools to optimize SEO, SEM and improve visibility in search engines
- Implement automation and predictive analytics in social networks to boost online presence
- Use AI content generation tools for text, images, music and video in Marketing contexts
- Personalize user experiences on websites and applications using advanced AI techniques
- Develop, integrate and manage chatbots and virtual assistants to improve customer interactions

## Specific Skills

- Create effective ChatGPT prompts and get targeted results in content generation
- Apply tools such as Midjourney for image creation, and Fliki for video generation, developing practical skills in visual content creation with AI
- Apply AI sentiment analysis to social media and customer feedback, optimizing interaction and improving brand awareness
- Master the automation and optimization of online ad buying through programmatic advertising with AI
- Apply *Email Marketing* strategies to automate campaigns

*Machine Learning is revolutionizing the world of Marketing, optimizing the effectiveness of strategies and fostering a more personalized relationship with consumers"*

04

# Course Management

The professors who teach this university program applied to Artificial Intelligence in Marketing represent the forefront of knowledge and experience in this multidisciplinary field. It should be noted that these professionals have years of experience working in prestigious institutions in the communications industry, where they have contributed innovative proposals to build customer loyalty. Mixing theory with practice, their commitment to continuous learning, their dedication to cutting-edge research and their ability to guide and motivate graduates make them exceptional mentors for those seeking to make a quality leap in their careers.

*The diverse talents and expertise of the faculty will create an enriching learning environment. Learn with the best!"*

## Management

### Dr. Peralta Martín-Palomino, Arturo

- CEO and CTO at Prometeus Global Solutions
- CTO at Korporate Technologies
- CTO at AI Shephers GmbH
- Consultant and Strategic Business Advisor at Alliance Medical
- Director of Design and Development at DocPath
- PhD. in Psychology from the University of Castilla La Mancha
- PhD in Economics, Business and Finance from the Camilo José Cela University
- PhD in Psychology from the University of Castilla La Mancha
- Máster in Executive MBA from Universidad Isabel I
- Master's Degree in Sales and Marketing Management, Isabel I University
- Expert Master's Degree in Big Data by Hadoop Training
- Master's Degree in Advanced Information Technologies from the University of Castilla La Mancha
- Member of: SMILE Research Group

### Mr. Sánchez Mansilla, Rodrigo

- Digital Advisor at AI Shephers GmbH
- Digital Account Manager at Kill Draper
- *Head of Digital* at Kuarere
- Digital Marketing Manager at Arconi Solutions, Deltoid Energy and Brinergy Tech
- *Founder and National Sales and Marketing Manager*
- Master's Degree in Digital Marketing (MDM) by The Power Business School
- Bachelor's Degree in Business Administration (BBA) from the University of Buenos Aires

## Professors

### Ms. Parreño Rodríguez, Adelaida

- *Technical Developer & Energy Communities Engineer in PHOENIX and FLEXUM projects*
- *Technical Developer & Energy Communities Engineer* at the University of Murcia
- *Manager in Research & Innovation in European Projects* at the University of Murcia
- Content Creator in Global UC3M Challenge
- Ginés Huertas Martínez Award (2023)
- Master's Degree in Renewable Energies by the Polytechnic University of Cartagena
- Degree in Electrical Engineering (bilingual) from the Carlos III University of Madrid

### Ms. González Risco, Verónica

- Freelance Digital Marketing Consultant
- Product Marketing/International Business Development at UNIR - The University on the Internet
- *Digital Marketing Specialist* at Código Kreativo Comunicación SL
- Professional Master's Degree in *Online Marketing* and Advertising Management by Indisoft- Upgrade
- Diploma in Business Studies from the University of Almería

05

# Structure and Content

This Professional Master's Degree will stand out for its comprehensive approach as well as for its top-quality syllabus. Composed of 20 modules, the syllabus will delve into Content Generation through AI. Likewise, the university program will analyze the Automation and Optimization of Processes with Machine Learning, which will allow students to enrich their professional practice with the most advanced strategies. On the other hand, the didactic contents will pay special attention to future trends, so that graduates can benefit from them and overcome any challenge they may face during their respective activities.

*This online methodology allows you, through case studies, to practice in simulated environments to extract valuable lessons"*

## **Module 1.** Fundamentals of Artificial Intelligence

1.1. History of Artificial Intelligence
- 1.1.1. When Do We Start Talking About Artificial Intelligence?
- 1.1.2. References in Film
- 1.1.3. Importance of Artificial Intelligence
- 1.1.4. Technologies that Enable and Support Artificial Intelligence

1.2. Artificial Intelligence in Games
- 1.2.1. Game Theory
- 1.2.2. Minimax and Alpha-Beta Pruning
- 1.2.3. Simulation: Monte Carlo

1.3. Neural Networks
- 1.3.1. Biological Fundamentals
- 1.3.2. Computational Model
- 1.3.3. Supervised and Unsupervised Neural Networks
- 1.3.4. Simple Perceptron
- 1.3.5. Multilayer Perceptron

1.4. Genetic Algorithms
- 1.4.1. History
- 1.4.2. Biological Basis
- 1.4.3. Problem Coding
- 1.4.4. Generation of the Initial Population
- 1.4.5. Main Algorithm and Genetic Operators
- 1.4.6. Evaluation of Individuals: Fitness

1.5. Thesauri, Vocabularies, Taxonomies
- 1.5.1. Vocabulary
- 1.5.2. Taxonomy
- 1.5.3. Thesauri
- 1.5.4. Ontologies
- 1.5.5. Knowledge Representation Semantic Web

1.6. Semantic Web
- 1.6.1. Specifications RDF, RDFS and OWL
- 1.6.2. Inference/ Reasoning
- 1.6.3. Linked Data

1.7. Expert Systems and DSS
- 1.7.1. Expert Systems
- 1.7.2. Decision Support Systems

1.8. Chatbots and Virtual Assistants
- 1.8.1. Types of Assistants: Voice and Text Assistants
- 1.8.2. Fundamental Parts for the Development of an Assistant: *Intents*, Entities and Dialog Flow
- 1.8.3. Integrations: Web, Slack, WhatsApp, Facebook
- 1.8.4. Assistant Development Tools: Dialog Flow, Watson Assistant

1.9. AI Implementation Strategy

1.10. Future of Artificial Intelligence
- 1.10.1. Understand How to Detect Emotions Using Algorithms
- 1.10.2. Creating a Personality: Language, Expressions and Content
- 1.10.3. Trends of Artificial Intelligence
- 1.10.4. Reflections

## **Module 2.** Data Types and Life Cycle

2.1. Statistics
- 2.1.1. Statistics: Descriptive Statistics, Statistical Inferences
- 2.1.2. Population, Sample, Individual
- 2.1.3. Variables: Definition, Measurement Scales

2.2. Types of Data Statistics
- 2.2.1. According to Type
  - 2.2.1.1. Quantitative: Continuous Data and Discrete Data
  - 2.2.1.2. Qualitative. Binomial Data, Nominal Data and Ordinal Data
- 2.2.2. According to their Shape
  - 2.2.2.1. Numeric
  - 2.2.2.2. Text:
  - 2.2.2.3. Logical
- 2.2.3. According to its Source
  - 2.2.3.1. Primary
  - 2.2.3.2. Secondary

2.3. Life Cycle of Data
- 2.3.1. Stages of the Cycle
- 2.3.2. Milestones of the Cycle
- 2.3.3. FAIR Principles

2.4. Initial Stages of the Cycle
- 2.4.1. Definition of Goals
- 2.4.2. Determination of Resource Requirements
- 2.4.3. Gantt Chart
- 2.4.4. Data Structure

2.5. Data Collection
- 2.5.1. Methodology of Data Collection
- 2.5.2. Data Collection Tools
- 2.5.3. Data Collection Channels

2.6. Data Cleaning
- 2.6.1. Phases of Data Cleansing
- 2.6.2. Data Quality
- 2.6.3. Data Manipulation (with R)

2.7. Data Analysis, Interpretation and Evaluation of Results
- 2.7.1. Statistical Measures
- 2.7.2. Relationship Indexes
- 2.7.3. Data Mining

2.8. Datawarehouse
- 2.8.1. Elements that Comprise it
- 2.8.2. Design
- 2.8.3. Aspects to Consider

2.9. Data Availability
- 2.9.1. BORRAR
- 2.9.2. Uses
- 2.9.3. Security

2.10. Regulatory Framework
- 2.10.1. Data Protection Law
- 2.10.2. Good Practices
- 2.10.3. Other Regulatory Aspects

## **Module 3.** Data in Artificial Intelligence

3.1. Data Science
- 3.1.1. Data Science
- 3.1.2. Advanced Tools for Data Scientists

3.2. Data, Information and Knowledge
- 3.2.1. Data, Information and Knowledge
- 3.2.2. Types of Data
- 3.2.3. Data Sources

3.3. From Data to Information
- 3.3.1. Data Analysis
- 3.3.2. Types of Analysis
- 3.3.3. Extraction of Information from a Dataset

3.4. Extraction of Information Through Visualization
- 3.4.1. Visualization as an Analysis Tool
- 3.4.2. Visualization Methods
- 3.4.3. Visualization of a Data Set

3.5. Data Quality
- 3.5.1. Quality Data
- 3.5.2. Data Cleaning
- 3.5.3. Basic Data Pre-Processing

3.6. *Dataset*
- 3.6.1. Dataset Enrichment
- 3.6.2. The Curse of Dimensionality
- 3.6.3. Modification of Our Data Set

3.7. Unbalance
- 3.7.1. Classes of Unbalance
- 3.7.2. Unbalance Mitigation Techniques
- 3.7.3. Balancing a Dataset

3.8. Unsupervised Models
- 3.8.1. Unsupervised Model
- 3.8.2. Methods
- 3.8.3. Classification with Unsupervised Models

3.9. Supervised Models
- 3.9.1. Supervised Model
- 3.9.2. Methods
- 3.9.3. Classification with Supervised Models

3.10. Tools and Good Practices
- 3.10.1. Good Practices for Data Scientists
- 3.10.2. The Best Model
- 3.10.3. Useful Tools

## **Module 4.** Data Mining. Selection, Pre-Processing and Transformation

4.1. Statistical Inference
- 4.1.1. Descriptive Statistics vs. Statistical Inference
- 4.1.2. Parametric Procedures
- 4.1.3. Non-Parametric Procedures

4.2. Exploratory Analysis
- 4.2.1. Descriptive Analysis
- 4.2.2. Visualization
- 4.2.3. Data Preparation

4.3. Data Preparation
- 4.3.1. Integration and Data Cleaning
- 4.3.2. Normalization of Data
- 4.3.3. Transforming Attributes

4.4. Missing Values
- 4.4.1. Treatment of Missing Values
- 4.4.2. Maximum Likelihood Imputation Methods
- 4.4.3. Missing Value Imputation Using Machine Learning

4.5. Noise in the Data
- 4.5.1. Noise Classes and Attributes
- 4.5.2. Noise Filtering
- 4.5.3. The Effect of Noise

4.6. The Curse of Dimensionality
- 4.6.1. *Oversampling*
- 4.6.2. *Undersampling*
- 4.6.3. Multidimensional Data Reduction

4.7. From Continuous to Discrete Attributes
- 4.7.1. Continuous Data Vs. Discreet Data
- 4.7.2. Discretization Process

4.8. The Data
- 4.8.1. Data Selection
- 4.8.2. Prospects and Selection Criteria
- 4.8.3. Selection Methods

4.9. Instance Selection
- 4.9.1. Methods for Instance Selection
- 4.9.2. Prototype Selection
- 4.9.3. Advanced Methods for Instance Selection

4.10. Data Pre-Processing in Big Data Environments

## **Module 5.** Algorithm and Complexity in Artificial Intelligence

5.1. Introduction to Algorithm Design Strategies
- 5.1.1. Recursion
- 5.1.2. Divide and Conquer
- 5.1.3. Other Strategies

5.2. Efficiency and Analysis of Algorithms
- 5.2.1. Efficiency Measures
- 5.2.2. Measuring the Size of the Input
- 5.2.3. Measuring Execution Time
- 5.2.4. Worst, Best and Average Case
- 5.2.5. Asymptotic Notation
- 5.2.6. Criteria for Mathematical Analysis of Non-Recursive Algorithms
- 5.2.7. Mathematical Analysis of Recursive Algorithms
- 5.2.8. Empirical Analysis of Algorithms

5.3. Sorting Algorithms
- 5.3.1. Concept of Sorting
- 5.3.2. Bubble Sorting
- 5.3.3. Sorting by Selection
- 5.3.4. Sorting by Insertion
- 5.3.5. *Merge Sort*
- 5.3.6. *Quick Sort*

5.4. Algorithms with Trees
- 5.4.1. Tree Concept
- 5.4.2. Binary Trees
- 5.4.3. Tree Paths
- 5.4.4. Representing Expressions
- 5.4.5. Ordered Binary Trees
- 5.4.6. Balanced Binary Trees

5.5. Algorithms Using Heaps
- 5.5.1. Heaps
- 5.5.2. The Heapsort Algorithm
- 5.5.3. Priority Queues

5.6. Graph Algorithms
- 5.6.1. Representation
- 5.6.2. Traversal in Width
- 5.6.3. Depth Travel
- 5.6.4. Topological Sorting

5.7. Greedy Algorithms
- 5.7.1. *Greedy* Strategy
- 5.7.2. Elements of the Greedy Strategy
- 5.7.3. Currency Exchange
- 5.7.4. Traveler's Problem
- 5.7.5. Backpack Problem

5.8. Minimal Path Finding
- 5.8.1. The Minimum Path Problem
- 5.8.2. Negative Arcs and Cycles
- 5.8.3. Dijkstra's Algorithm

5.9. Greedy Algorithms on Graphs
- 5.9.1. The Minimum Covering Tree
- 5.9.2. Prim's Algorithm
- 5.9.3. Kruskal's Algorithm
- 5.9.4. Complexity Analysis

5.10. *Backtracking*
- 5.10.1. Backtracking
- 5.10.2. Alternative Techniques

## **Module 6.** Intelligent Systems

6.1. Agent Theory
- 6.1.1. Concept History
- 6.1.2. Agent Definition
- 6.1.3. Agents in Artificial Intelligence
- 6.1.4. Agents in Software Engineering

6.2. Agent Architectures
- 6.2.1. The Reasoning Process of an Agent
- 6.2.2. Reactive Agents
- 6.2.3. Deductive Agents
- 6.2.4. Hybrid Agents
- 6.2.5. Comparison

6.3. Information and Knowledge
- 6.3.1. Difference between Data, Information and Knowledge
- 6.3.2. Data Quality Assessment
- 6.3.3. Data Collection Methods
- 6.3.4. Information Acquisition Methods
- 6.3.5. Knowledge Acquisition Methods

6.4. Knowledge Representation
- 6.4.1. The Importance of Knowledge Representation
- 6.4.2. Definition of Knowledge Representation According to Roles
- 6.4.3. Knowledge Representation Features

6.5. Ontologies
- 6.5.1. Introduction to Metadata
- 6.5.2. Philosophical Concept of Ontology
- 6.5.3. Computing Concept of Ontology
- 6.5.4. Domain Ontologies and Higher-Level Ontologies
- 6.5.5. How to Build an Ontology?

6.6. Ontology Languages and Ontology Creation Software
- 6.6.1. Triple RDF, Turtle and N
- 6.6.2. RDF *Schema*
- 6.6.3. OWL
- 6.6.4. SPARQL
- 6.6.5. Introduction to Ontology Creation Tools
- 6.6.6. Installing and Using Protégé

6.7. Semantic Web
- 6.7.1. Current and Future Status of the Semantic Web
- 6.7.2. Semantic Web Applications

6.8. Other Knowledge Representation Models
- 6.8.1. Vocabulary
- 6.8.2. Global Vision
- 6.8.3. Taxonomy
- 6.8.4. Thesauri
- 6.8.5. Folksonomy
- 6.8.6. Comparison
- 6.8.7. Mind Maps

6.9. Knowledge Representation Assessment and Integration
- 6.9.1. Zero-Order Logic
- 6.9.2. First-Order Logic
- 6.9.3. Descriptive Logic
- 6.9.4. Relationship between Different Types of Logic
- 6.9.5. Prolog: Programming Based on First-Order Logic

6.10. Semantic Reasoners, Knowledge-Based Systems and Expert Systems
- 6.10.1. Concept of Reasoner
- 6.10.2. Reasoner Applications
- 6.10.3. Knowledge-Based Systems
- 6.10.4. MYCIN: History of Expert Systems
- 6.10.5. Expert Systems Elements and Architecture
- 6.10.6. Creating Expert Systems

## **Module 7.** Machine Learning and Data Mining

7.1. Introduction to Knowledge Discovery Processes and Basic Concepts of Machine Learning
- 7.1.1. Key Concepts of Knowledge Discovery Processes
- 7.1.2. Historical Perspective of Knowledge Discovery Processes
- 7.1.3. Stages of the Knowledge Discovery Processes
- 7.1.4. Techniques Used in Knowledge Discovery Processes
- 7.1.5. Characteristics of Good Machine Learning Models
- 7.1.6. Types of Machine Learning Information
- 7.1.7. Basic Learning Concepts
- 7.1.8. Basic Concepts of Unsupervised Learning

7.2. Data Exploration and Pre-processing
- 7.2.1. Data Processing
- 7.2.2. Data Processing in the Data Analysis Flow
- 7.2.3. Types of Data
- 7.2.4. Data Transformations
- 7.2.5. Visualization and Exploration of Continuous Variables
- 7.2.6. Visualization and Exploration of Categorical Variables
- 7.2.7. Correlation Measures
- 7.2.8. Most Common Graphic Representations
- 7.2.9. Introduction to Multivariate Analysis and Dimensionality Reduction

7.3. Decision Trees
- 7.3.1. ID Algorithm
- 7.3.2. Algorithm C
- 7.3.3. Overtraining and Pruning
- 7.3.4. Result Analysis

7.4. Evaluation of Classifiers
- 7.4.1. Confusion Matrixes
- 7.4.2. Numerical Evaluation Matrixes
- 7.4.3. Kappa Statistic
- 7.4.4. ROC Curves

7.5. Classification Rules
- 7.5.1. Rule Evaluation Measures
- 7.5.2. Introduction to Graphic Representation
- 7.5.3. Sequential Overlay Algorithm

7.6. Neural Networks
- 7.6.1. Basic Concepts
- 7.6.2. Simple Neural Networks
- 7.6.3. Backpropagation Algorithm
- 7.6.4. Introduction to Recurrent Neural Networks

7.7. Bayesian Methods
- 7.7.1. Basic Probability Concepts
- 7.7.2. Bayes' Theorem
- 7.7.3. Naive Bayes
- 7.7.4. Introduction to Bayesian Networks

7.8. Regression and Continuous Response Models
- 7.8.1. Simple Linear Regression
- 7.8.2. Multiple Linear Regression
- 7.8.3. Logistic Regression
- 7.8.4. Regression Trees
- 7.8.5. Introduction to Support Vector Machines (SVM)
- 7.8.6. Goodness-of-Fit Measures

7.9. *Clustering*
- 7.9.1. Basic Concepts
- 7.9.2. Hierarchical Clustering
- 7.9.3. Probabilistic Methods
- 7.9.4. EM Algorithm
- 7.9.5. B-*Cubed* Method
- 7.9.6. Implicit Methods

7.10. Text Mining and Natural Language Processing (NLP)
- 7.10.1. Basic Concepts
- 7.10.2. Corpus Creation
- 7.10.3. Descriptive Analysis
- 7.10.4. Introduction to Feelings Analysis

## **Module 8.** Neural Networks, the Basis of *Deep Learning*

8.1. Deep Learning
- 8.1.1. Types of Deep Learning
- 8.1.2. Applications of Deep Learning
- 8.1.3. Advantages and Disadvantages of Deep Learning

8.2. Surgery
- 8.2.1. Sum
- 8.2.2. Product
- 8.2.3. Transfer

8.3. Layers
- 8.3.1. Input layer
- 8.3.2. Cloak
- 8.3.3. Output layer

8.4. Layer Bonding and Operations
- 8.4.1. Architecture Design
- 8.4.2. Connection between layers
- 8.4.3. Forward propagation

8.5. Construction of the first neural network
- 8.5.1. Network Design
- 8.5.2. Establish the weights
- 8.5.3. Network Training

8.6. Trainer and Optimizer
- 8.6.1. Optimizer Selection
- 8.6.2. Establishment of a Loss Function
- 8.6.3. Establishing a Metric

8.7. Application of the Principles of Neural Networks
- 8.7.1. Activation Functions
- 8.7.2. Backward Propagation
- 8.7.3. Parameter Adjustment

8.8. From Biological to Artificial Neurons
- 8.8.1. Functioning of a Biological Neuron
- 8.8.2. Transfer of Knowledge to Artificial Neurons
- 8.8.3. Establish Relations Between the Two

8.9. Implementation of MLP (Multilayer Perceptron) with Keras
- 8.9.1. Definition of the Network Structure
- 8.9.2. Model Compilation
- 8.9.3. Model Training

8.10. Fine Tuning Hyperparameters of Neural Networks
- 8.10.1. Selection of the Activation Function
- 8.10.2. Set the Learning Rate
- 8.10.3. Adjustment of Weights

## **Module 9.** Deep Neural Networks Training

9.1. Gradient Problems
- 9.1.1. Gradient Optimization Techniques
- 9.1.2. Stochastic Gradients
- 9.1.3. Weight Initialization Techniques

9.2. Reuse of Pre-Trained Layers
- 9.2.1. Learning Transfer Training
- 9.2.2. Feature Extraction
- 9.2.3. Deep Learning

9.3. Optimizers
- 9.3.1. Stochastic Gradient Descent Optimizers
- 9.3.2. Optimizers Adam and RMSprop
- 9.3.3. Moment Optimizers

9.4. Learning Rate Programming
- 9.4.1. Automatic Learning Rate Control
- 9.4.2. Learning Cycles
- 9.4.3. Smoothing Terms

9.5. Overfitting
- 9.5.1. Cross Validation
- 9.5.2. Regularization
- 9.5.3. Evaluation Metrics

9.6. Practical Guidelines
- 9.6.1. Model Design
- 9.6.2. Selection of Metrics and Evaluation Parameters
- 9.6.3. Hypothesis Testing

9.7. *Transfer Learning*
- 9.7.1. Learning Transfer Training
- 9.7.2. Feature Extraction
- 9.7.3. Deep Learning

9.8. *Data Augmentation*
- 9.8.1. Image Transformations
- 9.8.2. Synthetic Data Generation
- 9.8.3. Text Transformation

9.9. Practical Application of Transfer *Learning*
- 9.9.1. Learning Transfer Training
- 9.9.2. Feature Extraction
- 9.9.3. Deep Learning

9.10. Regularization
- 9.10.1. L and L
- 9.10.2. Regularization by Maximum Entropy
- 9.10.3. *Dropout*

## **Module 10.** Model Customization and training with TensorFlow

10.1. *TensorFlow*
- 10.1.1. Use of the TensorFlow Library
- 10.1.2. Model Training with TensorFlow
- 10.1.3. Operations with Graphs in TensorFlow

10.2. *TensorFlow* and NumPy
- 10.2.1. NumPy Computing Environment for *TensorFlow*
- 10.2.2. Using NumPy Arrays with *TensorFlow*
- 10.2.3. NumPy Operations for *TensorFlow* Graphs

10.3. Model Customization and Training Algorithms
- 10.3.1. Building custom models with TensorFlow
- 10.3.2. Management of Training Parameters
- 10.3.3. Use of Optimization Techniques for Training

10.4. TensorFlow Features and Graphs
- 10.4.1. Functions with *TensorFlow*
- 10.4.2. Use of Graphs for Model Training
- 10.4.3. Grap Optimization with *TensorFlow* Operations

10.5. Loading and Preprocessing Data with TensorFlow
- 10.5.1. Loading Data Sets with *TensorFlow*
- 10.5.2. Preprocessing Data with TensorFlow
- 10.5.3. Using TensorFlow tools for data manipulation

10.6. The API tfdata
- 10.6.1. Using the tfdataAPI for Data Processing
- 10.6.2. Construction of Data Streams with tfdata
- 10.6.3. Using the tfdata API for Model Training

10.7. The TFRecord Format
- 10.7.1. Using the TFRecord API for Data Serialization
- 10.7.2. Loading TFRecord files with TensorFlow
- 10.7.3. Using TFRecord files for training models

10.8. Keras Preprocessing Layers
- 10.8.1. Using the Keras Preprocessing API
- 10.8.2. Preprocessing Pipelined Construction with Keras
- 10.8.3. Using the Keras Preprocessing API for Model Training

10.9. The TensorFlow Datasets Project
- 10.9.1. Using *TensorFlow Datasets*for Data Loading
- 10.9.2. Preprocessing Data with TensorFlow Datasets
- 10.9.3. Using TensorFlow Datasets for Model Training

10.10. Building a Deep *Learning* App with *TensorFlow*
- 10.10.1. Practical Applications
- 10.10.2. Building a Deep Learning App with TensorFlow
- 10.10.3. Model Training with TensorFlow
- 10.10.4. Use of the Application for the Prediction of Results

## **Module 11.** Deep Computer Vision with Convolutional Neural Networks

11.1. The Visual Cortex Architecture
- 11.1.1. Functions of the Visual Cortex
- 11.1.2. Theories of Computational Vision
- 11.1.3. Models of Image Processing

11.2. Convolutional Layers
- 11.2.1. Reuse of Weights in Convolution
- 11.2.2. Convolution D
- 11.2.3. Activation Functions

11.3. Grouping Layers and Implementation of Grouping Layers with Keras
- 11.3.1. Pooling and Striding
- 11.3.2. *Flattening*
- 11.3.3. Types of Pooling

11.4. CNN Architecture
- 11.4.1. VGG Architecture
- 11.4.2. AlexNet Architecture
- 11.4.3. ResNet Architecture

11.5. Implementing a CNN *ResNet* using *Keras*
- 11.5.1. Weight Initialization
- 11.5.2. Input Layer Definition
- 11.5.3. Output Definition

11.6. Use of Pre-trained Keras Models
- 11.6.1. Characteristics of Pre-trained Models
- 11.6.2. Uses of Pre-trained Models
- 11.6.3. Advantages of Pre-trained Models

11.7. Pre-trained Models for Transfer Learning
- 11.7.1. Learning by Transfer
- 11.7.2. Transfer Learning Process
- 11.7.3. Advantages of Transfer Learning

11.8. Deep Computer Vision Classification and Localization
- 11.8.1. Image Classification
- 11.8.2. Localization of Objects in Images
- 11.8.3. Object Detection

11.9. Object Detection and Object Tracking
- 11.9.1. Object Detection Methods
- 11.9.2. Object Tracking Algorithms
- 11.9.3. Tracking and Localization Techniques

11.10. Semantic Segmentation
- 11.10.1. Deep Learning for Semantic Segmentation
- 11.10.2. Edge Detection
- 11.10.3. Rule-based Segmentation Methods

## **Module 12.** Natural Language Processing (NLP) with Natural Recurrent Networks (NNN) and Attention

12.1. Text Generation using RNN
- 12.1.1. Training an RNN for Text Generation
- 12.1.2. Natural Language Generation with RNN
- 12.1.3. Text Generation Applications with RNN

12.2. Training Data Set Creation
- 12.2.1. Preparation of the Data for Training an RNN
- 12.2.2. Storage of the Training Dataset
- 12.2.3. Data Cleaning and Transformation
- 12.2.4. Sentiment Analysis

12.3. Classification of Opinions with RNN
- 12.3.1. Detection of Themes in Comments
- 12.3.2. Sentiment Analysis with Deep Learning Algorithms

12.4. Encoder-Decoder Network for Neural Machine Translation
- 12.4.1. Training an RNN for Machine Translation
- 12.4.2. Use of an *encoder-decoder* Network for Machine Translation
- 12.4.3. Improving the Accuracy of Machine Translation with RNNs

12.5. Attention Mechanisms
- 12.5.1. Application of Care Mechanisms in RNN
- 12.5.2. Use of Care Mechanisms to Improve the Accuracy of the Models
- 12.5.3. Advantages of Attention Mechanisms in Neural Networks

12.6. Transformer Models
- 12.6.1. Using Transformers Models for Natural Language Processing
- 12.6.2. Application of *Transformers* Models for Vision
- 12.6.3. Advantages of Transformers Models

12.7. Transformers for Vision
- 12.7.1. Use of Transformers Models for Vision
- 12.7.2. Image Data Preprocessing
- 12.7.3. Training a Transformers Model for Vision

12.8. *Hugging Face's* Transformer Library
- 12.8.1. Using the *Hugging Face's* Transformers Library
- 12.8.2. *Hugging Face´s* Transformers Library App
- 12.8.3. Advantages of Hugging Face´s Transformers Library

12.9. Other Transformers Libraries. Comparison
- 12.9.1. Comparison Between Different Transformers Libraries
- 12.9.2. Use of the Other Transformers Libraries
- 12.9.3. Advantages of the Other *Transformers* Libraries

12.10. Development of an NLP Application with RNN and Attention. Practical Applications
- 12.10.1. Development of a Natural Language Processing Application with RNN and Attention
- 12.10.2. Use of RNN, Attention Mechanisms and Transformers Models in the Application
- 12.10.3. Evaluation of the Practical Application

## **Module 13.** *Autoencoders, GANs* and Diffusion Models

13.1. Representation of Efficient Data
- 13.1.1. Dimensionality Reduction
- 13.1.2. Deep Learning
- 13.1.3. Compact Representations

13.2. PCA Realization with an Incomplete Linear Automatic Encoder
- 13.2.1. Training Process
- 13.2.2. Implementation in Python
- 13.2.3. Use of Test Data

13.3. Stacked Automatic Encoders
- 13.3.1. Deep Neural Networks
- 13.3.2. Construction of Coding Architectures
- 13.3.3. Use of Regularization

13.4. Convolutional Autoencoders
- 13.4.1. Design of Convolutional Models
- 13.4.2. Convolutional Model Training
- 13.4.3. Results Evaluation

13.5. Noise Suppression of Automatic Encoders
- 13.5.1. Filter Application
- 13.5.2. Design of Coding Models
- 13.5.3. Use of Regularization Techniques

13.6. Sparse Automatic Encoders
- 13.6.1. Increasing Coding Efficiency
- 13.6.2. Minimizing the Number of Parameters
- 13.6.3. Using Regularization Techniques

13.7. Variational Automatic Encoders
- 13.7.1. Use of Variational Optimization
- 13.7.2. Unsupervised Deep Learning
- 13.7.3. Deep Latent Representations

13.8. Generation of Fashion MNIST Images
- 13.8.1. Pattern Recognition
- 13.8.2. Image Generation
- 13.8.3. Deep Neural Networks Training

13.9. Generative Adversarial Networks and Diffusion Models
- 13.9.1. Content Generation from Images
- 13.9.2. Modeling of Data Distributions
- 13.9.3. Use of Adversarial Networks

13.10. Implementation of the Models
- 13.10.1. Practical Application
- 13.10.2. Implementation of the Models
- 13.10.3. Use of Real Data
- 13.10.4. Results Evaluation

## **Module 14.** Bio-Inspired Computing

14.1. Introduction to Bio-Inspired Computing
- 14.1.1. Introduction to Bio-Inspired Computing

14.2. Social Adaptation Algorithms
- 14.2.1. Bio-Inspired Computation Based on Ant Colonies
- 14.2.2. Variants of Ant Colony Algorithms
- 14.2.3. Particle Cloud Computing

14.3. Genetic Algorithms
- 14.3.1. General Structure
- 14.3.2. Implementations of the Major Operators

14.4. Space Exploration-Exploitation Strategies for Genetic Algorithms
- 14.4.1. CHC Algorithm
- 14.4.2. Multimodal Problems

14.5. Evolutionary Computing Models (I)
- 14.5.1. Evolutionary Strategies
- 14.5.2. Evolutionary Programming
- 14.5.3. Algorithms Based on Differential Evolution

14.6. Evolutionary Computation Models (II)
- 14.6.1. Evolutionary Models Based on Estimation of Distributions (EDA)
- 14.6.2. Genetic Programming

14.7. Evolutionary Programming Applied to Learning Problems
- 14.7.1. Rules-Based Learning
- 14.7.2. Evolutionary Methods in Instance Selection Problems

14.8. Multi-Objective Problems
- 14.8.1. Concept of Dominance
- 14.8.2. Application of Evolutionary Algorithms to Multi-Objective Problems

14.9. Neural Networks (I)
- 14.9.1. Introduction to Neural Networks
- 14.9.2. Practical Example with Neural Networks

14.10. Neural Networks (II)
- 14.10.1. Use Cases of Neural Networks in Medical Research
- 14.10.2. Use Cases of Neural Networks in Economics
- 14.10.3. Use Cases of Neural Networks in Artificial Vision

## **Module 15.** Artificial Intelligence: Strategies and Applications

15.1. Financial Services
- 15.1.1. The implications of Artificial Intelligence (AI) in financial services. Opportunities and challenges
- 15.1.2. Case Uses
- 15.1.3. Potential Risks Related to the Use of AI
- 15.1.4. Potential Future Developments/Uses of AI

15.2. Implications of Artificial Intelligence in the Healthcare Service
- 15.2.1. Implications of AI in the Healthcare Sector Opportunities and Challenges
- 15.2.2. Case Uses

15.3. Risks Related to the Use of AI in the Health Service
- 15.3.1. Potential Risks Related to the Use of AI
- 15.3.2. Potential Future Developments/Uses of AI

15.4. *Retail*
- 15.4.1. Implications of AI in Retail. Opportunities and Challenges
- 15.4.2. Case Uses
- 15.4.3. Potential Risks Related to the Use of AI
- 15.4.4. Potential Future Developments/Uses of AI

15.5. Industry
- 15.5.1. Implications of AI in Industry Opportunities and Challenges
- 15.5.2. Case Uses

15.6. Potential Risks Related to the Use of AI in Industry
- 15.6.1. Case Uses
- 15.6.2. Potential Risks Related to the Use of AI
- 15.6.3. Potential Future Developments/Uses of AI

15.7. Public Administration
- 15.7.1. AI Implications for Public Administration Opportunities and Challenges
- 15.7.2. Case Uses
- 15.7.3. Potential Risks Related to the Use of AI
- 15.7.4. Potential Future Developments/Uses of AI

15.8. Educational
- 15.8.1. AI Implications for Education Opportunities and Challenges
- 15.8.2. Case Uses
- 15.8.3. Potential Risks Related to the Use of AI
- 15.8.4. Potential Future Developments/Uses of AI

15.9. Forestry and Agriculture
- 15.9.1. Implications of AI in Forestry and Agriculture. Opportunities and Challenges
- 15.9.2. Case Uses
- 15.9.3. Potential Risks Related to the Use of AI
- 15.9.4. Potential Future Developments/Uses of AI

15.10. Human Resources
- 15.10.1. Implications of AI for Human Resources Opportunities and Challenges
- 15.10.2. Case Uses
- 15.10.3. Potential Risks Related to the Use of AI
- 15.10.4. Potential Future Developments/Uses of AI

## **Module 16.** Artificial Intelligence in Digital Marketing Strategies

16.1. Digital Marketing Transformation with AI and ChatGPT
- 16.1.1. Introduction to Digital Transformation
- 16.1.2. Impact on Content Strategy
- 16.1.3. Automation of Marketing Processes
- 16.1.4. Development of Customer Experience

16.2. AI Tools for SEO and SEM: KeywordInsights and DiiB
- 16.2.1. Keyword Optimization with AI
- 16.2.2. Competition Analysis
- 16.2.3. Search Trend Forecast
- 16.2.4. Intelligent Audience Segmentation

16.3. IA Application in Social Media
- 16.3.1. Sentiment Analysis with MonkeyLearn
- 16.3.2. Social Trend Detection
- 16.3.3. Publication Automation with Metricool
- 16.3.4. Automated Content Generation with Predis

16.4. AI tools for Customer Communication
- 16.4.1. *Custom Chatbots using Dialogflow*
- 16.4.2. Automated Email Response Systems using Mailchimp
- 16.4.3. Real-Time Response Optimization using Freshchat
- 16.4.4. Customer Feedback Analysis using SurveyMonkey

16.5. User Experience Personalization with AI
- 16.5.1. Personalized Recommendations
- 16.5.2. User Interface Adaptation
- 16.5.3. Dynamic Audience Segmentation
- 16.5.4. Intelligent A/B Testing with VWO (Visual Website Optimizer)

16.6. *Chatbots* and Virtual Assistants in Marketing Digital
- 16.6.1. Proactive Interaction with MobileMonkey
- 16.6.2. Multichannel Integration using Tars
- 16.6.3. Contextual Responses with Chatfuel
- 16.6.4. Conversation Analytics using Botpress

16.7. Programmatic Advertising with AI
- 16.7.1. Advanced Segmentation with Adroll
- 16.7.2. Real-Time Optimization using WordStream
- 16.7.3. Automatic Bidding using BidIQ
- 16.7.4. Analysis of Results

16.8. Predictive Analytics and Big Data in Digital Marketing
- 16.8.1. Market Trends Forecast
- 16.8.2. Advanced Attribution Models
- 16.8.3. Predictive Audience Segmentation
- 16.8.4. Sentiment Analysis in Big Data

16.9. AI and Email Marketing for Campaign Customization and Automation
- 16.9.1. Dynamic List Segmentation
- 16.9.2. Dynamic Content in Emails
- 16.9.3. Workflow Automation with Brevo
- 16.9.4. Optimizing Open Rate with Benchmark Email

16.10. Future Trends in AI for Digital Marketing
- 16.10.1. Advanced Conversational AI
- 16.10.2. Augmented Reality Integration using ZapWorks
- 16.10.3. Emphasis on AI Ethics
- 16.10.4. AI in Content Creation

## **Module 17.** Content Generation with AI

17.1. Prompt Engineering in ChatGPT
- 17.1.1. Quality Improvement of the Generated Content
- 17.1.2. Model Performance Optimization Strategies
- 17.1.3. Effective Prompts Design

17.2. AI Image Generation Tools through ChatGPT
- 17.2.1. Object Recognition and Generation
- 17.2.2. Applying Custom Styles and Filters to Images
- 17.2.3. Methods to Improve the Visual Quality of Images

17.3. Video Creation with AI
- 17.3.1. Tools to Automate Video Editing
- 17.3.2. Voice Synthesis and Automatic Dubbing
- 17.3.3. Techniques for Object Tracking and Animation

17.4. AI Text Generation for Blogging and Social Media Creation through ChatGPT
- 17.4.1. Strategies for Improving SEO Positioning in Generated Content
- 17.4.2. Using AI to Predict and Generate Content Trends
- 17.4.3. Creating Attractive Headlines

17.5. Personalization of AI Content to Different Audiences Using Optimizely
- 17.5.1. Identification and Analysis of Audience Profiles
- 17.5.2. Dynamic Adaptation of Content according to User Profiles
- 17.5.3. Predictive Audience Segmentation

17.6. Ethical Considerations for the Responsible Use of AI in Content Generation
- 17.6.1. Transparency in Content Generation
- 17.6.2. Preventing Bias and Discrimination in Content Generation
- 17.6.3. Control and Human Supervision in Generative Processes

17.7. Analysis of Successful Cases in Content Generation with AI
- 17.7.1. Identification of Key Strategies in Successful Cases
- 17.7.2. Adaptation to Different Sectors
- 17.7.3. Importance of Collaboration between AI Specialists and Industry Practitioners

17.8. Integration of AI-generated Content in Digital Marketing Strategies
- 17.8.1. Optimization of Advertising Campaigns with Content Generation
- 17.8.2. Personalization of User Experience
- 17.8.3. Automation of Marketing Processes

17.9. Future Trends in Content Generation with AI
- 17.9.1. Advanced and Seamless Text, Image and Audio Integration
- 17.9.2. Hyper-personalized Content Generation
- 17.9.3. Improved AI Development in Emotion Detection

17.10. Evaluation and Measurement of the Impact of AI-generated Content
- 17.10.1. Appropriate Metrics to Evaluate the Performance of Generated Content
- 17.10.2. Measurement of Audience Engagement
- 17.10.3. Continuous Improvement of Content through Analytics

## **Module 18.** Automation and Optimization of Marketing Processes with AI

18.1. Marketing Automation with AI using Hubspot
- 18.1.1. Audience Segmentation Based on AI
- 18.1.2. Workflow Automation
- 18.1.3. Continuous Optimization of Online Campaigns

18.2. Integration of Data and Platforms in Automated Marketing Strategies
- 18.2.1. Analysis and Unification of Multichannel Data
- 18.2.2. Interconnection between Different Marketing Platforms
- 18.2.3. Real-Time Data Updating

18.3. Optimization of Advertising Campaigns with AI through Google Ads
- 18.3.1. Predictive Analysis of Advertising Performance
- 18.3.2. Automatic Advertisement Personalization According to Target Audience
- 18.3.3. Automatic Budget Adjustment Based on Results

18.4. Audience Personalization with AI
- 18.4.1. Content Segmentation and Personalization
- 18.4.2. Personalized Content Recommendations
- 18.4.3. Automatic Identification of Audiences or Homogeneous Groups

18.5. Automation of Responses to Customers through AI
- 18.5.1. Chatbots and Machine Learning
- 18.5.2. Automatic Response Generation
- 18.5.3. Automatic Problem Solving

18.6. AI in Email Marketing for Automation and Customization
- 18.6.1. Automation of Email Sequences
- 18.6.2. Dynamic Customization of Content According to Preferences
- 18.6.3. Intelligent Segmentation of Mailing Lists

18.7. Social Media Sentiment Analysis with AI and Customer Feedback through Lexalytics
- 18.7.1. Automatic Sentiment Monitoring in Comments
- 18.7.2. Personalized Responses to Emotions
- 18.7.3. Predictive Reputation Analysis

18.8. Price and Promotions Optimization with AI through Vendavo
- 18.8.1. Automatic Price Adjustment Based on Predictive Analysis
- 18.8.2. Automatic Generation of Offers Adapted to User Behavior
- 18.8.3. Real-Time Competitive and Price Analysis

18.9. Integration of AI into Existing Marketing Tools
- 18.9.1. Integration of AI Capabilities with Existing Marketing Platforms
- 18.9.2. Optimization of Existing Functionalities
- 18.9.3. Integration with CRM Systems

18.10. Trends and Future of Marketing Automation with AI
- 18.10.1. AI to Improve User Experience
- 18.10.2. Predictive Approach to Marketing Decisions
- 18.10.3. Conversational Advertising

## **Module 19.** Analysis of Communication and Marketing Data for Decision Making

19.1. Specific Technologies and Tools for Communication and Marketing Data Analysis using Google Analytics 4
- 19.1.1. Tools for Analyzing Conversations and Trends in Social Media
- 19.1.2. Systems to Identify and Evaluate Emotions in Communications
- 19.1.3. Use of Big Data to Analyze Communications

19.2. AI Applications in Marketing Big Data Analytics such as Google BigQuery
- 19.2.1. Automatic Processing of Massive Data
- 19.2.2. Identification of Behavioral Patterns
- 19.2.3. Optimization of Algorithms for Data Analysis

19.3. Tools for Data Visualization and *Reporting* of Campaigns and Communications with AI
- 19.3.1. Creation of Interactive Dashboards
- 19.3.2. Automatic Report Generation
- 19.3.3. Predictive Visualization of Campaign Results

19.4. Application of AI in Market Research through Quid
- 19.4.1. Automatic Survey Data Processing
- 19.4.2. Automatic Identification of Audience Segments
- 19.4.3. Market Trend Prediction

19.5. Predictive Analytics in Marketing for Decision Making
- 19.5.1. Predictive Models of Consumer Behavior
- 19.5.2. Campaign Performance Forecasting
- 19.5.3. Automatic Adjustment of Strategic Optimization

19.6. Market Segmentation with AI using Meta
- 19.6.1. Automated Analysis of Demographic Data
- 19.6.2. Identification of Interest Groups
- 19.6.3. Dynamic Personalization of Offers

19.7. Marketing Strategy Optimization with AI
- 19.7.1. Use of AI to Measure Channel Effectiveness
- 19.7.2. Strategic Automatic Adjustment to Maximize Results
- 19.7.3. Scenario Simulation

19.8. AI in Marketing ROI Measurement with GA4
- 19.8.1. Conversion Attribution Models
- 19.8.2. ROI Analysis using AI
- 19.8.3. Customer Lifetime Value Estimation

19.9. Success Stories in Data Analytics with AI
- 19.9.1. Demonstration by Practical Cases in which AI has Improved Results
- 19.9.2. Cost and Resource Optimization
- 19.9.3. Competitive Advantages and Innovation

19.10. Challenges and Ethical Considerations in AI Data Analysis
- 19.10.1. Biases in Data and Results
- 19.10.2. Ethical Considerations in Handling and Analyzing Sensitive Data
- 19.10.3. Challenges and Solutions for Making AI Models Transparent

## **Module 20.** Sales and Leads Generation with Artificial Intelligence

20.1. Application of AI in the Sales Process through Salesforce
- 20.1.1. Automation of Sales Tasks
- 20.1.2. Predictive Analysis of the Sales Cycle
- 20.1.3. Optimization of Pricing Strategies

20.2. Lead Generation Techniques and Tools with AI through Hubspot
- 20.2.1. Automated Prospect Identification
- 20.2.2. User Behavior Analysis
- 20.2.3. Personalization of Content for Engagement

20.3. Lead Scoring with AI using Hubspot
- 20.3.1. Automated Evaluation of Lead Qualification
- 20.3.2. Lead Analysis Based on Interactions
- 20.3.3. Lead Scoring Model Optimization

20.4. AI in Customer Relationship Management
- 20.4.1. Automated Tracking to Improve Customer Relationships
- 20.4.2. Personalized Customer Recommendations
- 20.4.3. Automation of Personalized Communications

20.5. Implementation and Success Cases of Virtual Assistants in Sales
- 20.5.1. Virtual Assistants for Sales Support
- 20.5.2. Customer Experience Improvement
- 20.5.3. Conversion Rate Optimization and Sales Closing

20.6. Customer Needs Prediction with AI
- 20.6.1. Purchase Behavior Analysis
- 20.6.2. Dynamic Offer Segmentation
- 20.6.3. Personalized Recommendation Systems

20.7. Sales Offer Personalization with AI
- 20.7.1. Dynamic Adaptation of Sales Proposals
- 20.7.2. Behavior-Based Exclusive Offers
- 20.7.3. Creation of Customized Packs

20.8. Competition Analysis with IA
- 20.8.1. Automated Competitor Monitoring
- 20.8.2. Automated Comparative Price Analysis
- 20.8.3. Predictive Competitive Surveillance

20.9. Integration of AI in Sales Tools
- 20.9.1. Compatibility with CRM Systems
- 20.9.2. Empowerment of Sales Tools
- 20.9.3. Predictive Analysis in Sales Platforms

20.10. Innovations and Predictions in the Sales Environment
- 20.10.1. Augmented Reality in Shopping Experience
- 20.10.2. Advanced Automation in Sales
- 20.10.3. Emotional intelligence in Sales Interactions

*A first class educational experience that will elevate your professional horizons. Enroll now!"*

06

# Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning.**

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.

*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

*At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world"*

*You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.*

*The student will learn to solve complex situations in real business environments through collaborative activities and real cases.*

## A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

> *Our program prepares you to face new challenges in uncertain environments and achieve success in your career"*

The case method has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the course, students will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

## Relearning Methodology

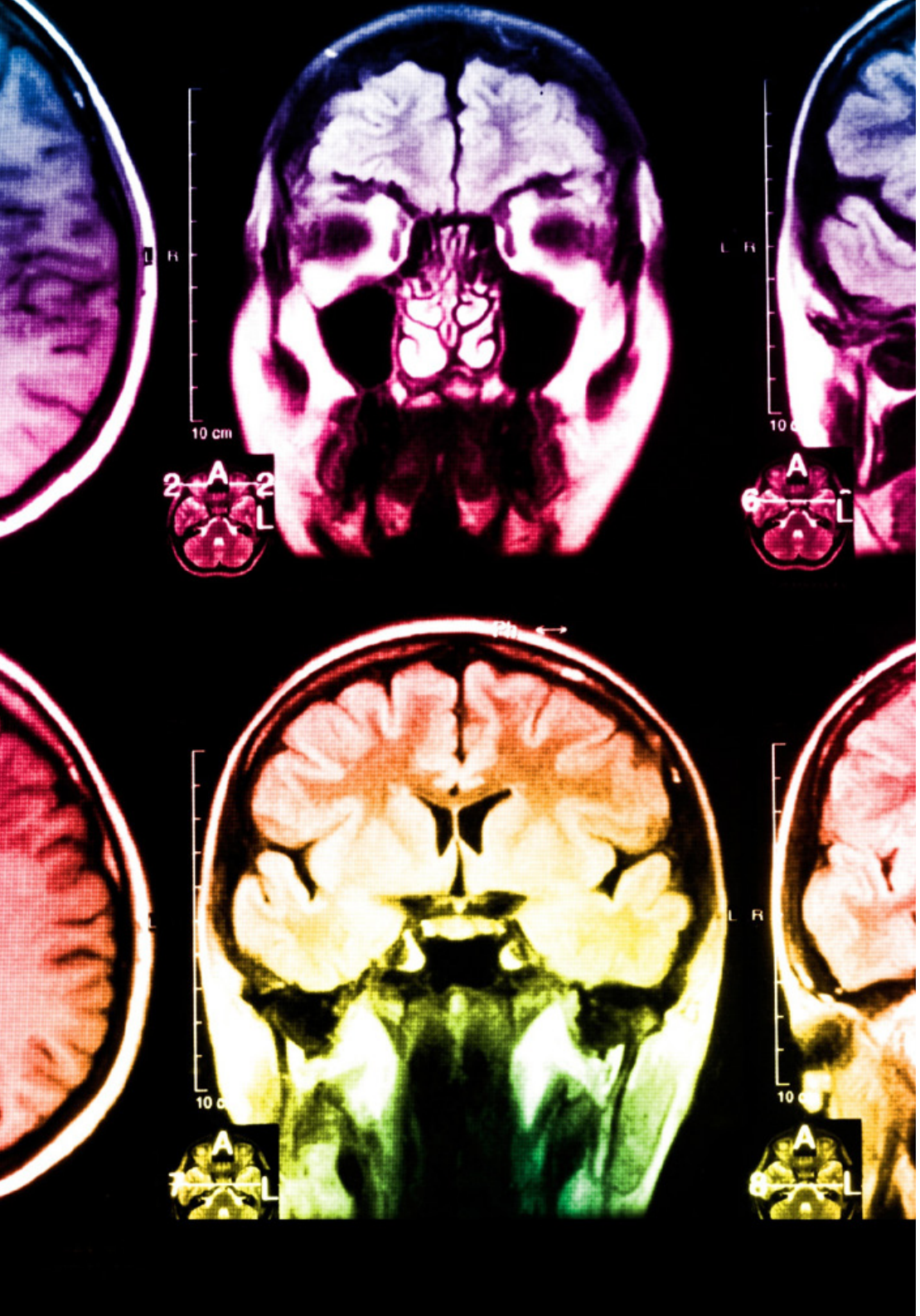
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

*In 2019, we obtained the best learning results of all online universities in the world.*

At TECH you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically. This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

*Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.*

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.

This program offers the best educational material, prepared with professionals in mind:

### Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.

### Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

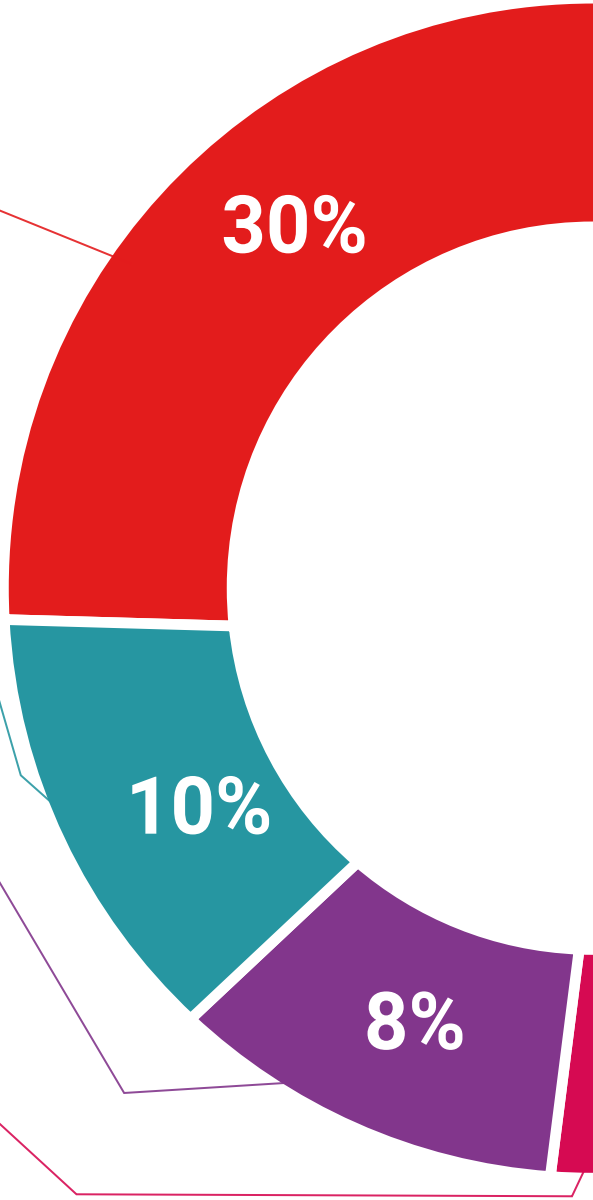
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

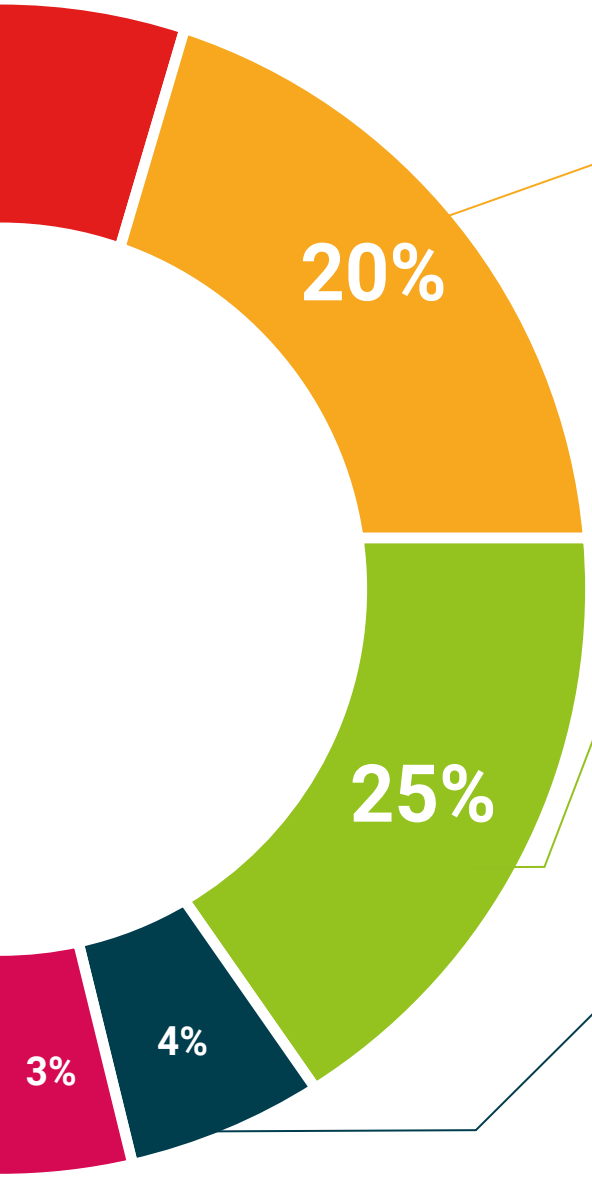
### Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.

### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.






### Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.

### Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

### Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.

07

# Certificate

The Professional Master's Degree in Artificial Intelligence in Marketing and Communication guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.

*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork"*

This private qualification will allow you to obtain a **Professional Master's Degree in Artificial Intelligence in Marketing and Communication** endorsed by **TECH Global University**, the world's largest online university.

**TECH Global University** is an official European University publicly recognized by the Government of Andorra (***official bulletin***). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** private qualification is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Professional Master's Degree in Artificial Intelligence in Marketing and Communication**

Modality: **Online**

Duration: **12 months.**

Accreditation: **60 ECTS**

tech global university

Mr./Ms. _____ with identification document _____
has successfully passed and obtained the title of:

**Professional Master's Degree in Artificial Intelligence in Marketing and Communication**

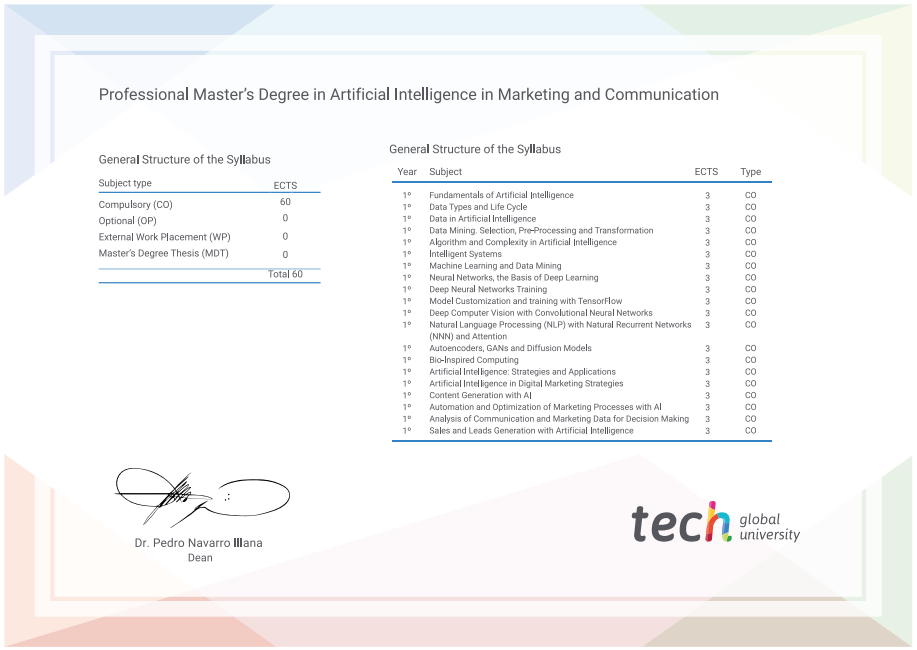
This is a private qualification of 1,800 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Dean

Unique TECH Code: AFWORD23S techtitute.com/certificates



Professional Master's Degree in Artificial Intelligence in Marketing and Communication

General Structure of the Syllabus

| Subject type | ECTS |
|---|---|
| Compulsory (CO) | 60 |
| Optional (OP) | 0 |
| External Work Placement (WP) | 0 |
| Master's Degree Thesis (MDT) | 0 |
| | Total 60 |

General Structure of the Syllabus

| Year | Subject | ECTS | Type |
|---|---|---|---|
| 1º | Fundamentals of Artificial Intelligence | 3 | CO |
| 1º | Data Types and Life Cycle | 3 | CO |
| 1º | Data in Artificial Intelligence | 3 | CO |
| 1º | Data Mining. Selection, Pre-Processing and Transformation | 3 | CO |
| 1º | Algorithm and Complexity in Artificial Intelligence | 3 | CO |
| 1º | Intelligent Systems | 3 | CO |
| 1º | Machine Learning and Data Mining | 3 | CO |
| 1º | Neural Networks, the Basis of Deep Learning | 3 | CO |
| 1º | Deep Neural Networks Training | 3 | CO |
| 1º | Model Customization and training with TensorFlow | 3 | CO |
| 1º | Deep Computer Vision with Convolutional Neural Networks | 3 | CO |
| 1º | Natural Language Processing (NLP) with Natural Recurrent Networks (NNN) and Attention | 3 | CO |
| 1º | Autoencoders, GANs and Diffusion Models | 3 | CO |
| 1º | Bio-Inspired Computing | 3 | CO |
| 1º | Artificial Intelligence: Strategies and Applications | 3 | CO |
| 1º | Artificial Intelligence in Digital Marketing Strategies | 3 | CO |
| 1º | Content Generation with AI | 3 | CO |
| 1º | Automation and Optimization of Marketing Processes with AI | 3 | CO |
| 1º | Analysis of Communication and Marketing Data for Decision Making | 3 | CO |
| 1º | Sales and Leads Generation with Artificial Intelligence | 3 | CO |

Dr. Pedro Navarro Illana
Dean

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*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

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# Professional Master's Degree
## Artificial Intelligence in Marketing and Communication

- Modality: **online**
- Duration: **12 months.**
- Certificate: **TECH Global University**
- Accreditation: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

# Professional Master's Degree

## Artificial Intelligence in Marketing and Communication

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