

Executive Master's Degree Artificial Intelligence in the Financial Department

M A I F D



Executive Master's Degree Artificial Intelligence in the Financial Department

- » Modality: online
- » Duration: 12 months
- » Certificate: TECH Global University
- » Accreditation: 90 ECTS
- » Schedule: at your own pace
- » Exams: online
- » Target Group: Bachelor's Degree, Diploma or University Degree holders, who have previously completed any of the degrees in the fields of Social and Legal Sciences, Administrative and Business Sciences and Artificial Intelligence

Website: www.techitute.com/us/school-of-business/executive-master-degree/master-artificial-intelligence-financial-department

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01 Welcome

Artificial Intelligence (AI) is profoundly transforming the Finance Department, optimizing processes and improving decision-making accuracy. According to a Deloitte report, 84% of companies have integrated AI tools to automate repetitive tasks, such as invoice processing and bank reconciliation, which has significantly reduced human errors and accelerated processing times. In this context, TECH offers an innovative university program, designed to equip CFOs with the necessary tools to effectively guide the digital transformation. In addition, it is important to note that the course is conducted entirely online, giving graduates the flexibility to organize their schedules autonomously.



Executive Master's Degree in Artificial Intelligence in the Financial Department
TECH Global University



“

With this 100% online Executive Master's Degree, you will obtain the tools and knowledge to implement AI solutions that optimize financial processes, such as accounting automation and risk management”

02

Why Study at TECH?

TECH is the world's largest 100% online business school. It is an elite business school, with a model based on the highest academic standards. A world-class center for intensive managerial skills education.



“

TECH is a university at the forefront of technology, and puts all its resources at the student's disposal to help them achieve entrepreneurial success"

At TECH Global University



Innovation

The university offers an online learning model that balances the latest educational technology with the most rigorous teaching methods. A unique method with the highest international recognition that will provide students with the keys to develop in a rapidly-evolving world, where innovation must be every entrepreneur's focus.

"*Microsoft Europe Success Story*", for integrating the innovative, interactive multi-video system.



The Highest Standards

Admissions criteria at TECH are not economic. Students don't need to make a large investment to study at this university. However, in order to obtain a qualification from TECH, the student's intelligence and ability will be tested to their limits. The institution's academic standards are exceptionally high...

95% | of TECH students successfully complete their studies



Networking

Professionals from countries all over the world attend TECH, allowing students to establish a large network of contacts that may prove useful to them in the future.

+100000

executives prepared each year

+200

different nationalities



Empowerment

Students will grow hand in hand with the best companies and highly regarded and influential professionals. TECH has developed strategic partnerships and a valuable network of contacts with major economic players in 7 continents.

+500

collaborative agreements with leading companies



Talent

This program is a unique initiative to allow students to showcase their talent in the business world. An opportunity that will allow them to voice their concerns and share their business vision.

After completing this program, TECH helps students show the world their talent.



Multicultural Context

While studying at TECH, students will enjoy a unique experience. Study in a multicultural context. In a program with a global vision, through which students can learn about the operating methods in different parts of the world, and gather the latest information that best adapts to their business idea.

TECH students represent more than 200 different nationalities.



TECH strives for excellence and, to this end, boasts a series of characteristics that make this university unique:



Analysis

TECH explores the student's critical side, their ability to question things, their problem-solving skills, as well as their interpersonal skills.



Academic Excellence

TECH offers students the best online learning methodology. The university combines the Relearning method (postgraduate learning methodology with the best international valuation) with the Case Study. Tradition and vanguard in a difficult balance, and in the context of the most demanding educational itinerary.



Economy of Scale

TECH is the world's largest online university. It currently boasts a portfolio of more than 10,000 university postgraduate programs. And in today's new economy, **volume + technology = a groundbreaking price**. This way, TECH ensures that studying is not as expensive for students as it would be at another university.



Learn with the best

In the classroom, TECH's teaching staff discuss how they have achieved success in their companies, working in a real, lively, and dynamic context. Teachers who are fully committed to offering a quality specialization that will allow students to advance in their career and stand out in the business world.

Teachers representing 20 different nationalities.



At TECH, you will have access to the most rigorous and up-to-date case analyses in academia"

03

Why Our Program?

Studying this TECH program means increasing the chances of achieving professional success in senior business management.

It is a challenge that demands effort and dedication, but it opens the door to a promising future. Students will learn from the best teaching staff and with the most flexible and innovative educational methodology.



“

We have highly qualified teachers and the most complete syllabus on the market, which allows us to offer you education of the highest academic level”

This program will provide you with a multitude of professional and personal advantages, among which we highlight the following:

01

A Strong Boost to Your Career

By studying at TECH, students will be able to take control of their future and develop their full potential. By completing this program, students will acquire the skills required to make a positive change in their career in a short period of time.

70% of students achieve positive career development in less than 2 years.

02

Develop a strategic and global vision of the company

TECH offers an in-depth overview of general management to understand how each decision affects each of the company's different functional fields.

Our global vision of companies will improve your strategic vision.

03

Consolidate the student's senior management skills

Studying at TECH means opening the doors to a wide range of professional opportunities for students to position themselves as senior executives, with a broad vision of the international environment.

You will work on more than 100 real senior management cases.

04

You will take on new responsibilities

The program will cover the latest trends, advances and strategies, so that students can carry out their professional work in a changing environment.

45% of graduates are promoted internally.

05

Access to a powerful network of contacts

TECH connects its students to maximize opportunities. Students with the same concerns and desire to grow. Therefore, partnerships, customers or suppliers can be shared.

You will find a network of contacts that will be instrumental for professional development.

06

Thoroughly develop business projects.

Students will acquire a deep strategic vision that will help them develop their own project, taking into account the different fields in companies.

20% of our students develop their own business idea.

07

Improve soft skills and management skills

TECH helps students apply and develop the knowledge they have acquired, while improving their interpersonal skills in order to become leaders who make a difference.

Improve your communication and leadership skills and enhance your career.

08

You will be part of an exclusive community

Students will be part of a community of elite executives, large companies, renowned institutions, and qualified teachers from the most prestigious universities in the world: the TECH Global University community.

We give you the opportunity to study with a team of world-renowned teachers.

04 Objectives

This university program has been designed to equip entrepreneurs with the necessary competencies to transform their financial operations using advanced technologies. Therefore, it will focus on enabling business leaders to implement AI solutions that optimize processes such as accounting automation, strategic planning and financial risk management. In addition, by integrating analytics tools and predictive models, they will be able to improve decision-making accuracy, increase operational efficiency and adapt their strategies to changing market dynamics.



“

You will lead innovation within your organization, taking full advantage of the potential of AI to strengthen your competitive position in the industry, through the best teaching materials, at the forefront of technology and education”

TECH makes the goals of their students their own goals too
Working together to achieve them

The **Executive Master's Degree in Artificial Intelligence in the Financial Department** will enable students to:

01

Analyze the historical evolution of Artificial Intelligence

02

Understand the operation of neural networks in learning models

03

Study principles and applications of genetic algorithms

04

Analyze the importance of thesauri, vocabularies and taxonomies in AI

05

Manage automation solutions using AI



06

Handle tools such as TensorFlow and Scikit-Learn

08

Lead digital transformation in financial companies

09

Understand fundamental concepts of statistics in data analysis.

07

Develop competencies in exploratory analysis of financial data

10

Identify and classify statistical data types

11

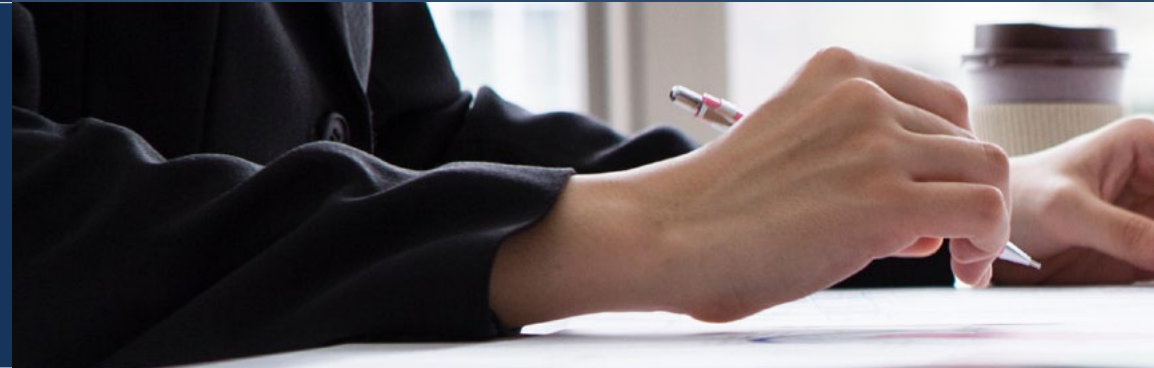
Analyze the data lifecycle

14

Utilize best practices in data handling and processing

12

Explore the datawarehouse and its design



13

Master data science fundamentals and mining techniques

15

Apply statistical inference techniques in data mining

16

Perform exploratory analysis and data preprocessing

18

Explore agent theory and knowledge representation in intelligent systems



19

Develop machine learning and data mining skills

17

Introduce design strategies and analyze the efficiency of algorithms

20

Master advanced financial optimization techniques with OR-Tools

05 Skills

The Executive Master's Degree will provide entrepreneurs with key skills to revolutionize their financial strategies through advanced technologies. Therefore, professionals will acquire skills in the implementation of automation solutions that optimize financial processes, from invoice management to bank reconciliation, which increases operational efficiency and reduces costs. In addition, they will develop a deep understanding of how to use AI for predictive analytics and strategic decision making, therefore improving the ability to forecast market trends and manage risks more accurately.



A grayscale photograph of a hand pointing at a bar chart on a document. The chart has several bars of varying heights. The text 'profit trend' is visible on the document. The image is partially obscured by a dark blue diagonal overlay.

“

You will gain advanced skills in financial optimization and data visualization, interpreting and using financial information more effectively to make informed and strategic decisions”

01

Obtain advanced skills to integrate Artificial Intelligence techniques in the automation and optimization of financial processes to guide strategic decision making

02

Analyze large volumes of financial data using algorithms to generate forecasts, identify trends and mitigate financial risks

03

Design and implement automation systems for routine tasks such as accounting, auditing or risk management

04

Ensure that Artificial Intelligence solutions comply with current regulations, while managing ethical and privacy issues in the use of financial data



05

Algorithms to significantly optimize investments

06

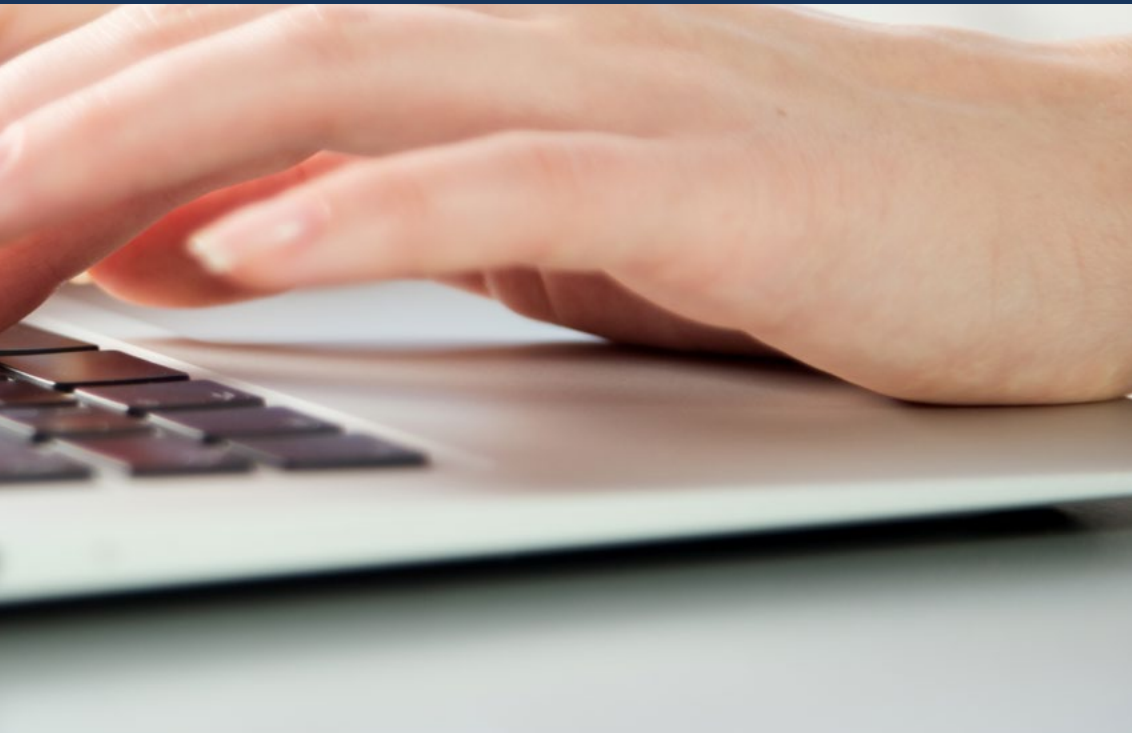
Create Artificial Intelligence based systems that identify unusual patterns in financial transactions in order to prevent fraud and other illicit activities in real time

07

Apply predictive financial analytics techniques to forecast cash flows, value assets, and assess the viability of investment projects

08

Integrate emerging automation technologies for optimal invoice management



06

Structure and Content

The program will include in-depth specialization in financial process automation, which enables entrepreneurs to optimize the management of repetitive tasks and improve operational efficiency. It will also cover predictive modeling and advanced data analytics techniques to support strategic decision making and financial optimization strategies with sophisticated tools. In addition, entrepreneurs will be able to implement AI solutions for financial risk management and to use data visualization platforms to interpret financial information effectively.



“

The content of the Executive Master's Degree has been carefully designed to address the specific needs of entrepreneurs seeking to transform their financial operations through technology”

Syllabus

The syllabus of this Executive Master's Degree has been designed to provide comprehensive specialization in the latest technologies and methodologies that are revolutionizing the financial sector. In a first block, the automation of financial processes through advanced AI techniques will be addressed. This will include learning about tools and systems that optimize the management of repetitive tasks, such as invoice processing and bank reconciliation, enabling professionals to improve accuracy and efficiency in financial administration.

In addition, the focus will be on strategic planning and decision making, layered with the latest technology and tools to improve the efficiency and accuracy of financial management. They will also be able to apply analysis and simulation techniques to formulate decisions based on accurate data, which is crucial to adapt to a dynamic and competitive economic environment. They will also develop a more robust strategic vision based on quantitative information.

Finally, advanced financial optimization and data analysis techniques will be analyzed, becoming familiar with tools such as OR-Tools for portfolio optimization, as well as advanced techniques for financial data visualization and analysis, with Plotly and Google Data Studio. In turn, advanced methods for financial risk management will be addressed through AI models developed with TensorFlow and Scikit-learn, ensuring that experts are prepared to face modern financial challenges with innovative and data-driven solutions.

In this way, TECH has developed a complete university program in a fully online mode, allowing graduates to access the teaching materials from any device with an Internet connection. This eliminates the need to travel to a physical center and to adapt to fixed schedules. Additionally, it incorporates the innovative Relearning methodology, which is based on the repetition of key concepts to ensure optimal understanding of the content.

This Executive Master's Degree takes place over 12 months and is divided into 20 modules:

Module 1	Fundamentals of Artificial Intelligence
Module 2	Data Types and Data Life Cycle
Module 3	Data in Artificial Intelligence
Module 4	Data Mining: Selection, Pre-Processing and Transformation
Module 5	Algorithm and Complexity in Artificial Intelligence
Module 6	Intelligent Systems
Module 7	Machine Learning and Data Mining
Module 8	Neural Networks, the Basis of Deep Learning
Module 9	Deep Neural Networks Training
Module 10	Model Customization and training with TensorFlow

Module 11	Deep Computer Vision with Convolutional Neural Networks
Module 12	Natural Language Processing (NLP) with Recurrent Neural Networks (RNN) and Attention
Module 13	Autoencoders, GANs and Diffusion Models
Module 14	Bio-Inspired Computing
Module 15	Artificial Intelligence: Strategies and Applications
Module 16	Automation of Financial Department Processes with Artificial Intelligence
Module 17	Strategic Planning and Decision Making with Artificial Intelligence
Module 18	Advanced Financial Optimization Techniques with OR-Tools
Module 19	Analysis and Visualization of Financial Data with Plotly and Google Data Studio
Module 20	Artificial Intelligence for Financial Risk Management with TensorFlow and Scikit-Learn

Where, When and How is it Taught?

TECH offers the possibility to develop this Executive Master's Degree in Artificial Intelligence in the Financial Department completely online. Throughout the 12 months of the educational program, the students will be able to access all the contents of this program at any time, allowing them to self-manage their study time.

A unique, key, and decisive educational experience to boost your professional development and make the definitive leap.

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
- 1.7.1. 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 Data 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
- 2.3.2. 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 Result Evaluation

- 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. Access
- 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. Discrete 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. Mathematical Analysis Criteria for 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. Union of Layers 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. Adam and RMSprop Optimizers
- 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. Graph 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 Tfddata API for Data Processing
- 10.6.2. Construction of Data Streams with Tfddata
- 10.6.3. Using the Tfddata 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. Construction of preprocessing pipelined 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 Application
- 10.10.2. Building a Deep Learning App with TensorFlow
- 10.10.3. Training a model 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 Cortex Visual 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. Transfer Learning
- 11.7.2. Transfer Learning Process
- 11.7.3. Advantages of Transfer Learning

11.8. Classification and Localization in Deep Computer Vision

- 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
- 11.10.1. Edge Detection
- 11.10.1. Segmentation methods based on rules

Module 12. Natural Language Processing (NLP) with Recurrent Neural Networks (RNN) 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 Attention Mechanisms in RNN
- 12.5.2. Use of Attention 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 Transformer Library

- 12.8.1. Using the Hugging Face's Transformers Library
- 12.8.2. Hugging Face's Transformers Library Application
- 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 Application

- 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 Algorithms14.2.1. Bio-inspired Computing 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 the 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. Automation of Financial Department Processes with Artificial Intelligence

16.1. Automation of Financial Processes with Artificial Intelligence and Robotic Process Automation (RPA)

- 16.1.1. AI and RPA for Process Automation and Robotization
- 16.1.2. RPA Platforms for Financial Processes: UiPath, Blue Prism, and Automation Anywhere
- 16.1.3. Evaluation of RPA Use Cases in Finance and Expected ROI

16.2. Automated Invoice Processing with AI with Kofax

- 16.2.1. Configuration of AI Solutions for Invoice Processing with Kofax
- 16.2.2. Application of Machine Learning Techniques for Invoice Classification
- 16.2.3. Automation of the Accounts Payable Cycle with AI Technologies

16.3. Payment Automation with AI Platforms

- 16.3.1. Implementing Automated Payment Systems with Stripe Radar and AI
- 16.3.2. Use of Predictive AI Models for Efficient Cash Management
- 16.3.3. Security in Automated Payment Systems: Fraud Prevention with AI

16.4. Bank Reconciliation with AI and Machine Learning

- 16.4.1. Automation of Bank Reconciliation Using AI with Platforms Such as Xero
- 16.4.2. Implementation of Machine Learning Algorithms to Improve Accuracy
- 16.4.3. Case Studies: Efficiency Improvements and Error Reduction

16.5. Cash Flow Management with Deep Learning and TensorFlow

- 16.5.1. Predictive Cash Flow Modeling with LSTM Networks Using TensorFlow
- 16.5.2. Implementation of LSTM Models in Python for Financial Forecasting
- 16.5.3. Integration of Predictive Models in Financial Planning Tools

16.6. Inventory Automation with Predictive Analytics

- 16.6.1. Use of Predictive Techniques to Optimize Inventory Management
- 16.6.2. Apply Predictive Models with Microsoft Azure Machine Learning
- 16.6.3. Integration of Inventory Management Systems with ERP

16.7. Creation of Automated Financial Reports with Power BI

- 16.7.1. Automation of Financial Reporting using Power BI
- 16.7.2. Developing Dynamic Dashboards for Real-Time Financial Analysis
- 16.7.3. Case Studies of Improvements in Financial Decision Making with Automated Reports

16.8. Purchasing Optimization with IBM Watson

- 16.8.1. Predictive Analytics for Purchasing Optimization with IBM Watson
- 16.8.2. AI Models for Negotiations and Pricing
- 16.8.3. Integration of AI Recommendations in Purchasing Platforms

16.9. Customer Support with Financial Chatbots and Google DialogFlow

- 16.9.1. Implementation of Financial Chatbots with Google Dialogflow
- 16.9.2. Integration of Chatbots in CRM Platforms for Financial Support
- 16.9.3. Continuous Improvement of Chatbots Based on User Feedback

16.10. AI-Assisted Financial Auditing

- 16.10.1. IA Applications in Internal Audits: Transaction Analysis
- 16.10.2. Implementation of IA for Compliance Auditing and Discrepancy Detection
- 16.10.3. Improvement of Audit Efficiency with IA Technologies

Module 17. Strategic Planning and Decision Making with Artificial Intelligence

17.1. Predictive Modeling for Strategic Planning with Scikit-Learn

- 17.1.1. Building Predictive Models with Python and Scikit-Learn
- 17.1.2. Application of Regression Analysis in Project Evaluation
- 17.1.3. Validation of Predictive Models Using Cross-Validation Techniques in Python

17.2. Scenario Analysis with Monte Carlo Simulations

- 17.2.1. Implementation of Monte Carlo Simulations with Python for Risk Analysis
- 17.2.2. Use of AI for the Automation and Improvement of Scenario Simulations
- 17.2.3. Interpretation and Application of Results for Strategic Decision Making

17.3. Investment Appraisal using IA

- 17.3.1. IA Techniques for the Valuation of Assets and Companies
- 17.3.2. Machine Learning Models for Value Estimation with Python
- 17.3.3. Case Analysis: Use of AI in the Valuation of Technology Startups

17.4. Optimization of Mergers and Acquisitions with Machine Learning and TensorFlow

- 17.4.1. Predictive Modeling to Evaluate M&A Synergies with TensorFlow
- 17.4.2. Simulation of Post-M&A Integrations with AI Models
- 17.4.3. Use of NLP for Automated due Diligence Analysis

17.5. Portfolio Management with Genetic Algorithms

- 17.5.1. Use of Genetic Algorithms for Portfolio Optimization
- 17.5.2. Implementation of Selection and Allocation Strategies with Python
- 17.5.3. Analyzing the Effectiveness of Portfolios Optimized by AI

17.6. Artificial Intelligence for Succession Planning

- 17.6.1. Use of AI for Talent Identification and Development
- 17.6.2. Predictive Modeling for Succession Planning using Python
- 17.6.3. Improvements in Change Management using AI Integration

17.7. Market Strategy Development with AI and TensorFlow

- 17.7.1. Application of Deep Learning Techniques for Market Analysis
- 17.7.2. Use of TensorFlow and Keras for Market Trend Modeling
- 17.7.3. Development of Market Entry Strategies Based on AI Insights

17.8. Competitiveness and Competitive Analysis with AI and IBM Watson

- 17.8.1. Competitor Monitoring using NLP and Machine Learning
- 17.8.2. Automated Competitive Analysis with IBM Watson
- 17.8.3. Implementation of Competitive Strategies Derived from AI Analysis

17.9. AI-Assisted Strategic Negotiations

- 17.9.1. Application of IA Models in the Preparation of Negotiations
- 17.9.2. Use of IA-Based Negotiation Simulators for Training Purposes
- 17.9.3. Evaluation of the Impact of IA on Negotiation Results

17.10. Implementation of IA Projects in Financial Strategy

- 17.10.1. Planning and Management of IA Projects
- 17.10.2. Use of Project Management Tools Such as Microsoft Project
- 17.10.3. Presentation of Case Studies and Analysis of Success and Learning

Module 18. Advanced Financial Optimization Techniques with OR-Tools**18.1. Introduction to Financial Optimization**

- 18.1.1. Basic Optimization Concepts
- 18.1.2. Optimization Tools and Techniques in Finance
- 18.1.3. Applications of Optimization in Finance

18.2. Investment Portfolio Optimization

- 18.2.1. Markowitz Models for Portfolio Optimization
- 18.2.3. Portfolio Optimization with Constraints
- 18.2.4. Implementation of Optimization Models with OR-Tools in Python

18.3. Genetic Algorithms in Finance

- 18.3.1. Introduction to Genetic Algorithms
- 18.3.2. Application of Genetic Algorithms in Financial Optimization
- 18.3.3. Practical Examples and Case Studies

18.4. Linear and Nonlinear Programming in Finance

- 18.4.1. Fundamentals of Linear and Nonlinear Programming
- 18.4.2. Applications in Portfolio Management and Resource Optimization
- 18.4.3. Tools for Solving Linear Programming Problems

18.5. Stochastic Optimization in Finance

- 18.5.1. Concepts of Stochastic Optimization
- 18.5.2. Applications in Risk Management and Financial Derivatives
- 18.5.3. Stochastic Optimization Models and Techniques

18.6. Robust Optimization and its Application in Finance

- 18.6.1. Fundamentals of Robust Optimization
- 18.6.2. Applications in Uncertain Financial Environments
- 18.6.3. Case Studies and Examples of Robust Optimization

18.7. Multi-Objective Optimization in Finance

- 18.7.1. Introduction to Multiobjective Optimization
- 18.7.2. Applications in Diversification and Asset Allocation
- 18.7.3. Techniques and Tools for Multiobjective Optimization

18.8. Machine Learning for Financial Optimization

- 18.1.1. Application of Machine Learning Techniques in Optimization
- 18.1.2. Optimization Algorithms Based on Machine Learning
- 18.1.3. Implementation and Case Studies

18.9. Optimization Tools in Python and OR-Tools

- 18.9.1. Python Optimization Libraries and Tools (SciPy, OR-Tools).
- 18.9.2. Practical Implementation of Optimization Problems
- 18.9.3. Examples of Financial Applications

18.10. Projects and Practical Applications of Financial Optimization

- 18.10.1. Development of Financial Optimization Projects
- 18.10.2. Implementation of Optimization Solutions in the Financial Sector
- 18.10.3. Evaluation and Presentation of Project Results

Module 19. Analysis and Visualization of Financial Data with Plotly and Google Data Studio

19.1. Fundamentals of Financial Data Analysis

- 19.1.1. Introduction to Data Analysis
- 19.1.2. Tools and Techniques for Financial Data Analysis
- 19.1.3. Importance of Data Analysis in Finance

19.2. Techniques for Exploratory Analysis of Financial Data

- 19.2.1. Descriptive Analysis of Financial Data
- 19.2.2. Visualization of Financial Data with Python and R
- 19.2.3. Identifying Patterns and Trends in Financial Data

19.3. Financial Time Series Analysis

- 19.3.1. Fundamentals of Time Series
- 19.3.2. Time Series Models for Financial Data
- 19.3.3. Time Series Analysis and Forecasting

19.4. Correlation and Causality Analysis in Finance

- 19.4.1. Correlation Analysis Methods
- 19.4.2. Techniques for Identifying Causal Relationships
- 19.4.3. Applications in Financial Analysis

19.5. Advanced Visualization of Financial Data

- 19.5.1. Advanced Data Visualization Techniques
- 19.5.2. Tools for Interactive Visualization (Plotly, Dash)
- 19.5.3. Use Cases and Practical Examples

19.6. Cluster Analysis in Financial Data

- 19.6.1. Introduction to Cluster Analysis
- 19.6.2. Applications in Market and Customer Segmentation
- 19.6.3. Tools and Techniques for Cluster Analysis

19.7. Network and Graph Analysis in Finance

- 19.7.1. Fundamentals of Network Analysis
- 19.7.2. Applications of Network Analysis in Finance
- 19.7.3. Network Analysis Tools (NetworkX, Gephi)

19.8. Text and Sentiment Analysis in Finance

- 19.8.1. Natural Language Processing (NLP) in Finance
- 19.8.2. Sentiment Analysis in News and Social Networks
- 19.8.3. Tools and Techniques for Text Analysis

19.9. Financial Data Analysis and Visualization Tools with AI

- 19.9.1. Data Analysis Libraries in Python (Pandas, NumPy)
- 19.9.2. Visualization Tools in R (ggplot2, Shiny)
- 19.9.3. Practical Implementation of Analysis and Visualization

19.10. Practical Analysis and Visualization Projects and Applications

- 19.10.1. Development of Financial data Analysis Projects
- 19.10.2. Implementation of Interactive Visualization Solutions
- 19.10.3. Evaluation and Presentation of Project Results

Module 20. Artificial Intelligence for Financial Risk Management with TensorFlow and Scikit-Learn**20.1. Fundamentals of Financial Risk Management**

- 20.1.1. Risk Management Basics
- 20.1.2. Types of Financial Risks
- 20.1.3. Importance of Risk Management in Finance

20.2. Credit Risk Models with AI

- 20.2.1. Machine Learning Techniques for Credit Risk Assessment
- 20.2.2. Credit Scoring Models (Scikit-Learn)
- 20.2.3. Implementation of Credit Risk Models with Python

20.3. Market Risk Models with AI

- 20.3.1. Market Risk Analysis and Management
- 20.3.2. Application of Predictive Market Risk Models
- 20.3.3. Implementation of Market Risk Models

20.4. Operational Risk and its Management with AI

- 20.4.1. Concepts and Types of Operational Risk
- 20.4.2. Application of AI Techniques for Operational Risk Management
- 20.4.3. Tools and Practical Examples

20.5. Liquidity Risk Models with AI

- 20.5.1. Fundamentals of Liquidity Risk
- 20.5.2. Machine Learning Techniques for Liquidity Risk Analysis
- 20.5.3. Practical Implementation of Liquidity Risk Models

20.6. Systemic Risk Analysis with AI

- 20.6.1. Systemic Risk Concepts
- 20.6.2. Applications of AI in the Evaluation of Systemic Risk
- 20.6.3. Case Studies and Practical Examples

20.7. Portfolio Optimization with Risk Considerations

- 20.7.1. Portfolio Optimization Techniques
- 20.7.2. Incorporation of Risk Measures in Optimization
- 20.7.3. Portfolio Optimization Tools

20.8. Simulation of Financial Risks

- 20.8.1. Simulation Methods for Risk Management
- 20.8.2. Application of Monte Carlo Simulations in Finance
- 20.8.3. Implementation of Simulations with Python

20.9. Continuous Risk Assessment and Monitoring

- 20.9.1. Continuous Risk Assessment Techniques
- 20.9.2. Risk Monitoring and Reporting Tools
- 20.9.3. Implementation of Continuous Monitoring Systems

20.10. Projects and Practical Applications in Risk Management

- 20.10.1. Development of Financial Risk Management Projects
- 20.10.2. Implementation of AI Solutions for Risk Management
- 20.10.3. Evaluation and Presentation of Project Results

07

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"

TECH Business School uses the 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”



This program prepares you to face business challenges in uncertain environments and achieve business success.



A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch to present executives with challenges and business decisions at the highest level, whether at the national or international level. 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 business reality is taken into account.

“ *You will learn, through collaborative activities and real cases, how to solve complex situations in real business environments”*

The case method has been the most widely used learning system among the world's leading business 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 we face in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They must integrate all their knowledge, research, argue and defend their ideas and decisions.

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

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.

Our online system will allow you to organize your time and learning pace, adapting it to your schedule. You will be able to access the contents from any device with an internet connection.

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 online business school is the only one in the world licensed to incorporate 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.

With this methodology we have 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, markets, and financial 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 specialization, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation to 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.



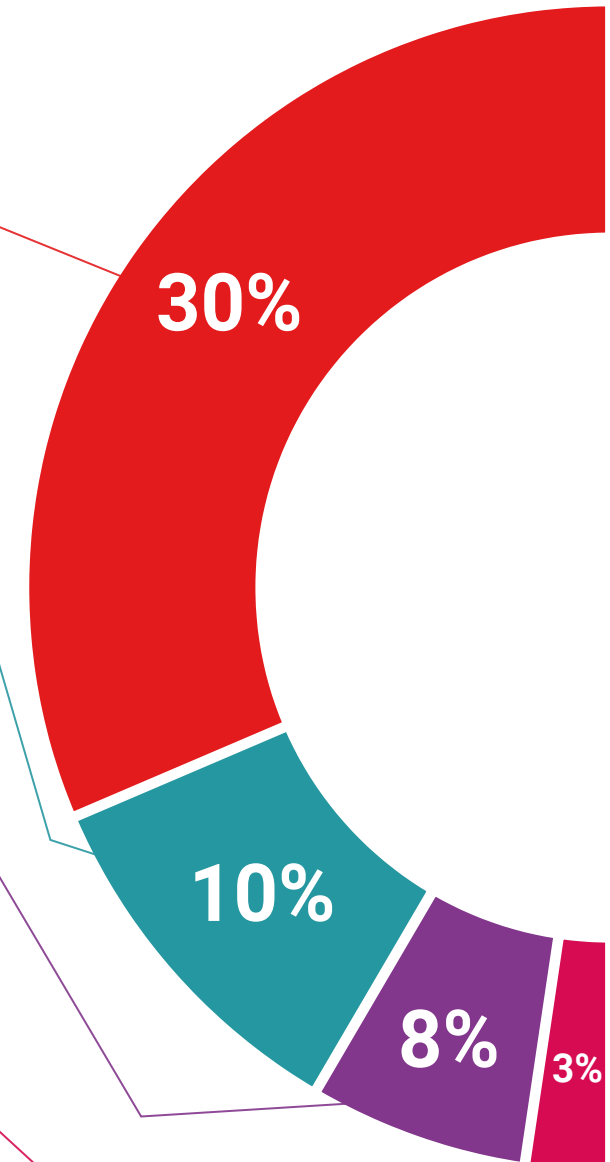
Management Skills Exercises

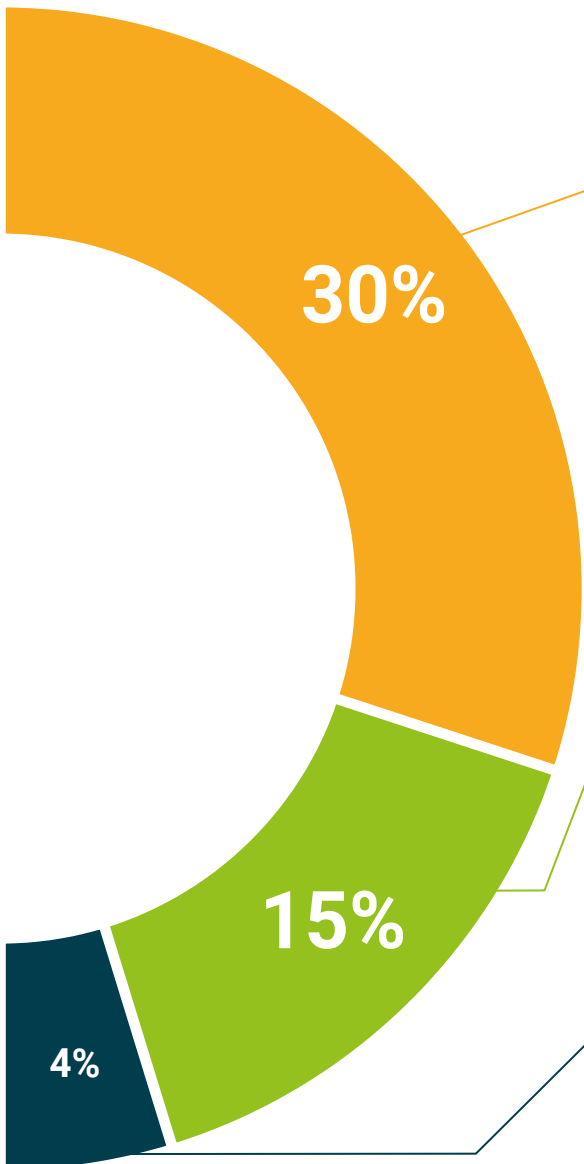
They will carry out activities to develop specific executive competencies in each thematic area. Practices and dynamics to acquire and develop the skills and abilities that a high-level manager needs to develop in the context of the globalization we live in.



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 senior management 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.



08

Our Students' Profiles

The student profile is composed of entrepreneurs and senior managers looking to integrate advanced technological solutions into their financial strategies. In fact, these professionals often have solid experience in the financial sector and an interest in leveraging Artificial Intelligence to improve operational efficiency, optimize processes and make decisions based on accurate data. Therefore, the diversity of participants with different academic profiles and from multiple nationalities will shape the multidisciplinary approach of this program. In addition, the program has been designed for those who wish to lead innovation within their organizations, proactively manage risks and adapt to changing market dynamics.



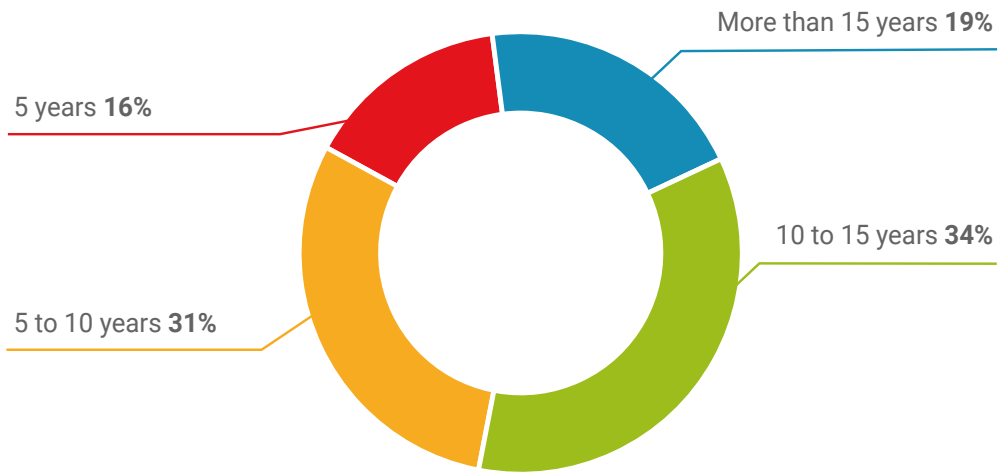
“

Students in this program value the practical application of the knowledge acquired and seek tools that will enable them to maintain a competitive advantage in an increasingly data-driven environment”

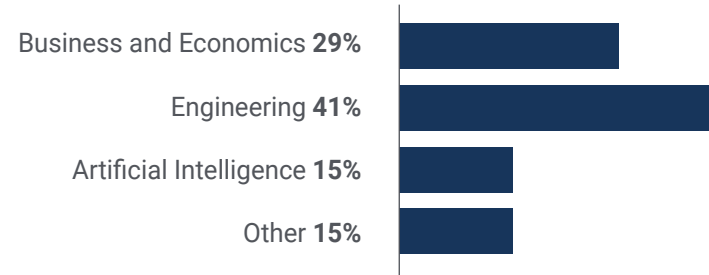
Average Age

Between **35** and **45** years old

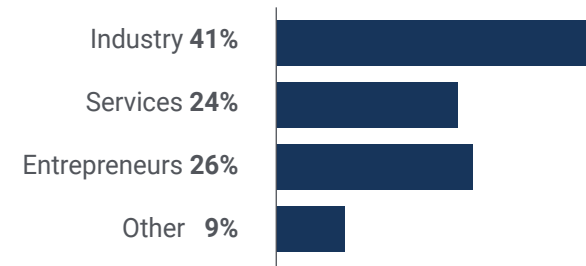
Years of Experience



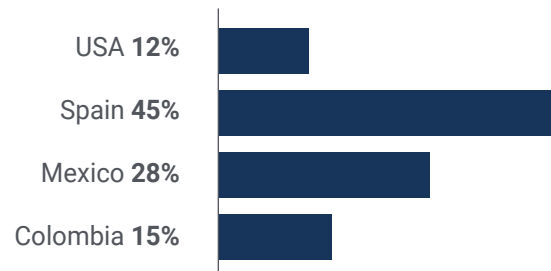
Training



Educational Profile



Geographical Distribution



Sergio Marín Urriaga

Data Analyst

"The Executive Master's Degree in Artificial Intelligence in the Financial Department has been an incredible experience! The course has provided me with tools and knowledge that have not only broadened my perspective, but also transformed my approach to data analysis. I have learned how to automate financial processes, create predictive models and handle large volumes of data with an accuracy that seemed unattainable before. The best part has been seeing how these new skills translate into practical and effective solutions for my day-to-day work. Without a doubt, this program has raised my professional profile"

09

Course Management

The academic program has a teaching team composed of renowned experts in the field of AI and finance, highly qualified to offer cutting-edge specialization. Indeed, they are professionals with extensive experience in the implementation of advanced technologies in the financial sector, including process automation, predictive analytics and risk management. In addition, their practical and academic experience will ensure that graduates receive a preparation based on the latest market trends and practices, allowing them to directly apply the acquired knowledge to their own business challenges.



“

The faculty will not only provide a solid theoretical perspective, but also practical cases and innovative strategies that will facilitate a deep and applicable understanding of Artificial Intelligence in the financial context”

Management



Dr. Peralta Martín-Palomino, Arturo

- ♦ CEO and CTO at Prometheus 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 University of Castilla La Mancha
- ♦ Máster in Executive MBA por la 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



Professors

Dr. Carrasco Aguilar, Álvaro

- ♦ Sales & Marketing Coordinator at LionLingo
- ♦ Researcher in Information Technology Management
- ♦ PhD in Social and Health Research: Technical and Economic Evaluation of Technologies, Interventions and Policies Applied to Health Improvement from the University of Castilla La Mancha
- ♦ Master's Degree in Social and Health Research from the University of Castilla - La Mancha
- ♦ Degree in Political Science and Administration at the University of Granada
- ♦ Award for "Best Scientific Article for Technological Innovation for the Efficiency of Health Expenditure"
- ♦ Regular speaker at international scientific congresses

“

Take the opportunity to learn about the latest advances in this field in order to apply it to your daily practice"

10

Impact on Your Career

Studying the Executive Master's Degree in Artificial Intelligence in the Financial Department can have a significant impact on the career of entrepreneurs, raising their professional profile and expanding their strategic capabilities. Therefore, professionals will be provided with advanced tools to implement AI solutions that optimize financial processes, improve decision making and manage risks with greater precision. In addition, by acquiring skills in process automation, predictive analytics and data visualization, they will be able to innovate within their organizations, standing out in the market as leaders in the integration of advanced technology.



“

You will lead the digital transformation in your company, fostering a culture of innovation and positioning yourself as a leader in an increasingly competitive and data-driven financial sector”

You will equip yourself with skills in the management of advanced tools, data analytics and predictive algorithms, strengthening your accuracy in financial forecasting and strategic decision making.

Are you ready to take the leap? Excellent professional development awaits you

The Executive Master's Degree in Artificial Intelligence in the Financial Department from TECH is an intensive program that prepares them to face challenges and business decisions in the field of Artificial Intelligence in Marketing and Communication. The main objective is to promote your personal and professional growth. Helping them achieve success.

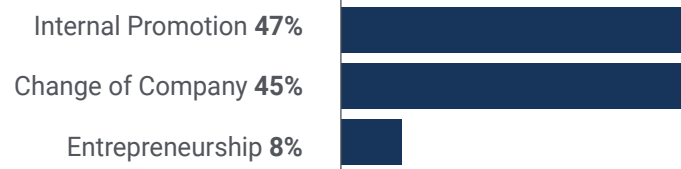
If you want to improve yourself, make a positive change at a professional level, and network with the best, then this is the place for you.

You will analyze how AI can transform business models, enabling you to lead innovation within your organization and adapt quickly to an ever-changing financial environment.

Time of Change



Type of change



Salary increase

This program represents a salary increase of more than **26.24%** for our students



11

Benefits for Your Company

By acquiring skills in process automation, predictive analytics and risk management through AI, business owners will be able to optimize operational efficiency, reduce costs and improve decision-making accuracy. In addition, this ability to implement AI solutions will enable companies to adapt quickly to market changes, identify opportunities and challenges more clearly, and remain competitive in an ever-changing economic environment.



“

The knowledge gained will enhance innovation within the company, strengthening its market position and contributing to sustainable growth and lasting competitive advantage”

Developing and retaining talent in companies is the best long-term investment.

01

Growth of talent and intellectual capital

The professional will introduce the company to new concepts, strategies, and perspectives that can bring about significant changes in the organization.

02

Retaining high-potential executives to avoid talent drain

This program strengthens the link between the company and the professional and opens new avenues for professional growth within the company.

03

Building agents of change

You will be able to make decisions in times of uncertainty and crisis, helping the organization overcome obstacles.

04

Increased international expansion possibilities

Thanks to this program, the company will come into contact with the main markets in the world economy.



05

Project Development

The professional can work on a real project or develop new projects in the field of R & D or business development of your company.

06

Increased competitiveness

This program will equip students with the skills to take on new challenges and drive the organization forward.

12 Certificate

The Executive Master's Degree in Artificial Intelligence in the Financial Department guarantees students, in addition to the most rigorous and up-to-date education, access to a Executive Master's Degree 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 an **Executive Master's Degree in Artificial Intelligence in Digital Marketing** 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.

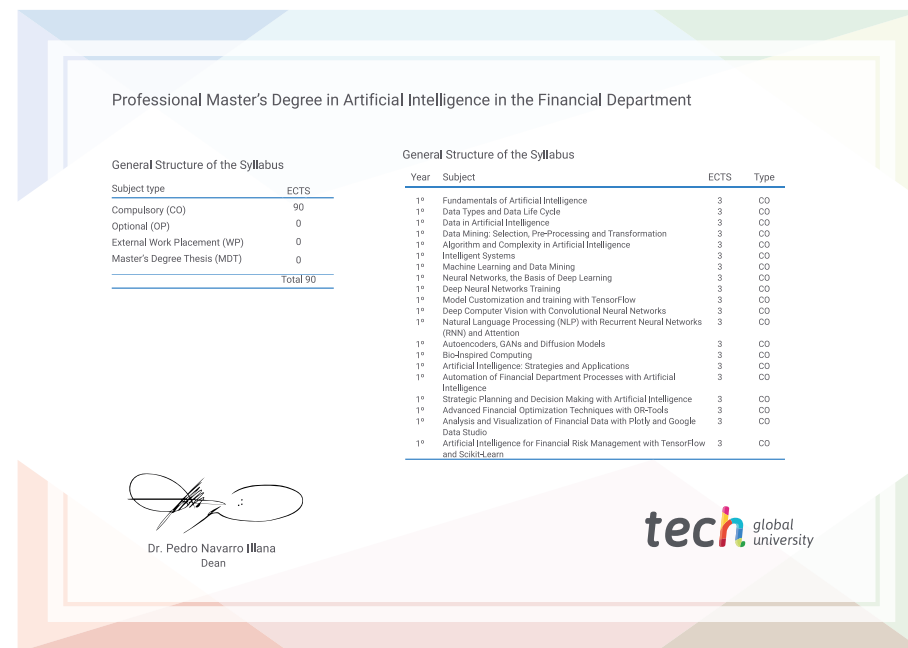
This **TECH Global University** private qualification, is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Executive Master's Degree in Artificial Intelligence in the Financial Department**

Modality: **online**

Duration: **12 months.**

Accreditation: **90 ECTS**



*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.



Executive Master's Degree

Artificial Intelligence in the Financial Department

- » Modality: **Online**
- » Duration: **12 months**
- » Certificate: **TECH Global University**
- » Accreditation: **90 ECTS**
- » Schedule: **at your own pace**
- » Exams: **online**

Executive Master's Degree Artificial Intelligence in the Financial Department