Executive Master's Degree

Artificial Intelligence in Stock Exchanges and Financial Markets

MAISEFM

tech global university

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Executive Master's Degree
Artificial Intelligence in Stock Exchanges and Financial Markets

- Modality: **online**
- Duration: **12 months.**
- Certificate: **TECH Global University**
- Accreditation: **90 ECTS**
- Schedule: **at your own pace**
- Exams: **online**
- Target Group: **University graduates who have previously completed any degree in the fields of Social and Legal Sciences, Administrative and Business Sciences, or Design and Artificial Intelligence**

Website: **www.techtitute.com/us/school-of-business/executive-master-degree/master-artificial-intelligence-stock-exchanges-financial-markets**

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01

Welcome

Artificial Intelligence (AI)-based tools, such as machine learning algorithms and natural language processing, are optimizing investment decision-making by analyzing large volumes of data in real time. For example, algorithmic trading systems employing AI can identify patterns and perform trades with much greater speed and accuracy than humans, which can generate significant profits and minimize risks. In this context, TECH offers an innovative university program designed to equip graduates with the necessary tools to effectively lead the digital transformation of their companies. In addition, it is conducted entirely online, allowing them to organize their schedules autonomously, with the support of the Relearning methodology.

Executive Master's Degree in Artificial Intelligence in Stock Exchanges and Financial Markets
TECH Global University

Thanks to this Executive Master's Degree 100% online, you will have access to specialized training in the application of AI techniques in financial markets"

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.

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"

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 ground-breaking price**. This way, TECH ensures that studying is not as expensive for students as it would be at another university.

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

The main objective of this Executive Master's Degree will be to enable entrepreneurs to effectively integrate Artificial Intelligence into their financial and investment strategies. Therefore, through a comprehensive approach, they will develop advanced skills in technical and fundamental analysis of financial markets, algorithmic trading optimization and management of large volumes of data. In addition, professionals will learn how to use AI tools and techniques to improve the accuracy of predictions, automate investment processes and manage risks.

Bet on TECH! You will gain a deep understanding of the ethical and regulatory aspects of AI, preparing you to implement innovative solutions responsibly and comply with current regulations"

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 Stock Exchanges and Financial Markets** will enable students to:

01 Understand the historical evolution and key developments in Artificial Intelligence (AI)

02 Study the principles and applications of neural networks, genetic algorithms, and data processing techniques in AI

03 Understand the fundamental concepts of statistics, data classification and the data life cycle

04 Analyze and apply data collection, integration, and storage techniques, including data warehouses

05 Develop skills in data science, transformation of data into information, and efficient management of datasets

06 Apply techniques of statistical inference, exploratory analysis and data pre-processing for data mining

07 Study and apply various optimization algorithms and techniques, including sorting algorithms, trees, graphs, and backtracking techniques

08 Explore concepts of intelligent agents, knowledge representation, and the semantic web in intelligent systems

09 Introduce and apply machine learning techniques, including decision trees, neural networks, Bayesian methods, and clustering techniques

10 Understand and apply the fundamentals of Deep Learning and convolutional neural networks to Deep Learning

11 Develop and optimize deep neural networks, using techniques such as Transfer Learning and Data Augmentation

12 Customize and train Deep Learning models with TensorFlow, using advanced tools and techniques of the platform

13 Apply convolutional neural networks in Deep Computer Vision, including the use of pre-trained models and object classification and detection techniques

14 Develop skills in Natural Language Processing (NLP) with RNNs, attention mechanisms and Transformers models

15 Explore Autoencoders, GANs and Diffusion Models for data representation and generation

16 Introduce and apply concepts of bio-inspired computation and evolutionary models for optimization

17 Develop AI strategies in financial services and other industries, considering specific risks and applications

18 Optimize technical and fundamental analysis of financial markets using AI, including algorithmic trading techniques and performance analysis

19 Master Big Data technologies for large-scale, real-time processing of financial data, ensuring security and privacy

20 Explore ethical and regulatory aspects of AI in finance, promoting responsible practices and regulatory compliance

05

Skills

Entrepreneurs will acquire skills in technical and fundamental analysis of markets using Artificial Intelligence, allowing them to optimize trading strategies and make more informed decisions. They will also be trained in the implementation and management of algorithmic trading systems, analysis of large volumes of data with Big Data tools, and application of Machine Learning and natural language processing techniques. In addition, professionals will be able to address ethical and regulatory challenges associated with AI, ensuring solutions implemented are both innovative and compliant with industry regulations.

The program will equip you with the key competencies to transform your financial operations through the use of advanced technologies, from the world's best online university, according to Forbes: TECH"

01 Apply AI techniques and strategies to improve efficiency in the retail sector

02 Delve into understanding and application of genetic algorithms

03 Implement noise removal techniques using automatic encoders

04 Effectively create training data sets for natural language processing (NLP) tasks

05 Run grouping layers and their use in Deep Computer Vision models with Keras

06 Use TensorFlow features and graphics to optimize the performance of custom models

07 Optimize the development and application of chatbots and virtual assistants, understanding their operation and potential applications

08 Master reuse of pre-workout layers to optimize and accelerate the training process

09 Build the first neural network, applying the concepts learned in practice

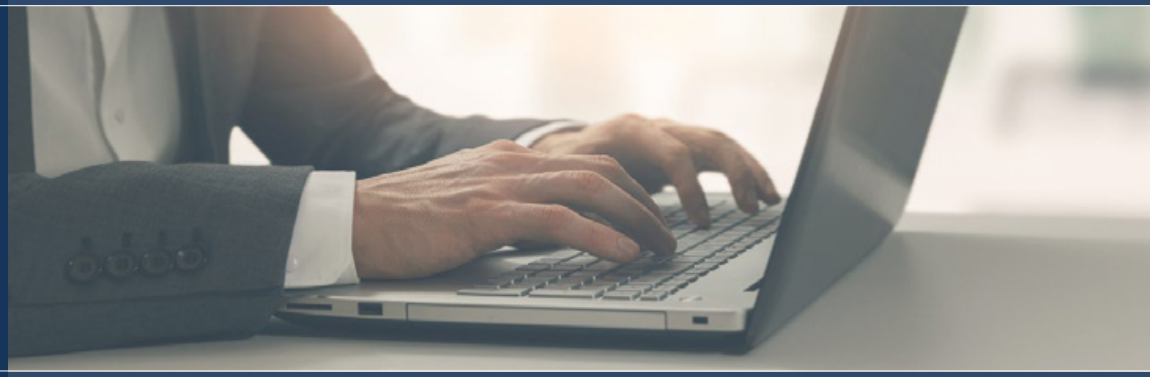
10 Activate Multilayer Perceptron (MLP) using the Keras library

11 Apply data scanning and preprocessing techniques, identifying and preparing data for effective use in machine learning models

12 Implement effective strategies for handling missing values in datasets, applying imputation or elimination methods according to context

13 Investigate languages and software for the creation of ontologies, using specific tools for the development of semantic models

14 Develop data cleaning techniques to ensure the quality and accuracy of the information used in subsequent analyses



15 Analyze financial statements with Natural Language Processing (NLP) to extract valuable insights and perform accurate valuations of companies

16 Manage and process large volumes of financial data using Big Data tools such as Hadoop and Spark

17 Develop and evaluate High Frequency Trading (HFT) strategies, optimizing speed and accuracy in order execution

18 Apply Explainable Artificial Intelligence (XAI) techniques to ensure transparency and understanding of models used in finance

19 Comply with ethical and regulatory standards in the implementation of AI in the financial sector, ensuring responsible and legally compliant practices

20 Visualize financial data in an advanced way with tools, such as Plotly and Dash, facilitating informed decision making

06

Structure and Content

This academic program will provide entrepreneurs with comprehensive training in the integration of advanced technologies in the management and analysis of financial markets. As such, various content will be covered, including Artificial Intelligence for technical and fundamental analysis, the implementation of algorithmic trading strategies, and the processing of large volumes of financial data. In addition, the ethical and regulatory implications of AI in finance will be addressed, preparing professionals to innovate in a responsible manner and in accordance with the regulations in force.

You will apply data visualization tools and Machine Learning techniques to optimize your investment decisions, managing critical aspects such as data security and privacy"

Syllabus

The curriculum will provide comprehensive training in technical and fundamental analysis of financial markets, using Artificial Intelligence to enhance indicator visualization, pattern recognition and trading automation. In this way, entrepreneurs will be able to implement advanced techniques, such as convolutional neural networks, to identify investment opportunities and use Reinforcement Learning to develop effective algorithmic trading strategies.

Crucial aspects of fundamental analysis and large-scale financial data processing will also be covered, using Big Data tools, such as Hadoop and Spark, to handle large volumes of information efficiently and securely. Machine Learning and NLP techniques for modeling financial performance, fraud detection and accurate valuations will also be examined. At the same time, it will focus on the design of algorithmic trading strategies and associated risk management.

In this way, TECH has developed a complete university program in a completely online format, which allows graduates to access educational materials from any device with an Internet connection. This eliminates the need to move to a physical location and adhere to fixed schedules. Additionally, it employs the revolutionary Relearning methodology, which focuses on the repetition of fundamental concepts to ensure a deep 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	Technical Analysis of Financial Markets with AI
Module 17	Fundamental Analysis of Financial Markets with AI
Module 18	Large Scale Financial Data Processing
Module 19	Algorithmic Trading Strategies
Module 20	Ethical and Regulatory Aspects of AI in Finance

Where, When and How is it Taught?

TECH offers the possibility to develop this Executive Master's Degree in Artificial Intelligence in Stock Exchanges and Financial Markets 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
1.7.2. 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 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 Its 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. 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. 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. Hidden Layer
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. Transfer Learning 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. Transfer Learning 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. Transfer Learning 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. Pre-Processing 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. Construction of Pre-Processing Pipelined with Keras
10.8.3. Using the Keras Pre-processing API for Model Training

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

10.10. Building a Deep Learning application with TensorFlow
10.10.1. Practical Application
10.10.2. Building a Deep Learning Application 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
11.10.2. Edge Detection
11.10.3. Rule-Based Segmentation Methods

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 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 Transformer Library
12.8.1. Using 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. Trendy MNIST Image Generation
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 Model Implementation
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 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 Computation 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 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 Healthcare 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. Technical Analysis of Financial Markets with AI

16.1. Analysis and Visualization of Technical Indicators with Plotly and Dash
16.1.1. Implementation of Interactive Charts with Plotly
16.1.2. Advanced Visualization of Time Series with Matplotlib
16.1.3. Creating Real-Time Dynamic Dashboards with Dash

16.2. Optimization and Automation of Technical Indicators with Scikit-learn
16.2.1. Automation of Indicators with Scikit-learn
16.2.2. Optimization of Technical Indicators
16.2.3. Creating Personalized Indicators with Keras

16.3. Financial Pattern Recognition with CNN
16.3.1. Using CNN in TensorFlow to Identify Patterns in Charts
16.3.2. Improving Recognition Models with Transfer Learning Techniques
16.3.3. Validation of Recognition Models in Real-Time Markets

16.4. Quantitative Trading Strategies with QuantConnect
16.4.1. Building Algorithmic Trading Systems with QuantConnect
16.4.2. Backtesting Strategies with QuantConnect
16.4.3. Integrating Machine Learning into Trading Strategies with QuantConnect

16.5. Algorithmic Trading with Reinforcement Learning Using TensorFlow
16.5.1. Reinforcement Learning for Trading
16.5.2. Creating Trading Agents with TensorFlow Reinforcement Learning
16.5.3. Simulating and Tuning Agents in OpenAI Gym

16.6. Time Series Modeling with LSTM in Keras for Price Forecasting
16.6.1. Applying LSTM to Price Forecasting
16.6.2. Implementing LSTM Models in Keras for Financial Time Series
16.6.3. Optimization and Parameter Fitting in Time Series Models

16.7. Application of Explainable Artificial Intelligence (XAI) in Finance
16.7.1. Applicability of XAI in Finances
16.7.2. Applying LIME to Trading Models
16.7.3. Using SHAP for Feature Contribution Analysis in AI Decisions

16.8. High-Frequency Trading (HFT) Optimized with Machine Learning Models
16.8.1. Developing ML Models for HFT
16.8.2. Implementing HFT Strategies with TensorFlow
16.8.3. Simulation and Evaluation of HFT in Controlled Environments

16.9. Volatility Analysis Using Machine Learning
16.9.1. Applying Intelligent Models to Predict Volatility
16.9.2. Implementing Volatility Models with PyTorch
16.9.3. Integrating Volatility Analysis into Portfolio Risk Management

16.10. Portfolio Optimization with Genetic Algorithms
16.10.1. Fundamentals of Genetic Algorithms for Investment Optimization in Markets
16.10.2. Implementing Genetic Algorithms for Portfolio Selection
16.10.3. Evaluation of Portfolio Optimization Strategies

Module 17. Fundamental Analysis of Financial Markets with AI

17.1. Predictive Financial Performance Modeling with Scikit-Learn
17.1.1. Linear and Logistic Regression for Financial Forecasting with Scikit-Learn
17.1.2. Using Neural Networks with TensorFlow to Forecast Revenues and Earnings
17.1.3. Validating Predictive Models with Cross-Validation Using Scikit-Learn

17.2. Valuation of Companies with Deep Learning
17.2.1. Automating the Discounted Cash Flows (DCF) Model with TensorFlow
17.2.2. Advanced Valuation Models Using PyTorch
17.2.3. Integration and Analysis of Multiple Valuation Models with Pandas

17.3. Analysis of Financial Statements with NLP Using ChatGPT
17.3.1. Extracting Key Information from Annual Reports with ChatGPT
17.3.2. Sentiment Analysis of Analyst Reports and Financial News with ChatGPT
17.3.3. Implementing NLP Models with Chat GPT for Interpreting Financial Texts

17.4. Risk and Credit Analysis with Machine Learning
17.4.1. Credit Scoring Models Using SVM and Decision Trees in Scikit-Learn
17.4.2. Credit Risk Analysis in Corporations and Bonds with TensorFlow
17.4.3. Visualization of Risk Data with Tableau

17.5. Credit Analysis with Scikit-Learn
17.5.1. Implementing Credit Scoring Models
17.5.2. Credit Risk Analysis with RandomForest in Scikit-Learn
17.5.3. Advanced Visualization of Credit Scoring Results with Tableau

17.6. ESG Sustainability Assessment with Data Mining Techniques
17.6.1. ESG Data Mining Methods
17.6.2. ESG Impact Modeling with Regression Techniques
17.6.3. Applications of ESG Analysis in Investment Decisions

17.7. Sector Benchmarking with Artificial Intelligence Using TensorFlow and Power BI
17.7.1. Comparative Analysis of Companies Using AI
17.7.2. Predictive Modeling of Sector Performance with TensorFlow
17.7.3. Implementing Industry Dashboards with Power BI

17.8. Portfolio Management with AI Optimization
17.8.1. Portfolio Optimization
17.8.2. Use of Machine Learning Techniques for Portfolio Optimization with Scikit-Optimize
17.8.3. Implementing and Evaluating the Effectiveness of Algorithms in Portfolio Management

17.9. Financial Fraud Detection with AI Using TensorFlow and Keras
17.9.1. Basic Concepts and Techniques of Fraud Detection with AI
17.9.2. Constructing Neural Network Detection Models in TensorFlow
17.9.3. Practical Implementation of Fraud Detection Systems in Financial Transactions

17.10. Analysis and Modeling in Mergers and Acquisitions with AI
17.10.1. Using Predictive AI Models to Evaluate Mergers and Acquisitions
17.10.2. Simulating Post-Merger Scenarios Using Machine Learning Techniques
17.10.3. Evaluating the Financial Impact of M&A with Intelligent Models

Module 18. Large Scale Financial Data Processing

18.1. Big Data in the Financial Context
18.1.1. Key Characteristics of Big Data in Finance
18.1.2. Importance of the 5 Vs (Volume, Velocity, Variety, Veracity, Value) in Financial Data
18.1.3. Use Cases of Big Data in Risk Analysis and Compliance

18.2. Technologies for Storage and Management of Financial Big Data
18.2.1. NoSQL Database Systems for Financial Warehousing
18.2.2. Using Data Warehouses and Data Lakes in the Financial Sector
18.2.3. Comparison between On-Premises and Cloud-Based Solutions

18.3. Real-Time Processing Tools for Financial Data
18.3.1. Introduction to Tools such as Apache Kafka and Apache Storm
18.3.2. Real-Time Processing Applications for Fraud Detection
18.3.3. Benefits of Real-Time Processing in Algorithmic Trading

18.4. Integration and Data Cleaning in Finance
18.4.1. Methods and Tools for Integrating Data from Multiple Sources
18.4.2. Data Cleaning Techniques to Ensure Data Quality and Accuracy
18.4.3. Challenges in the Standardization of Financial Data

18.5. Data Mining Techniques Applied to The Financial Markets
18.5.1. Classification and Prediction Algorithms in Market Data
18.5.2. Sentiment Analysis in Social Networks for Predicting Market Movements
18.5.3. Data Mining to Identify Trading Patterns and Investor Behavior

18.6. Advanced Data Visualization for Financial Analysis
18.6.1. Visualization Tools and Software for Financial Data
18.6.2. Design of Interactive Dashboards for Market Monitoring
18.6.3. The Role of Visualization in Risk Analysis Communication

18.7. Use of Hadoop and Related Ecosystems in Finance
18.7.1. Key Components of the Hadoop Ecosystem and Their Application in Finance
18.7.2. Hadoop Use Cases for Large Transaction Volume Analysis
18.7.3. Advantages and Challenges of Integrating Hadoop into Existing Financial Infrastructures

18.8. Spark Applications in Financial Analytics
18.8.1. Spark for Real-Time and Batch Data Analytics
18.8.2. Predictive Model Building Using Spark MLlib
18.8.3. Integration of Spark with Other Big Data Tools in Finance

18.9. Data Security and Privacy in the Financial Sector
18.9.1. Data Protection Rules and Regulations (GDPR, CCPA)
18.9.2. Encryption and Access Management Strategies for Sensitive Data
18.9.3. Impact of Data Breaches on Financial Institutions

18.10. Impact of Cloud Computing on Large-Scale Financial Analysis
18.10.1. Advantages of the Cloud for Scalability and Efficiency in Financial Analysis
18.10.2. Comparison of Cloud Providers and Their Specific Financial Services
18.10.3. Case Studies on Migration to the Cloud in Large Financial Institutions

Module 19. Algorithmic Trading Strategies

19.1. Fundamentals of Algorithmic Trading
19.1.1. Algorithmic Trading Strategies
19.1.2. Key Technologies and Platforms for the Development of Algorithmic Trading Algorithms
19.1.3. Advantages and Challenges of Automated Trading versus Manual Trading

19.2. Design of Automated Trading Systems
19.2.1. Structure and Components of an Automated Trading System
19.2.2. Algorithm Programming: from the Idea to the Implementation
19.2.3. Latency and Hardware Considerations in Trading Systems

19.3. Backtesting and Evaluation of Trading Strategies
19.3.1. Methodologies for Effective Backtesting of Algorithmic Strategies
19.3.2. Importance of Quality Historical Data in Backtesting
19.3.3. Key Performance Indicators for Evaluating Trading Strategies

19.4. Optimizing Strategies with Machine Learning
19.4.1. Applying Supervised Learning Techniques in Strategy Improvement
19.4.2. Using Particle Swarm Optimization and Genetic Algorithms
19.4.3. Challenges of Overfitting in Trading Strategy Optimization

19.5. High Frequency Trading (HFT)
19.5.1. Principles and Technologies behind HFT
19.5.2. Impact of HFT on Market Liquidity and Volatility
19.5.3. Common HFT Strategies and Their Effectiveness

19.6. Order Execution Algorithms
19.6.1. Types of Execution Algorithms and Their Practical Application
19.6.2. Algorithms for Minimizing the Market Impact
19.6.3. Using Simulations to Improve Order Execution

19.7. Arbitration Strategies in Financial Markets
19.7.1. Statistical Arbitrage and Price Merger in Markets
19.7.2. Index and ETF Arbitrage
19.7.3. Technical and Legal Challenges of Arbitrage in Modern Trading

19.8. Risk Management in Algorithmic Trading
19.8.1. Risk Measures for Algorithmic Trading
19.8.2. Integrating Risk Limits and Stop-Loss in Algorithms
19.8.3. Specific Risks of Algorithmic Trading and How to Mitigate Them

19.9. Regulatory Aspects and Compliance in Algorithmic Trading
19.9.1. Global Regulations Impacting Algorithmic Trading
19.9.2. Regulatory Compliance and Reporting in an Automated Environment
19.9.3. Ethical Implications of Automated Trading

19.10. Future of Algorithmic Trading and Emerging Trends
19.10.1. Impact of Artificial Intelligence on the Future Development of Algorithmic Trading
19.10.2. New Blockchain Technologies and Their Application in Algorithmic Trading
19.10.3. Trends in Adaptability and Customization of Trading Algorithms

Module 20. Module 20. Ethical and Regulatory Aspects of AI in Finance

20.1. Ethics in Artificial Intelligence Applied to Finance
20.1.1. Fundamental Ethical Principles for the Development and Use of AI in Finance
20.1.2. Case Studies on Ethical Dilemmas in Financial AI Applications
20.1.3. Developing Ethical Codes of Conduct for Financial Technology Professionals

20.2. Global Regulations Affecting the Use of AI in Financial Markets
20.2.1. Overview of the Main International Financial Regulations on AI
20.2.2. Comparison of AI Regulatory Policies among Different Jurisdictions
20.2.3. Implications of AI Regulation on Financial Innovation

20.3. Transparency and Explainability of AI Models in Finance
20.3.1. Importance of Transparency in AI Algorithms for User Confidence
20.3.2. Techniques and Tools to Improve the Explainability of AI Models
20.3.3. Challenges of Implementing Interpretable Models in Complex Financial Environments

20.4. Risk Management and Ethical Compliance in the Use of AI
20.4.1. Risk Mitigation Strategies Associated with the Deployment of AI in Finance
20.4.2. Ethics Compliance in the Development and Application of AI Technologies
20.4.3. Ethical Oversight and Audits of AI Systems in Financial Operations

20.5. Social and Economic Impact of AI in Financial Markets
20.5.1. Effects of AI on the Stability and Efficiency of Financial Markets
20.5.2. AI and Its Impact on Employment and Professional Skills in Finance
20.5.3. Benefits and Social Risks of Large-Scale Financial Automation

20.6. Data Privacy and Protection in AI Financial Applications
20.6.1. Data Privacy Regulations Applicable to AI Technologies in Finance
20.6.2. Personal Data Protection Techniques in AI-Based Financial Systems
20.6.3. Challenges in Managing Sensitive Data in Predictive and Analytics Models

20.7. Algorithmic Bias and Fairness in AI Financial Models
20.7.1. Identification and Mitigation of Bias in Financial AI Algorithms
20.7.2. Strategies to Ensure Fairness in Automated Decision-Making Models
20.7.3. Impact of Algorithmic Bias on Financial Inclusion and Equity

20.8. Challenges of Regulatory Oversight in Financial AI
20.8.1. Difficulties in the Supervision and Control of Advanced AI Technologies
20.8.2. Role of Financial Authorities in the Ongoing Supervision of AI
20.8.3. Need for Regulatory Adaptation in the Face of Advancing AI Technology

20.9. Strategies for Responsible Development of AI Technologies in Finance
20.9.1. Best Practices for Sustainable and Responsible AI Development in the Financial Sector
20.9.2. Initiatives and Frameworks for Ethical Assessment of AI Projects in Finance
20.9.3. Collaboration between Regulators and Businesses to Encourage Responsible Practices

20.10. Future of AI Regulation in the Financial Sector
20.10.1. Emerging Trends and Future Challenges in AI Regulation in Finance
20.10.2. Preparation of Legal Frameworks for Disruptive Innovations in Financial Technology
20.10.3. International Dialogue and Cooperation for Effective and Unified Regulation of AI in Finance

You will address time series modeling and the application of explainable Artificial Intelligence, facilitating informed and accurate decision making in dynamic financial environments"

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.

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

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.

Relearning Methodology

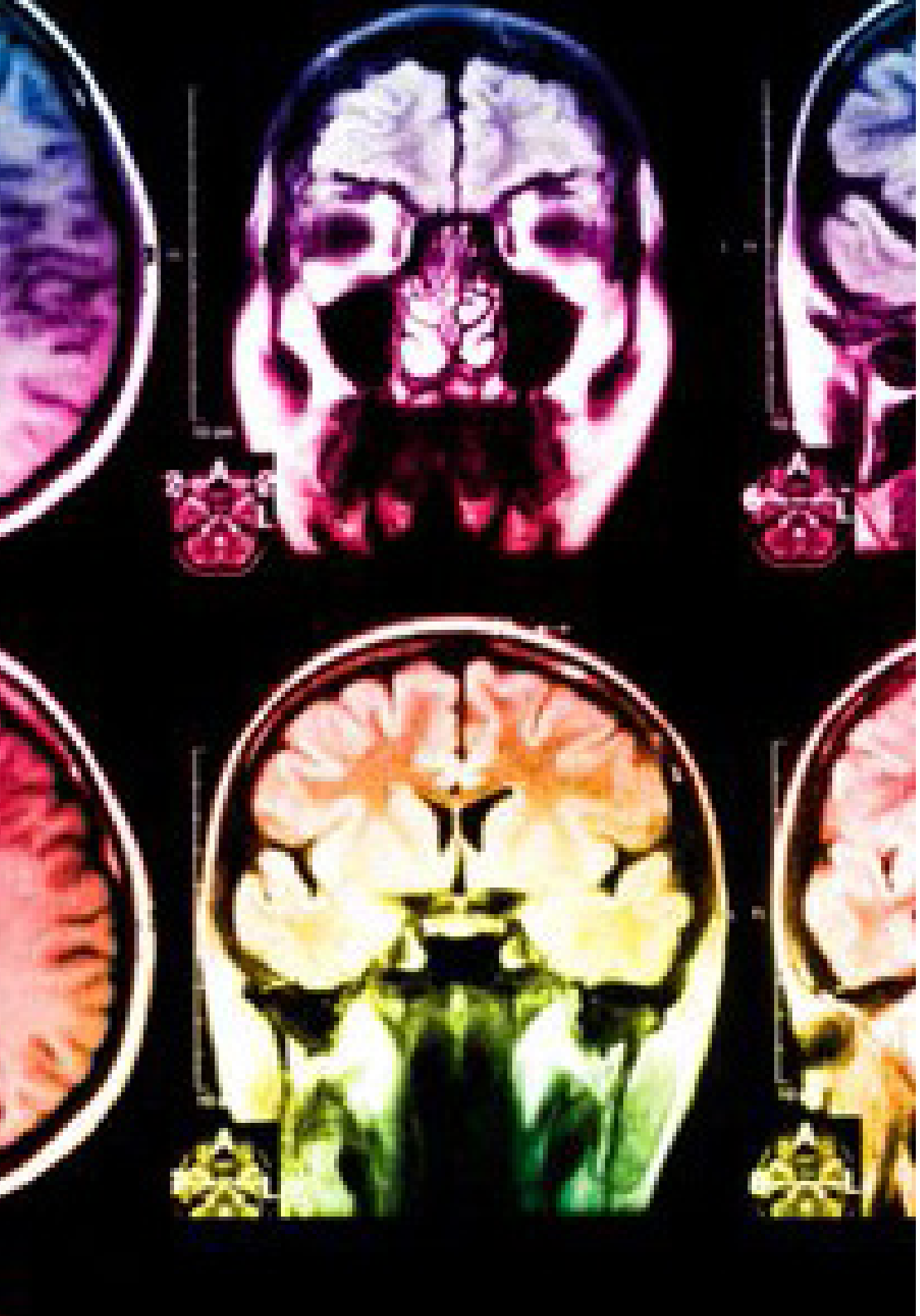
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

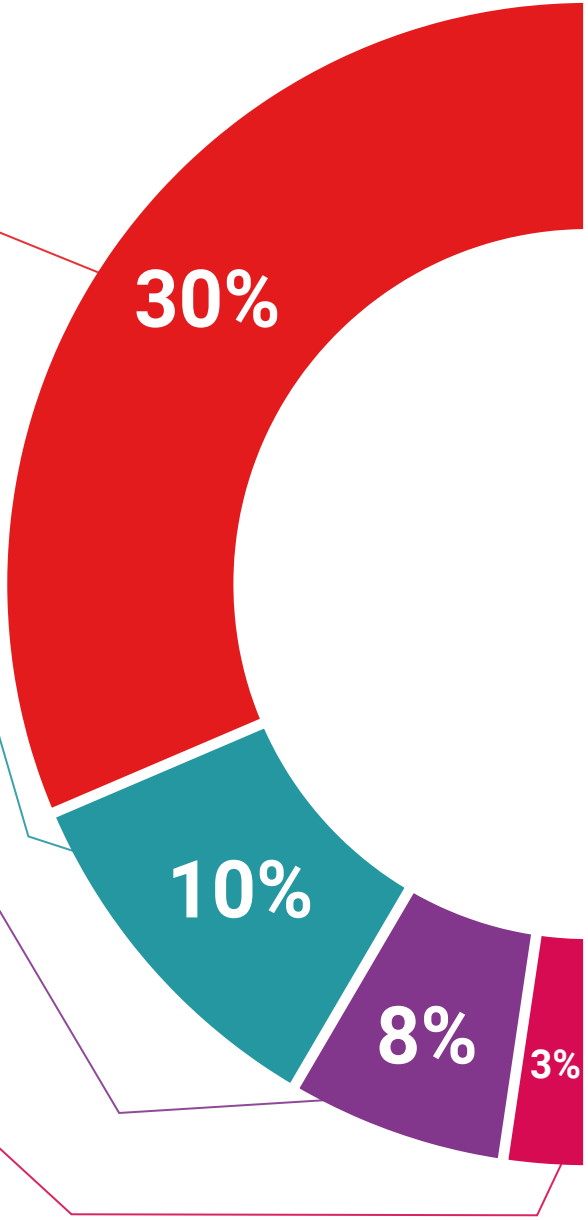
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

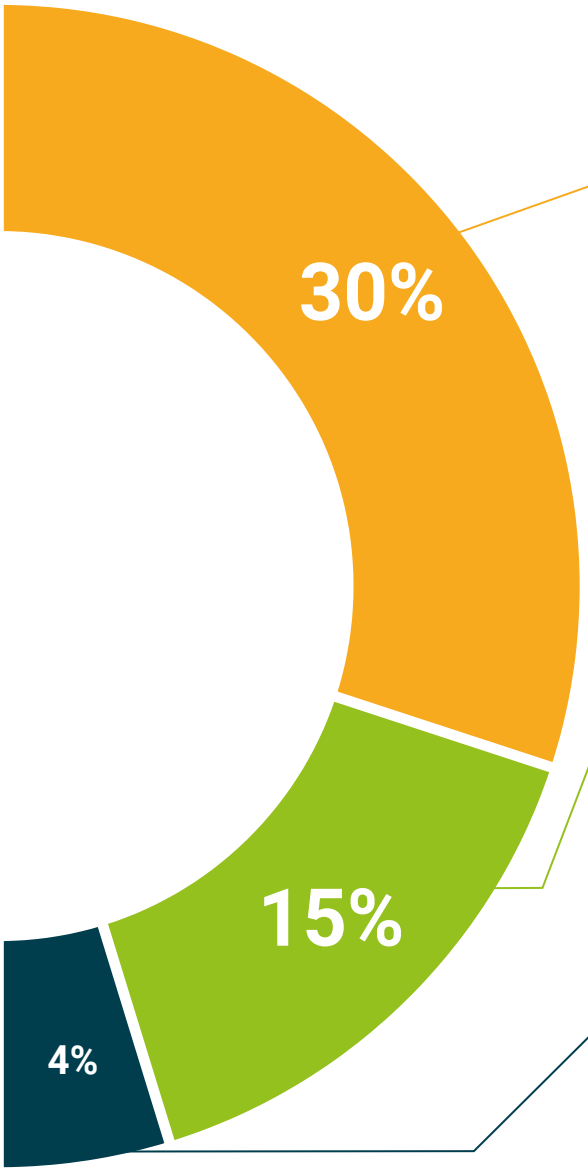
Management Skills Exercises

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

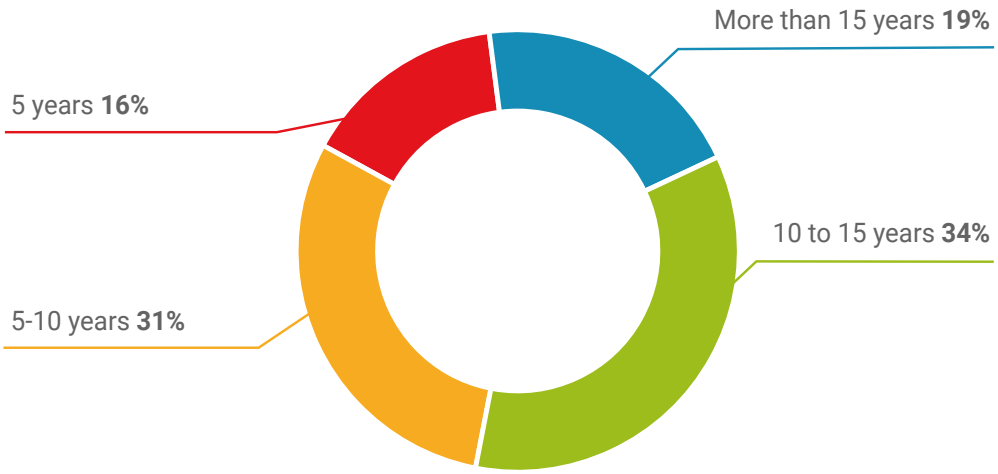
The students who take this Executive Master's Degree are high-level entrepreneurs and professionals, who seek to enhance their skills in the financial field through the incorporation of advanced technologies. In fact, this profile includes executives, investors, fund managers and financial analysts who wish to improve their ability to make data-driven decisions, optimize trading strategies and face market challenges with Artificial Intelligence tools. Therefore, the diversity of participants with different academic profiles and coming from multiple nationalities makes up the multidisciplinary approach of this program.

Students are motivated by the need to stay ahead in a constantly evolving industry and apply technological innovations to achieve a competitive advantage in their organizations"

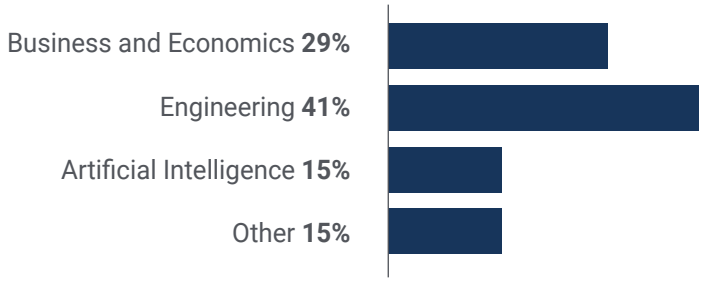
Average Age

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

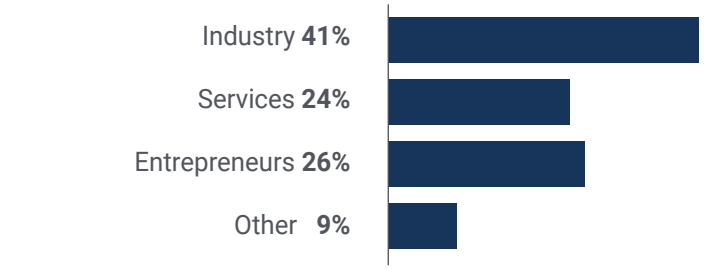
Years of Experience



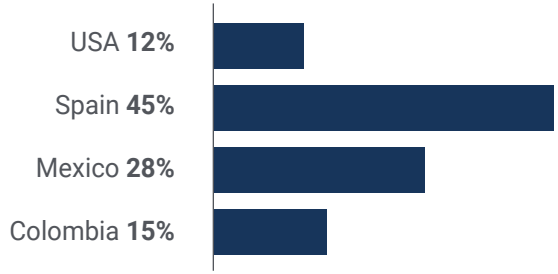
Training



Academic Profile



Geographical Distribution



Miriam Sánchez Aguado

Financial Analyst

"Completing the Executive Master's Degree in Artificial Intelligence in Stock Market and Financial Markets has been an incredibly enriching experience for me. It has provided me with advanced tools and knowledge to apply Artificial Intelligence in a practical way in financial analysis and optimization of investment strategies. From learning how to use data visualization tools, to implementing Machine Learning techniques in algorithmic trading, the program has significantly broadened my perspective and skills. Now, I feel much more prepared to face market challenges with a technological edge and make more informed and accurate decisions in my role as a Financial Analyst."

09

Course Management

The Executive Master's Degree will be taught by a team of qualified teachers with extensive experience in Artificial Intelligence and finance. In fact, these mentors are experts in their respective areas, with outstanding track records in the application of advanced technologies for the optimization of financial markets and algorithmic trading. In addition, they combine their professional experience with a solid academic background, ensuring rigorous and relevant training that will prepare graduates to face the challenges and take advantage of the opportunities in the modern financial environment.

Faculty members come from renowned financial institutions and leading technology companies, providing a practical and up-to-date perspective on the latest trends and tools in AI"

Management

Dr. Peralta Martín-Palomino, Arturo

- CEO and CTO at Prometeus Global Solutions
- CTO at Korporate Technologies
- CTO at AI Shepherds 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
- Master's Degree in Executive MBA from the Isabel I University
- 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

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

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

For entrepreneurs, taking this Executive Master's Degree in Artificial Intelligence in Stock Exchanges and Financial Markets will offer significant benefits for their career development. In fact, it will provide them with a deep understanding of how to integrate Artificial Intelligence into financial strategies, allowing professionals to innovate in investment optimization and data-driven decision making. Therefore, by acquiring advanced skills in technical and fundamental analysis, algorithmic trading and handling large volumes of data, graduates will be able to improve the efficiency and accuracy of their operations.

You will be trained to implement technological solutions in a responsible manner and comply with industry regulations, positioning yourself as a leader in an increasingly competitive market"

You will immediately apply the knowledge acquired in real scenarios, which will result in a comprehensive and updated preparation to face the challenges of the sector. With all TECH's quality guarantees!.

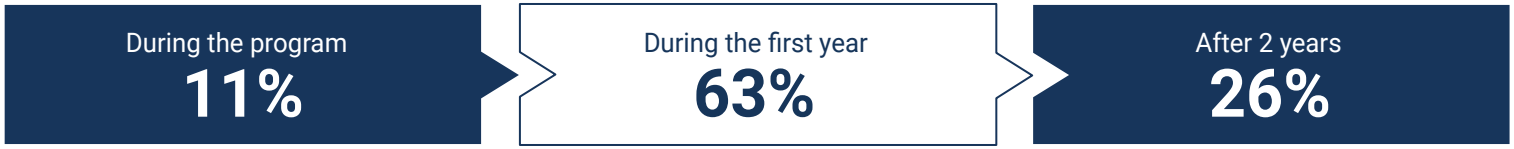
Are you ready to take the leap? Excellent professional development awaits you

The Executive Master's Degree in Artificial Intelligence in Stock Exchanges and Financial Markets from TECH is an intensive program that prepares you to face challenges and business decisions in the field of Artificial Intelligence applied to the Financial Department of companies. Its main objective is to promote your personal and professional growth. Helping you achieve success.

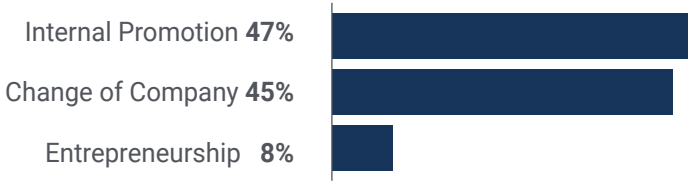
If you want to improve yourself, make a positive change at a professional level, and network with the best, then this is the place for you.

You will be able to demonstrate your skills in a growing discipline, enhancing your professional profile and opening doors to job opportunities in an increasingly technology-dependent industry.

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

For entrepreneurs, taking this program will offer a substantial competitive advantage for their organizations by incorporating advanced technologies into their financial strategies. By integrating Machine Learning and predictive analytics tools, professionals will be able to anticipate trends and manage risks more effectively, which will translate into greater profitability and long-term sustainability for their businesses. In addition, training in ethical and regulatory aspects will ensure that technological implementations are responsible and comply with current regulations.

You will use Artificial Intelligence to analyze large volumes of data, optimize trading and improve investment decisions, increasing your company's operational efficiency"

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 Stock Exchanges and Financial Markets guarantees students, in addition to the most rigorous and up-to-date education, access to an 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 a **Executive Master's Degree in Artificial Intelligence in Stock Exchanges and Financial Markets** 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 Stock Exchanges and Financial Markets**

Modality: **online**

Duration: **12 months.**

Accreditation: **90 ECTS**


tech global university

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

Executive Master's Degree in Artificial Intelligence in Stock Exchanges and Financial Markets

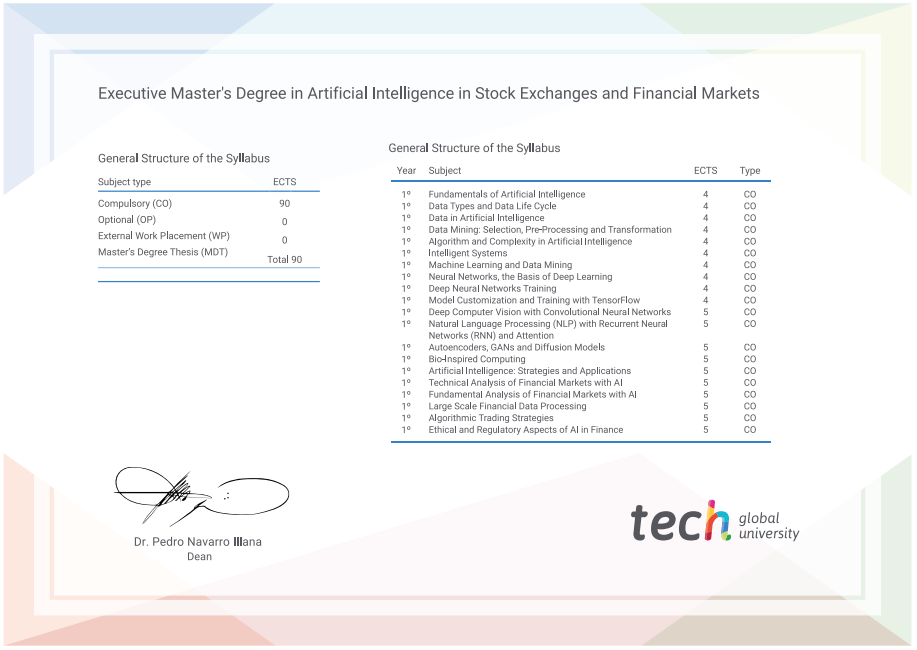
This is a private qualification of 2,700 hours of duration equivalent to 90 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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


Executive Master's Degree in Artificial Intelligence in Stock Exchanges and Financial Markets

General Structure of the Syllabus

Subject type	ECTS
Compulsory (CO)	90
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	
	Total 90

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Fundamentals of Artificial Intelligence	4	CO
1º	Data Types and Data Life Cycle	4	CO
1º	Data in Artificial Intelligence	4	CO
1º	Data Mining: Selection, Pre-Processing and Transformation	4	CO
1º	Algorithm and Complexity in Artificial Intelligence	4	CO
1º	Intelligent Systems	4	CO
1º	Machine Learning and Data Mining	4	CO
1º	Neural Networks, the Basis of Deep Learning	4	CO
1º	Deep Neural Networks Training	4	CO
1º	Model Customization and Training with TensorFlow	4	CO
1º	Deep Computer Vision with Convolutional Neural Networks	5	CO
1º	Natural Language Processing (NLP) with Recurrent Neural Networks (RNN) and Attention	5	CO
1º	Autoencoders, GANs and Diffusion Models	5	CO
1º	Bio-Inspired Computing	5	CO
1º	Artificial Intelligence: Strategies and Applications	5	CO
1º	Technical Analysis of Financial Markets with AI	5	CO
1º	Fundamental Analysis of Financial Markets with AI	5	CO
1º	Large Scale Financial Data Processing	5	CO
1º	Algorithmic Trading Strategies	5	CO
1º	Ethical and Regulatory Aspects of AI in Finance	5	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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Executive Master's Degree

Artificial Intelligence in Stock Exchanges and Financial Markets

- 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 Stock Exchanges and Financial Markets

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