# Professional Master's Degree

## Artificial Intelligence in Translation and Interpreting


tech technological university

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# Professional Master's Degree
## Artificial Intelligence in Translation and Interpreting

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Technological University**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/artificial-intelligence/professional-master-degree/master-artificial-intelligence-translation-interpreting**

# Index

01

# Introduction

Artificial Intelligence (AI) is significantly transforming the fields of translation and interpretation. Advances in language modeling, such as GPT-4 and its successors, have dramatically improved the accuracy and fluency of machine translations, bringing them ever closer to human quality. Furthermore, in the field of interpretation, it is facilitating real-time communication through simultaneous interpretation systems, which use speech recognition and machine translation technologies to provide instantaneous translations in multiple languages. In this scenario, TECH has created a fully online program that adjusts to the personal and professional schedules of graduates. It also uses the innovative learning methodology called Relearning, which is a pioneer in this university.

*With this 100% online Professional Master's Degree, you will understand the most advanced technologies in AI, mastering cutting-edge tools and techniques to improve efficiency and accuracy in translation and interpreting"*

Artificial Intelligence (AI) is rapidly transforming the field of translation and interpretation, with significant advances in the accuracy and efficiency of these processes. Tools such as Google Translate and DeepL use advanced neural networks to provide real-time translations and capture complex linguistic nuances. At the same time, emerging technologies are facilitating instantaneous communication between speakers of different languages through different languages through real-time interpreting applications.

This is how this Professional Master's Degree was created, which will delve into the fundamentals of linguistic models, exploring from traditional approaches to the most advanced ones in AI. In this sense, speech recognition and sentiment analysis will be addressed, equipping professionals with the necessary tools to implement these technologies in practical contexts and face the emerging challenges in the field.

In addition, Neural Machine Translation (NMT) and Natural Language Processing (NLP) will be explored, using specialized tools and platforms that allow instantaneous translation. It will also include a critical evaluation of the quality of real-time translations and a reflection on the ethical and social aspects associated with their implementation.

Finally, the development and optimization of speech recognition platforms will be addressed, as well as how to create chatbots using AI, applying natural language processing techniques to improve multilingual interaction and user experience. In addition, it will delve into the ethical and social challenges that emerge in these areas, ensuring that experts handle themselves effectively and ethically.

In this way, TECH has established a comprehensive, fully online university program, allowing graduates to access educational materials through an electronic device with an Internet connection. This eliminates the need to travel to a physical center and adhere to a fixed schedule. Additionally, it incorporates the revolutionary Relearning methodology, which is based on the repetition of key concepts to achieve a better understanding of the contents.

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

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

*You will implement innovative solutions, such as real-time machine translation and speech recognition systems, a competitive advantage in a constantly evolving job market"*

*You will immerse yourself in a comprehensive exploration of linguistic models, ranging from traditional to modern approaches, thanks to an extensive library of innovative multimedia resources"*

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

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

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

*You will cover the principles of Neural Machine Translation (NMT) and Natural Language Processing (NLP), including the use of specialized tools and platforms. What are you waiting for to enroll?*

*You will examine the integration of machine translation models and linguistic resources, as well as the user experience at the interface of these tools. With all TECH's quality guarantees!*

02

# Objectives

This program is designed to provide professionals with an in-depth understanding of linguistic models and their integration with AI technologies, as well as practical training in real-time translation tools, AI-assisted translation platforms and speech recognition technologies for machine interpreting.  In addition, it will focus on interface design and multilingual chatbots, providing a comprehensive overview of how AI is revolutionizing the industry. It will also address the associated ethical and social challenges, ensuring that graduates acquire advanced technical skills.

*The main objective of this Professional Master's Degree will be to offer comprehensive training, combining classical linguistic theory with the most advanced applications of AI in the field of translation and interpreting"*

## General Objectives

- Understand the theoretical foundations of Artificial Intelligence
- Study the different types of data and understand the data lifecycle
- Evaluate the crucial role of data in the development and implementation of AI solutions
- Delve into algorithms and complexity to solve specific problems
- Explore the theoretical basis of neural networks for Deep Learning development
- Explore bio-inspired computing and its relevance in the development of intelligent systems
- Understand classical and modern linguistic models and their application in Artificial Intelligence
- Acquire skills to use and optimize AI tools in real-time translation, ensuring accuracy and fluency in multilingual contexts
- Become skilled in the use of the main AI-assisted translation platforms and tools, integrating them effectively into the professional workflow
- Learn how to integrate speech recognition technologies into machine interpreting systems, improving accessibility and efficiency
- Design and program multilingual chatbots using AI, enhancing interaction with users in different languages
- Develop criteria and methods for assessing the quality of translations and interpretations performed with AI tools
- Integrate AI tools and platforms into the workflow of translators and interpreters, optimizing productivity and consistency
- Train in identifying and resolving ethical and social challenges related to the use of Artificial Intelligence in translation and interpreting
- Explore and implement innovations in the field of AI-assisted translation and interpretation, anticipating emerging trends
- Equip yourself with the necessary skills to lead projects and teams in the implementation of AI solutions in the field of translation and interpreting

*You will be trained to lead and innovate in a highly technological and constantly evolving global environment, through the best teaching materials, at the forefront of technology and education"*

## Specific Objectives

### Module 1. Fundamentals of Artificial Intelligence

- Analyze the historical evolution of Artificial Intelligence, from its beginnings to its current state, identifying key milestones and developments
- Understand the functioning of neural networks and their application in learning models in Artificial Intelligence
- Study the principles and applications of genetic algorithms, analyzing their usefulness in solving complex problems
- Analyze the importance of thesauri, vocabularies and taxonomies in the structuring and processing of data for AI systems

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

- Understand the fundamental concepts of statistics and their application in data analysis
- Identify and classify the different types of statistical data, from quantitative to qualitative data
- Analyze the life cycle of data, from generation to disposal, identifying key stages
- Explore the initial stages of the data life cycle, highlighting the importance of data planning and structure
- Study data collection processes, including methodology, tools and collection channels
- Explore the Datawarehouse concept, with emphasis on the elements that comprise it and its design

### Module 3. Data in Artificial Intelligence

- Master the fundamentals of data science, covering tools, types and sources for information analysis
- Explore the process of transforming data into information using data mining and visualization techniques
- Study the structure and characteristics of datasets, understanding their importance in the preparation and use of data for Artificial Intelligence models
- Use specific tools and best practices in data handling and processing, ensuring efficiency and quality in the implementation of Artificial Intelligence

### Module 4. Data Mining: Selection, Preprocessing and Transformation

- Master the techniques of statistical inference to understand and apply statistical methods in data mining
- Perform detailed exploratory analysis of data sets to identify relevant patterns, anomalies, and trends
- Develop skills for data preparation, including data cleaning, integration, and formatting for use in data mining
- Implement effective strategies for handling missing values in datasets, applying imputation or elimination methods according to context
- Identify and mitigate noise present in data, using filtering and smoothing techniques to improve the quality of the data set
- Address data preprocessing in Big Data environments

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

- Introduce algorithm design strategies, providing a solid understanding of fundamental approaches to problem solving
- Analyze the efficiency and complexity of algorithms, applying analysis techniques to evaluate performance in terms of time and space
- Study and apply sorting algorithms, understanding their performance and comparing their efficiency in different contexts
- Explore tree-based algorithms, understanding their structure and applications
- Investigate algorithms with Heaps, analyzing their implementation and usefulness in efficient data manipulation
- Analyze graph-based algorithms, exploring their application in the representation and solution of problems involving complex relationships
- Study Greedy algorithms, understanding their logic and applications in solving optimization problems.
- Investigate and apply the backtracking technique for systematic problem solving, analyzing its effectiveness in various scenarios

### Module 6. Intelligent Systems

- Explore agent theory, understanding the fundamental concepts of its operation and its application in Artificial Intelligence and software engineering
- Study the representation of knowledge, including the analysis of ontologies and their application in the organization of structured information
- Analyze the concept of the semantic web and its impact on the organization and retrieval of information in digital environments
- Evaluate and compare different knowledge representations, integrating these to improve the efficiency and accuracy of intelligent systems

### Module 7: Machine Learning and Data Mining

- Introduce the processes of knowledge discovery and the fundamental concepts of machine learning
- Study decision trees as supervised learning models, understanding their structure and applications
- Evaluate classifiers using specific techniques to measure their performance and accuracy in data classification
- Study neural networks, understanding their operation and architecture to solve complex machine learning problems
- Explore Bayesian methods and their application in machine learning, including Bayesian networks and Bayesian classifiers
- Analyze regression and continuous response models for predicting numerical values from data
- Study clustering techniques to identify patterns and structures in unlabeled data sets
- Explore text mining and natural language processing (NLP), understanding how machine learning techniques are applied to analyze and understand text

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

- Master the fundamentals of Deep Learning, understanding its essential role in Deep Learning
- Explore the fundamental operations in neural networks and understand their application in model building
- Analyze the different layers used in neural networks and learn how to select them appropriately
- Understand the effective linking of layers and operations to design complex and efficient neural network architectures

- Use trainers and optimizers to tune and improve the performance of neural networks
- Explore the connection between biological and artificial neurons for a deeper understanding of model design

### Module 9. Deep Neural Networks Training

- Solve gradient-related problems in deep neural network training
- Explore and apply different optimizers to improve the efficiency and convergence of models
- Program the learning rate to dynamically adjust the convergence speed of the model
- Understand and address overfitting through specific strategies during training
- Apply practical guidelines to ensure efficient and effective training of deep neural networks
- Implement Transfer Learning as an advanced technique to improve model performance on specific tasks
- Explore and apply Data Augmentation techniques to enrich datasets and improve model generalization
- Develop practical applications using Transfer Learning to solve real-world problems

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

- Master the fundamentals of TensorFlow and its integration with NumPy for efficient data management and calculations.
- Customize models and training algorithms using the advanced capabilities of TensorFlow
- Explore the tfdata API to efficiently manage and manipulate datasets
- Implement the TFRecord format for storing and accessing large datasets in TensorFlow
- Use Keras preprocessing layers to facilitate the construction of custom models
- Explore the TensorFlow Datasets project to access predefined datasets and improve development efficiency
- Develop a Deep Learning application with TensorFlow, integrating the knowledge acquired in the module
- Apply in a practical way all the concepts learned in building and training custom models with TensorFlow in real-world situations

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

- Understand the architecture of the visual cortex and its relevance in Deep Computer Vision
- Explore and apply convolutional layers to extract key features from images
- Implement clustering layers and their use in Deep Computer Vision models with Keras
- Analyze various Convolutional Neural Network (CNN) architectures and their applicability in different contexts
- Develop and implement a CNN ResNet using the Keras library to improve model efficiency and performance
- Use pre-trained Keras models to leverage transfer learning for specific tasks
- Apply classification and localization techniques in Deep Computer Vision environments
- Explore object detection and object tracking strategies using Convolutional Neural Networks

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

- Developing skills in text generation using Recurrent Neural Networks (RNN)
- Apply RNNs in opinion classification for sentiment analysis in texts
- Understand and apply attentional mechanisms in natural language processing models
- Analyze and use Transformers models in specific NLP tasks
- Explore the application of Transformers models in the context of image processing and computer vision
- Become familiar with the Hugging Face Transformers library for efficient implementation of advanced models
- Compare different Transformers libraries to evaluate their suitability for specific tasks
- Develop a practical application of NLP that integrates RNN and attention mechanisms to solve real-world problems

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

- Develop efficient representations of data using Autoencoders, GANs and Diffusion Models
- Perform PCA using an incomplete linear autoencoder to optimize data representation
- Implement and understand the operation of stacked autoencoders
- Explore and apply convolutional autoencoders for efficient visual data representations
- Analyze and apply the effectiveness of sparse automatic encoders in data representation
- Generate fashion images from the MNIST dataset using Autoencoders
- Understand the concept of Generative Adversarial Networks (GANs) and Diffusion Models
- Implement and compare the performance of Diffusion Models and GANs in data generation

### Module 14. Bio-Inspired Computing

- Introduce the fundamental concepts of bio-inspired computing.
- Analyze space exploration-exploitation strategies in genetic algorithms
- Examine models of evolutionary computation in the context of optimization
- Continue detailed analysis of evolutionary computation models
- Apply evolutionary programming to specific learning problems
- Address the complexity of multi-objective problems in the framework of bio-inspired computing
- Explore the application of neural networks in the field of bio-inspired computing
- Delve into the implementation and usefulness of neural networks in bio-inspired computing

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

- Develop strategies for the implementation of artificial intelligence in financial services
- Identify and assess the risks associated with the use of AI in the healthcare field
- Assess the potential risks associated with the use of AI in industry
- Apply Artificial Intelligence techniques in industry to improve productivity
- Design artificial intelligence solutions to optimize processes in public administration
- Evaluate the implementation of AI technologies in the education sector
- Apply artificial intelligence techniques in forestry and agriculture to improve productivity
- Optimize Human Resources processes through the strategic use of Artificial Intelligence

### Module 16. Linguistic Models and AI Application

- Acquire a solid knowledge of the different linguistic models, from classical to AI-based, and their relevance in translation and interpreting
- Develop the skills to apply probabilistic, rule-based and deep learning models in Natural Language Processing (NLP) tasks

### Module 17. AI and Real-Time Translation

- Learn to handle AI-based real-time translation tools, improving efficiency and accuracy in multilingual communication
- Develop skills to evaluate the quality of real-time translations, using specific metrics and indicators

### Module 18. AI-Assisted Translation Tools and Platforms

- Familiarize yourself with the main AI-assisted translation tools and platforms (TAIA) and learn how to integrate them into your professional workflow
- Learn how to integrate linguistic resources and databases into TAIA tools, optimizing translation productivity and consistency

### Module 19 Integration of Speech Recognition Technologies in Automatic Interpretation

- Develop skills to integrate speech recognition technologies into machine interpreting systems, improving the accessibility and quality of interpretations
- Learn how to improve the user experience in automatic interpreting systems through the optimization of speech recognition technologies

### Module 20. Design of Multilanguage Interfaces and Chatbots Using AI Tools

- Acquire skills in the design and development of multilanguage chatbots using Artificial Intelligence, applying Natural Language Processing (NLP) techniques
- Learn to analyze data and optimize the performance of multilanguage chatbots, improving their interaction capacity in different contexts and platforms

03

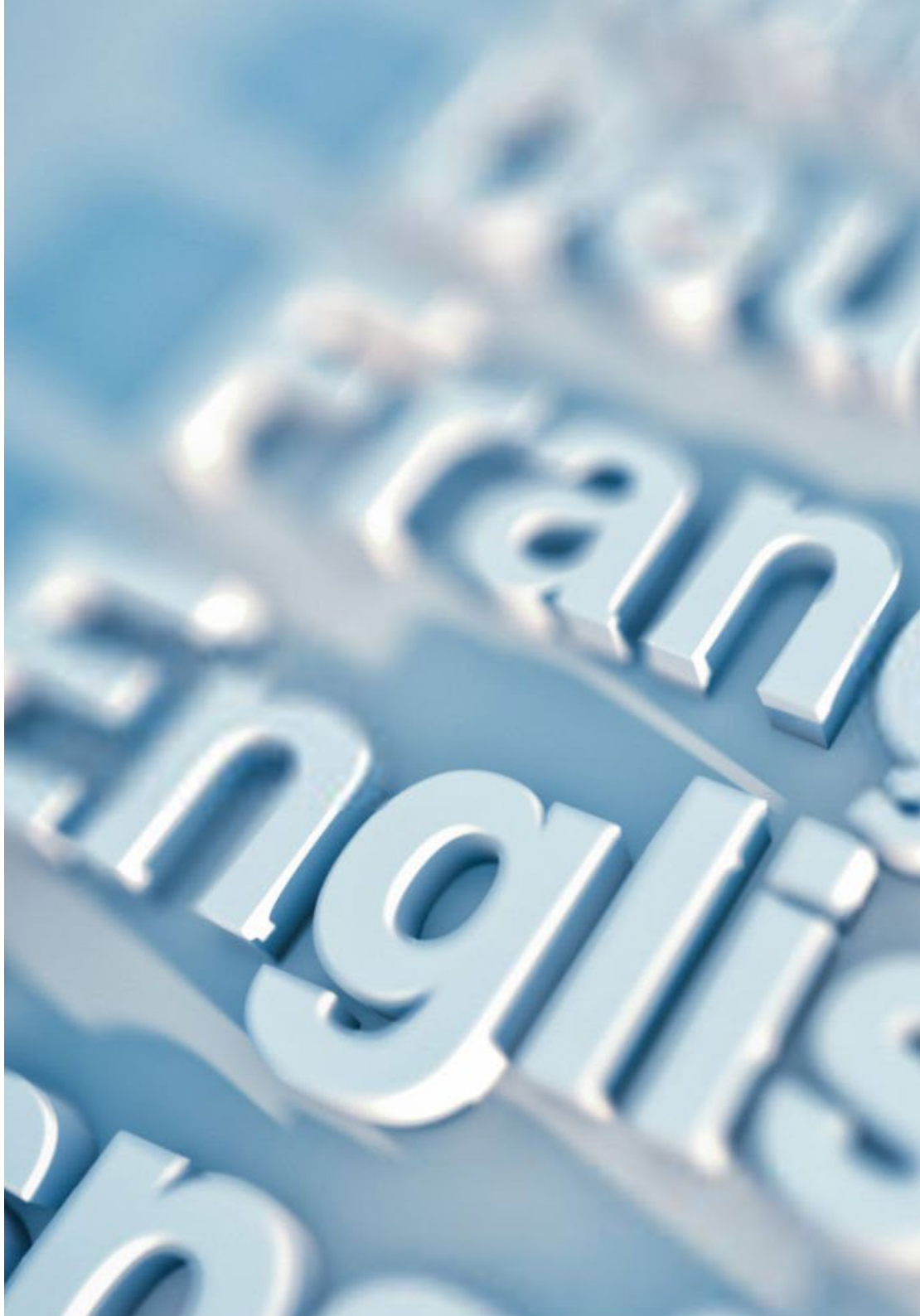
# Skills

This academic program will enable professionals to stand out in a labor market increasingly influenced by Artificial Intelligence. They will develop skills to apply advanced linguistic models in the creation and optimization of translation and interpretation tools, significantly improving the efficiency and accuracy of their work. In addition, they will be able to use AI platforms to develop innovative solutions, such as multilingual chatbots, and will be prepared to face the ethical and social challenges related to the use of these technologies.

*With training that combines advanced technical knowledge with a deep understanding of ethical implications, you will be equipped to lead projects in a digitized global environment"*

## General Skills

- Master data mining techniques, including complex data selection, preprocessing and transformation
- Design and develop intelligent systems capable of learning and adapting to changing environments
- Control machine learning tools and their application in data mining for decision making
- Employ Autoencoders, GANs and Diffusion Models to solve specific challenges in Artificial Intelligence
- Implement an encoder-decoder network for neural machine translation
- Apply the fundamental principles of neural networks in solving specific problems
- Understand and apply classical and modern linguistic models in Artificial Intelligence tools
- Use and optimize AI tools for real time translation, improving accuracy and fluency
- Implement AI-assisted translation platforms and tools in professional environments, optimizing workflows
- Integrate speech recognition technologies into machine interpreting systems, improving accessibility and efficiency



## Specific Skills

- Apply AI techniques and strategies to improve efficiency in the retail sector
- Delve into understanding and application of genetic algorithms
- Implement noise removal techniques using automatic encoders
- Effectively create training data sets for natural language processing (NLP) tasks
- Run grouping layers and their use in Deep Computer Vision models with Keras
- Use TensorFlow features and graphics to optimize the performance of custom models
- Optimize the development and application of chatbots and virtual assistants, understanding their operation and potential applications
- Master reuse of pre-workout layers to optimize and accelerate the training process
- Build the first neural network, applying the concepts learned in practice
- Activate Multilayer Perceptron (MLP) using the Keras library
- Apply data scanning and preprocessing techniques, identifying and preparing data for effective use in machine learning models
- Implement effective strategies for handling missing values in datasets, applying imputation or elimination methods according to context
- Investigate languages and software for the creation of ontologies, using specific tools for the development of semantic models
- Develop data cleaning techniques to ensure the quality and accuracy of the information used in subsequent analyses
- Apply PLN techniques in translation and interpretation, increasing multilingual language processing capacity
- Develop chatbots with multilingual capabilities through the use of AI, improving interaction with users in different languages
- Evaluate the quality of AI-assisted translations and interpretations, ensuring high professional standards
- Integrate AI tools into the workflow of translators and interpreters, improving productivity and consistency
- Address the ethical and social challenges related to the implementation of AI in translation and interpretation
- Explore emerging trends and the future of AI in the field of translation and interpreting, preparing to lead innovation

04

# Course Management

The Master's Degree has a high-level teaching team, composed of international experts in linguistics, Artificial Intelligence and its applications in translation and interpreting. In fact, their training and background will ensure quality teaching, offering an updated and practical perspective on the latest trends and challenges in the sector. In addition, the team stands out for its ability to integrate theory with real applications, providing graduates with the necessary skills to successfully address the demands of the global and technological market.


*The faculty are professionals with extensive experience in the development of advanced technologies, such as linguistic models and AI-assisted translation platforms, as well as academics recognized for their research"*

## 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

### Ms. Martínez Cerrato, Yésica

- Education, Business and Marketing Specialist
- Responsible for Technical Training at Securitas Seguridad España
- Product Manager in Electronic Security at Securitas Direct
- Business Intelligence Analyst at Ricopia Technologies
- Computer Technician and Responsible for OTEC computer classrooms at the University of Alcalá de Henares
- Collaborator in the ASALUMA Association
- Degree in Electronic Communications Engineering at the Polytechnic School, University of Alcalá de Henares

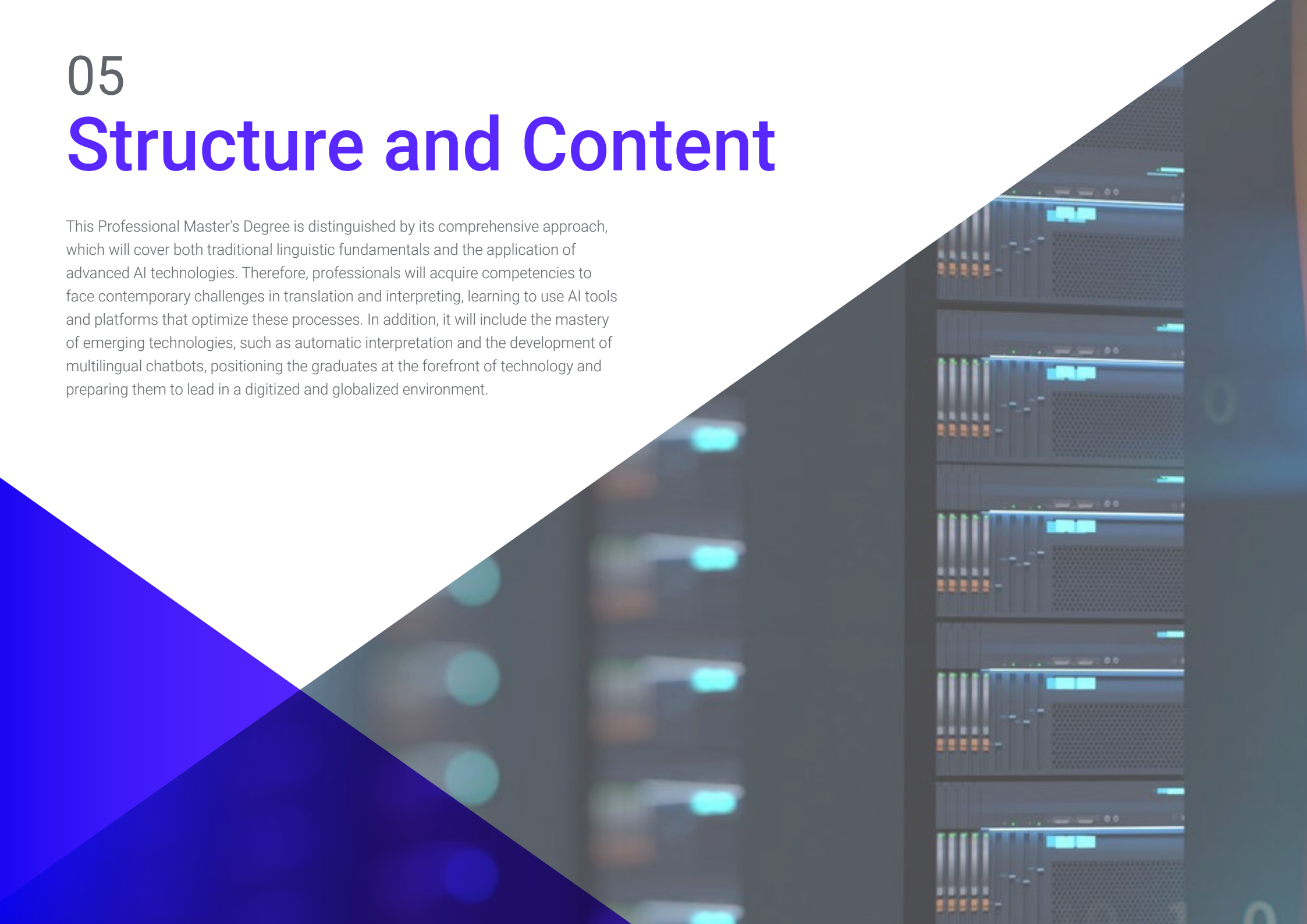
### Ms. Del Rey Sánchez, Cristina

- Talent Management Administrative Officer at Securitas Seguridad España, S.L.
- Coordinator of Extracurricular Activities Centers
  Support classes and pedagogical interventions with Primary and Secondary Education students
- Postgraduate in Development, Delivery and Tutoring of e-Learning Training Actions.
- Postgraduate in Early Childhood Care
- Degree in Pedagogy from the Complutense University of Madrid

05

# Structure and Content

This Professional Master's Degree is distinguished by its comprehensive approach, which will cover both traditional linguistic fundamentals and the application of advanced AI technologies. Therefore, professionals will acquire competencies to face contemporary challenges in translation and interpreting, learning to use AI tools and platforms that optimize these processes. In addition, it will include the mastery of emerging technologies, such as automatic interpretation and the development of multilingual chatbots, positioning the graduates at the forefront of technology and preparing them to lead in a digitized and globalized environment.




*This program will offer you a unique training, combining the classical knowledge of linguistics with the most recent innovations in Artificial Intelligence, supported by the revolutionary Relearning methodology"*

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

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

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

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

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

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



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

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

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

1.9. AI Implementation Strategy

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

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

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

2.2. Types of Data Statistics
- 2.2.1. According to Type
  - 2.2.1.1. Quantitative: Continuous Data and Discrete Data
  - 2.2.1.2. Qualitative. Binomial Data, Nominal Data and Ordinal Data
- 2.2.2. According to 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
2.3.3. FAIR Principles
2.4. Initial Stages of the Cycle
2.4.1. Definition of Goals
2.4.2. Determination of Resource Requirements
2.4.3. Gantt Chart
2.4.4. Data Structure
2.5. Data Collection
2.5.1. Methodology of Data Collection
2.5.2. Data Collection Tools
2.5.3. Data Collection Channels
2.6. Data Cleaning
2.6.1. Phases of Data Cleansing
2.6.2. Data Quality
2.6.3. Data Manipulation (with R)
2.7. Data Analysis, Interpretation and Evaluation of Results
2.7.1. Statistical Measures
2.7.2. Relationship Indexes
2.7.3. Data Mining
2.8. Datawarehouse
2.8.1. Elements that Comprise it
2.8.2. Design
2.8.3. Aspects to Consider
2.9. Data Availability
2.9.1. Access
2.9.2. Uses
2.9.3. Security

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

3.1. Data Science
3.1.1. Data Science
3.1.2. Advanced Tools for Data Scientists
3.2. Data, Information and Knowledge
3.2.1. Data, Information and Knowledge
3.2.2. Types of Data
3.2.3. Data Sources
3.3. From Data to Information
3.3.1. Data Analysis
3.3.2. Types of Analysis
3.3.3. Extraction of Information from a Dataset
3.4. Extraction of Information Through Visualization
3.4.1. Visualization as an Analysis Tool
3.4.2. Visualization Methods
3.4.3. Visualization of a Data Set
3.5. Data Quality
3.5.1. Quality Data
3.5.2. Data Cleaning
3.5.3. Basic Data Pre-Processing
3.6. *Dataset*
3.6.1. Dataset Enrichment
3.6.2. The Curse of Dimensionality
3.6.3. Modification of Our Data Set
3.7. Unbalance
3.7.1. Classes of Unbalance
3.7.2. Unbalance Mitigation Techniques
3.7.3. Balancing a Dataset

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

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

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

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

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

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

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

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

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

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

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

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

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

4.10. Data Pre-processing in Big Data Environments

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

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

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

5.3. Sorting Algorithms
- 5.3.1. Concept of Sorting
- 5.3.2. Bubble Sorting
- 5.3.3. Sorting by Selection
- 5.3.4. Sorting by Insertion
- 5.3.5. Merge Sort
- 5.3.6. Quick Sorting (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. Layer Bonding and Operations
- 8.4.1. Architecture Design
- 8.4.2. Connection between Layers
- 8.4.3. Forward Propagation

8.5. Construction of the First Neural Network
- 8.5.1. Network Design
- 8.5.2. Establish the Weights
- 8.5.3. Network Training

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

10.5. Loading and Preprocessing Data with TensorFlow
- 10.5.1. Loading Data Sets with TensorFlow
- 10.5.2. Preprocessing Data with TensorFlow
- 10.5.3. Using TensorFlow Tools for Data Manipulation

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

10.7. The TFRecord Format
- 10.7.1. Using the TFRecord API for Data Serialization
- 10.7.2. TFRecord File Upload with TensorFlow
- 10.7.3. Using TFRecord Files for Model Training

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

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

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

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

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

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

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

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

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

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

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

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

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

11.10. Semantic Segmentation
- 11.10.1. Deep Learning for Semantic Segmentation
- 11.10.1. Edge Detection
- 11.10.1. 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's Transformers 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. 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 Applications
- 13.10.2. Implementation of the Models
- 13.10.3. Use of Real Data
- 13.10.4. Results Evaluation

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

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

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

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

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

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

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

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

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

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

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

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

15.1. Financial Services
- 15.1.1. The Implications of Artificial Intelligence in Financial Services. Opportunities and Challenges
- 15.1.2. Case Uses
- 15.1.3. Potential Risks Related to the Use of Artificial Intelligence
- 15.1.4. Potential Future Developments / Uses of Artificial Intelligence

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

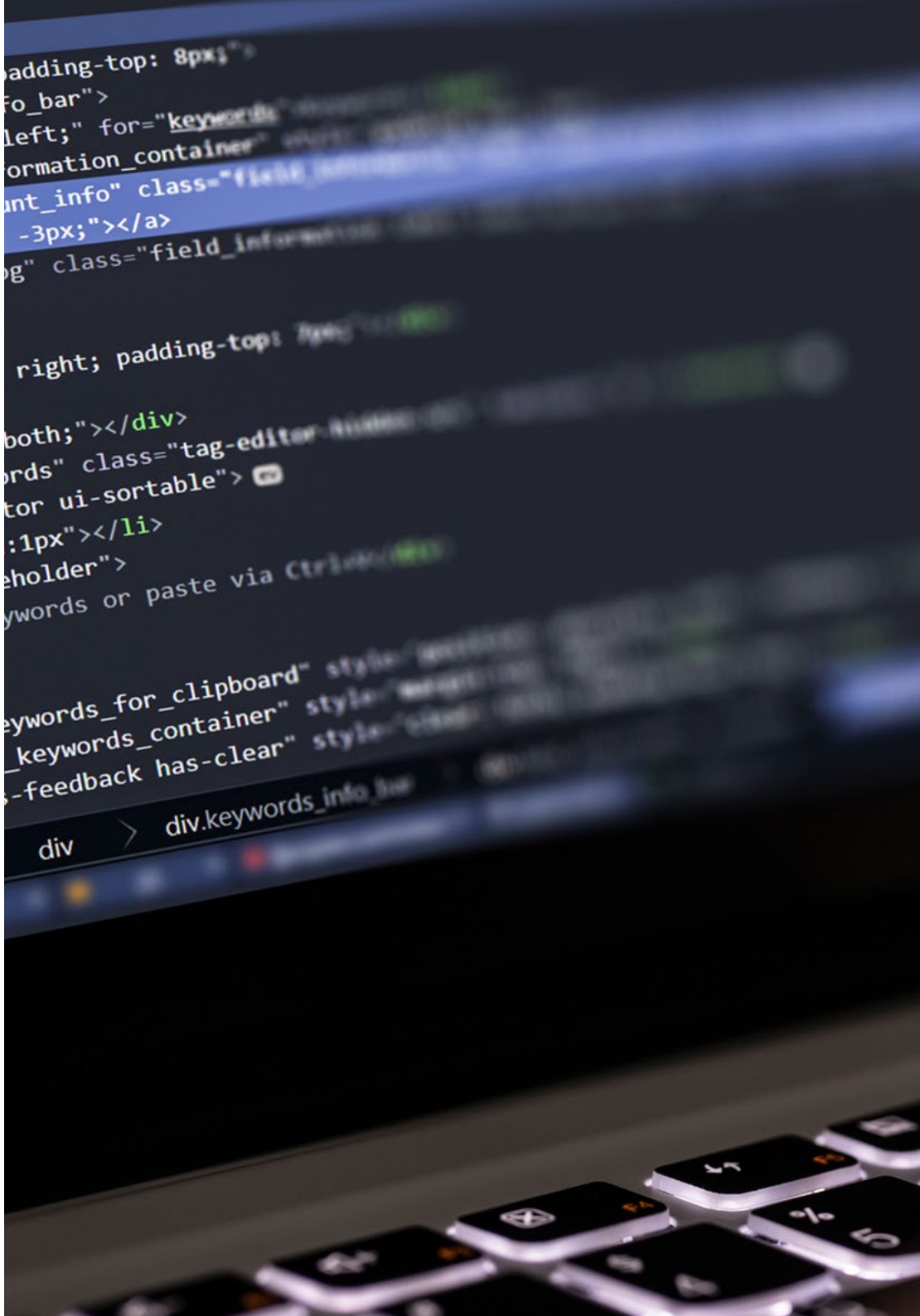
15.3. Risks Related to the Use of Artificial Intelligence in Health Services
- 15.3.1. Potential Risks Related to the Use of Artificial Intelligence
- 15.3.2. Potential Future Developments / Uses of Artificial Intelligence

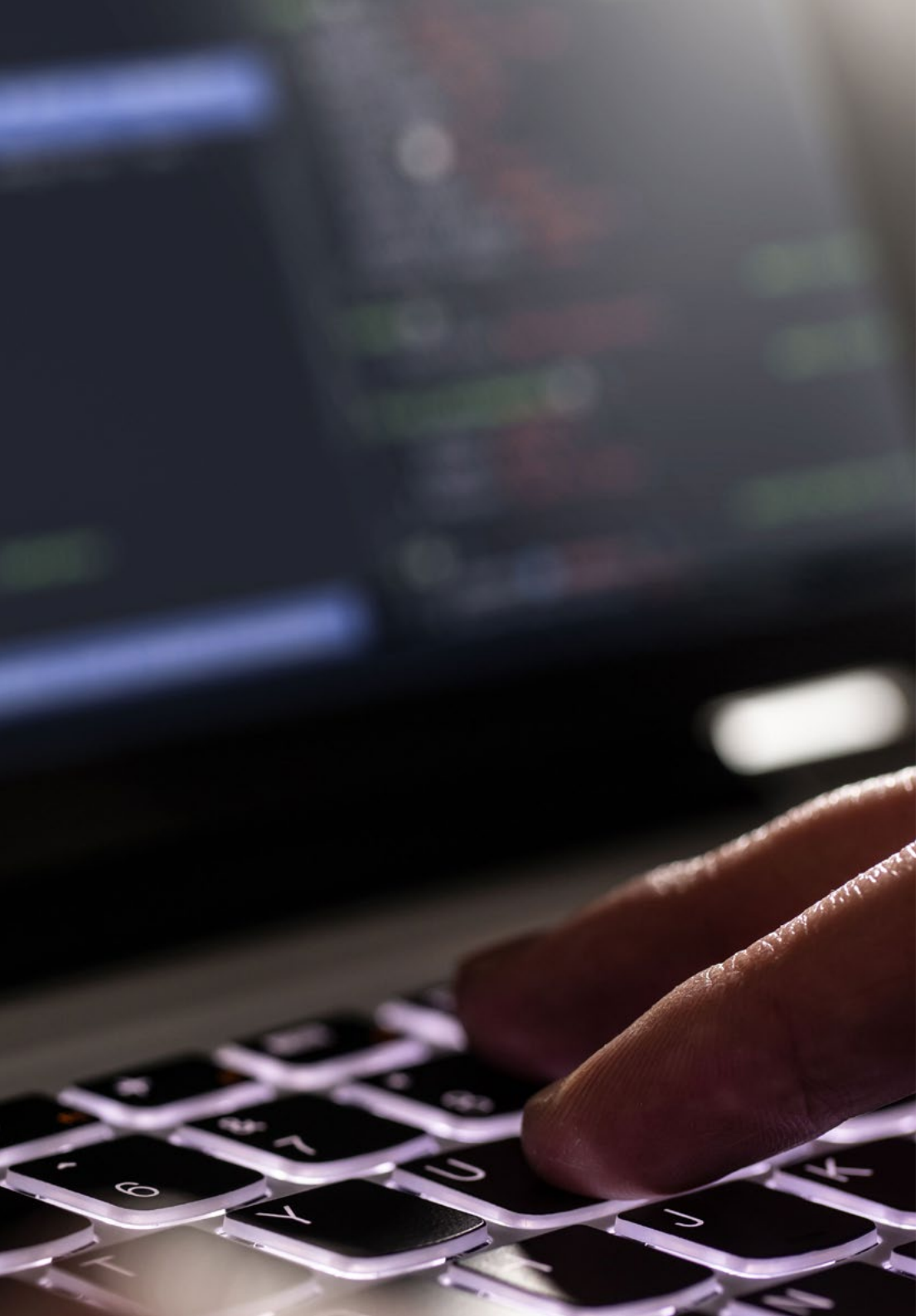
15.4. *Retail*
- 15.4.1. Implications of Artificial Intelligence in Retail. Opportunities and Challenges
- 15.4.2. Case Uses
- 15.4.3. Potential Risks Related to the Use of Artificial Intelligence
- 15.4.4. Potential Future Developments / Uses of Artificial Intelligence

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

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

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







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

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

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

## **Module 16.** Linguistic Models and AI Application

16.1. Classical Models of Linguistics and their Relevance to AI
- 16.1.1. Generative and Transformational Grammar
- 16.1.2. Structural Linguistic Theory
- 16.1.3. Formal Grammar Theory
- 16.1.4. Applications of Classical Models in AI

16.2. Probabilistic Models in Linguistics and Their Application in AI
- 16.2.1. Hidden Markov Models (HMM)
- 16.2.2. Statistical Language Models
- 16.2.3. Supervised and Unsupervised Learning Algorithms
- 16.2.4. Applications in Speech Recognition and Text Processing

16.3. Rule-Based Models and Their Implementation in AI. GPT
- 16.3.1. Formal Grammars and Rule Systems
- 16.3.2. Knowledge Representation and Computational Logic
- 16.3.3. Expert Systems and Inference Engines
- 16.3.4. Applications in Dialog Systems and Virtual Assistants

16.4. Deep Learning Models in Linguistics and Their Use in AI
- 16.4.1. Convolutional Neural Networks for Text Processing
- 16.4.2. Recurrent Neural Networks and LSTM for Sequence Modeling
- 16.4.3. Attention Models and Transformers. APERTIUM
- 16.4.4. Applications in Machine Translation, Text Generation and Sentiment Analysis.

16.5. Distributed Language Representations and Their Impact on AI
- 16.5.1. Word Embeddings and Vector Space Models
- 16.5.2. Distributed Representations of Sentences and Documents
- 16.5.3. Bag-of-Words Models and Continuous Language Models
- 16.5.4. Applications in Information Retrieval, Document Clustering and Content Recommendation

16.6. Machine Translation Models and Their Evolution in AI. Lilt
- 16.6.1. Statistical and Rule-Based Translation Models
- 16.6.2. Advances in Neural Machine Translation
- 16.6.3. Hybrid Approaches and Multilingual Models
- 16.6.4. Applications in Online Translation and Content Localization Services

16.7. Sentiment Analysis Models and Their Usefulness in AI
- 16.7.1. Sentiment Classification Methods
- 16.7.2. Detection of Emotions in Text
- 16.7.3. Analysis of User Opinions and Comments
- 16.7.4. Applications in Social Networks, Analysis of Product Opinions and Customer Service

16.8. Language Generation Models and Their Application in AI. TransPerfect Globallink
- 16.8.1. Autoregressive Text Generation Models
- 16.8.2. Conditioned and Controlled Text Generation
- 16.8.3. GPT-Based Natural Language Generation Models
- 16.8.4. Applications in Automatic Typing, Text Summarization, and Intelligent Conversation

16.9. Speech Recognition Models and Their Integration in AI
- 16.9.1. Audio Feature Extraction Methods
- 16.9.2. Speech Recognition Models Based on Neural Networks
- 16.9.3. Improvements in Speech Recognition Accuracy and Robustness
- 16.9.4. Applications in Virtual Assistants, Transcription Systems and Speech-based Device Control

16.10. Challenges and Future of Linguistic Models in AI
- 16.10.1. Challenges in Natural Language Understanding
- 16.10.2. Limitations and Biases in Current Linguistic Models
- 16.10.3. Research and Future Trends in AI Linguistic Modeling
- 16.10.4. Impact on Future Applications such as General Artificial Intelligence (AGI) and Human Language Understanding. SmartCAt

## **Module 17.** AI and Real-Time Translation

17.1. Introduction to Real-Time Translation with AI
- 17.1.1. Definition and Basic Concepts
- 17.1.2. Importance and Applications in Different Contexts
- 17.1.3. Challenges and Opportunities
- 17.1.4. Tools such as Fluently or Voice Tra

17.2. Artificial Intelligence Fundamentals in Translation
- 17.2.1. Brief Introduction to Artificial Intelligence
- 17.2.2. Specific Applications in Translation
- 17.2.3. Relevant Models and Algorithms

17.3. AI-Based Real-Time Translation Tools
- 17.3.1. Description of the Main Tools Available
- 17.3.2. Comparison of Functionalities and Features
- 17.3.3. Use Cases and Practical Examples

17.4. Neural Machine Translation (NMT) Models. SDL Language Cloud
- 17.4.1. Principles and Operation of NMT Models
- 17.4.2. Advantages over Traditional Approaches
- 17.4.3. Development and Evolution of NMT Models

17.5. Natural Language Processing (NLP) in Real-Time Translation. SayHi TRanslate
- 17.5.1. Basic NLP Concepts Relevant to Translation
- 17.5.2. Preprocessing and Post-Processing Techniques
- 17.5.3. Improving the Coherence and Cohesion of the Translated Text

17.6. Multilingual and Multimodal Translation Models
- 17.6.1. Translation Models that Support Multiple Languages
- 17.6.2. Integration of Modalities such as Text, Speech and Images
- 17.6.3. Challenges and Considerations in Multilingual and Multimodal Translation

17.7. Quality Assessment in Real-Time Translation with AI
- 17.7.1. Translation Quality Assessment Metrics
- 17.7.2. Automatic and Human Evaluation Methods. iTranslate Voice
- 17.7.3. Strategies to Improve Translation Quality

17.8. Integration of Real-Time Translation Tools in Professional Environments
- 17.8.1. Use of Translation Tools in Daily Work
- 17.8.2. Integration with Content Management and Localization Systems
- 17.8.3. Adaptation of Tools to Specific User Needs

17.9. Ethical and Social Challenges in Real-Time Translation with AI
- 17.9.1. Biases and Discrimination in Machine Translation
- 17.9.2. Privacy and Security of User Data
- 17.9.3. Impact on Linguistic and Cultural Diversity

17.10. Future of AI-Based Real-Time Translation. Applingua
- 17.10.1. Emerging Trends and Technological Advances
- 17.10.2. Future Prospects and Potential Innovative Applications
- 17.10.3. Implications for Global Communication and Language Accessibility

## **Module 18.** AI-Assisted Translation Tools and Platforms

18.1. Introduction to AI-Assisted Translation Tools and Platforms
- 18.1.1. Definition and Basic Concepts
- 18.1.2. Brief History and Evolution
- 18.1.3. Importance and Benefits in Professional Translation

18.2. Main AI-Assisted Translation Tools
- 18.2.1. Description and Functionalities of the Leading Tools on the Market
- 18.2.2. Comparison of Features and Prices
- 18.2.3. Use Cases and Practical Examples

18.3. Professional AI-Assisted Translation Platforms. Wordfast
- 18.3.1. Description of Popular AI-Assisted Translation Platforms
- 18.3.2. Specific Functionalities for Translation Teams and Agencies
- 18.3.3. Integration with Other Project Management Systems and Tools

18.4. Machine Translation Models Implemented in AI-Assisted Translation Tools
- 18.4.1. Statistical Translation Models
- 18.4.2. Neural Translation Models
- 18.4.3. Advances in Neural Machine Translation (NMT) and Its Impact on AI-Assisted Translation Tools

18.5. Integration of Linguistic Resources and Databases in AI-Assisted Translation Tools
- 18.5.1. Using Corpus and Linguistic Databases to Improve Translation Accuracy
- 18.5.2. Integrating Specialized Dictionaries and Glossaries
- 18.5.3. Importance of Context and Specific Terminology in AI-Assisted Translation

18.6. User Interface and User Experience in AI-Assisted Translation Tools
- 18.6.1. User Interface Design and Usability
- 18.6.2. Customization and Preference Settings
- 18.6.3. Accessibility and Multilingual Support on AI-Assisted Translation Platforms

18.7. Quality Assessment in AI-Assisted Translation
- 18.7.1. Translation Quality Assessment Metrics
- 18.7.2. Machine vs. Human Evaluation
- 18.7.3. Strategies to Improve the Quality of AI-Assisted Translation

18.8. Integration of AI-Assisted Translation Tools into the Translator's Workflow
- 18.8.1. Incorporation of AI-Assisted Translation Tools into the Translation Process
- 18.8.2. Optimizing Workflow and Increasing Productivity
- 18.8.3. Collaboration and Teamwork in AI-Assisted Translation Environments

18.9. Ethical and Social Challenges in the Use of AI-Assisted Translation Tools
- 18.9.1. Biases and Discrimination in Machine Translation
- 18.9.2. Privacy and Security of User Data
- 18.9.3. Impact on the Translation Profession and on Linguistic and Cultural Diversity

18.10. Future of AI-Assisted Translation Tools and Platforms.Wordbee
- 18.10.1. Emerging Trends and Technological Developments
- 18.10.2. Future Prospects and Potential Innovative Applications
- 18.10.3. Implications for Training and Professional Development in the Field of Translation

## **Module 19.** Integration of Speech Recognition Technologies in Machine Interpreting

19.1. Introduction to the Integration of Speech Recognition Technologies in Machine Interpreting
- 19.1.1. Definition and Basic Concepts
- 19.1.2. Brief History and Evolution. Kaldi
- 19.1.3. Importance and Benefits in the Field of Interpretation

19.2. Principles of Speech Recognition for Machine Interpreting
- 19.2.1. How Speech Recognition Works
- 19.2.2. Technologies and Algorithms Used
- 19.2.3. Types of Speech Recognition Systems

19.3. Development and Improvements in Speech Recognition Technologies
- 19.3.1. Recent Technological Advances. Speech Recognition
- 19.3.2. Improvements in Accuracy and Speed
- 19.3.3. Adaptation to Different Accents and Dialects

19.4. Speech Recognition Platforms and Tools for Machine Interpreting
- 19.4.1. Description of the Main Platforms and Tools Available
- 19.4.2. Comparison of Functionalities and Features
- 19.4.3. Use Cases and Practical Examples. Speechmatics

19.5. Integrating Speech Recognition Technologies into Machine Interpreting Systems
- 19.5.1. Design and Implementation of Machine Interpreting Systems with Speech Recognition
- 19.5.2. Adaptation to Different Interpreting Environments and Situations
- 19.5.3. Technical and Infrastructure Considerations

19.6. Optimization of the User Experience in Machine Interpreting with Speech Recognition
- 19.6.1. Design of Intuitive and Easy to Use User Interfaces
- 19.6.2. Customization and Configuration of Preferences. OTTER.ai
- 19.6.3. Accessibility and Multilingual Support in Machine Interpreting Systems

19.7. Assessment of the Quality in Machine Interpreting with Speech Recognition
- 19.7.1. Interpretation Quality Assessment Metrics
- 19.7.2. Machine vs. Human Evaluation
- 19.7.3. Strategies to Improve the Quality in Machine Interpreting with Speech Recognition

19.8. Ethical and Social Challenges in the Use of Speech Recognition Technologies in Machine Interpreting
- 19.8.1. Privacy and Security of User Data
- 19.8.2. Biases and Discrimination in Speech Recognition
- 19.8.3. Impact on the Interpreting Profession and on Linguistic and Cultural Diversity

19.9. Specific Applications of Machine Interpreting with Speech Recognition
- 19.9.1. Real-Time Interpreting in Business and Commercial Environments
- 19.9.2. Remote and Telephonic Interpreting with Speech Recognition
- 19.9.3. Interpreting at International Events and Conferences

19.10. Future of the Integration of Speech Recognition Technologies in Machine Interpreting
- 19.10.1. Emerging Trends and Technological Developments. CMU Sphinx
- 19.10.2. Future Prospects and Potential Innovative Applications
- 19.10.3. Implications for Global Communication and Elimination of Language Barriers

## **Module 20.** Design of Multilanguage Interfaces and Chatbots Using AI Tools

20.1. Fundamentals of Multilanguage Interfaces
- 20.1.1. Design Principles for Multilingualism: Usability and Accessibility with AI
- 20.1.2. Key Technologies: Using TensorFlow and PyTorch for Interface Development
- 20.1.3. Case Studies: Analysis of Successful Interfaces Using AI

20.2. Introduction to Chatbots with AI
- 20.2.1. Evolution of Chatbots: from Simple to AI-Driven
- 20.2.2. Comparison of Chatbots: Rules vs. AI-Based Models
- 20.2.3. Components of AI-Driven Chatbots: Use of Natural Language Understanding (NLU)

20.3. Multilanguage Chatbot Architectures with AI
- 20.3.1. Design of Scalable Architectures with IBM Watson
- 20.3.2. Designing Scalable Architectures with IBM Watson
- 20.3.3. Integration of Chatbots in Platforms with Microsoft Bot Framework

20.4. Natural Language Processing (NLP) for Chatbots
- 20.4.1. Syntactic and Semantic Parsing with Google BERT
- 20.4.2. Language Model Training with OpenAI GPT
- 20.4.3. Application of PLN Tools such as spaCy in Chatbots

20.5. Development of Chatbots with AI Frameworks
- 20.5.1. Implementation with Google Dialogflow
- 20.5.2. Creating and Training Dialog Flows with IBM Watson
- 20.5.3. Advanced Customization Using AI APIs such as Microsoft LUIS

20.6. Conversation and Context Management in Chatbots
- 20.6.1. State Models with Rasa for Chatbots
- 20.6.2. Conversational Management Strategies with Deep Learning
- 20.6.3. Real-Time Ambiguity Resolution and Corrections Using AI

20.7. UX/UI Design for Multilanguage Chatbots with AI
- 20.7.1. User-Centered Design Using AI Data Analytics
- 20.7.2. Cultural Adaptation with Automatic Localization Tools
- 20.7.3. Usability Testing with AI-Based Simulations

20.8. Integration of Multi-Channel Chatbots with AI
- 20.8.1. Omni-Channel Development with TensorFlow
- 20.8.2. Secure and Private Integration Strategies with AI Technologies
- 20.8.3. Security Considerations with AI Cryptography Algorithms

20.9. Data Analysis and Chatbot Optimization
- 20.9.1. Use of Analytics Platforms such as Google Analytics for Chatbots
- 20.9.2. Performance Optimization with Machine Learning Algorithms
- 20.9.3. Machine Learning for Continuous Chatbot Refinement

20.10. Implementing a Multilanguage Chatbot with AI
- 20.10.1. Project Definition with AI Management Tools
- 20.10.2. Technical Implementation Using TensorFlow or PyTorch
- 20.10.3. Evaluation and Tuning Based on Machine Learning and User Feedback

*You will equip yourself with skills to face contemporary challenges in translation and interpreting by learning how to use AI tools and platforms that optimize these processes"*

06

# Methodology

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

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

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

## Case Study to contextualize all content

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

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


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

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

## A learning method that is different and innovative

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

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

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

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

## Relearning Methodology

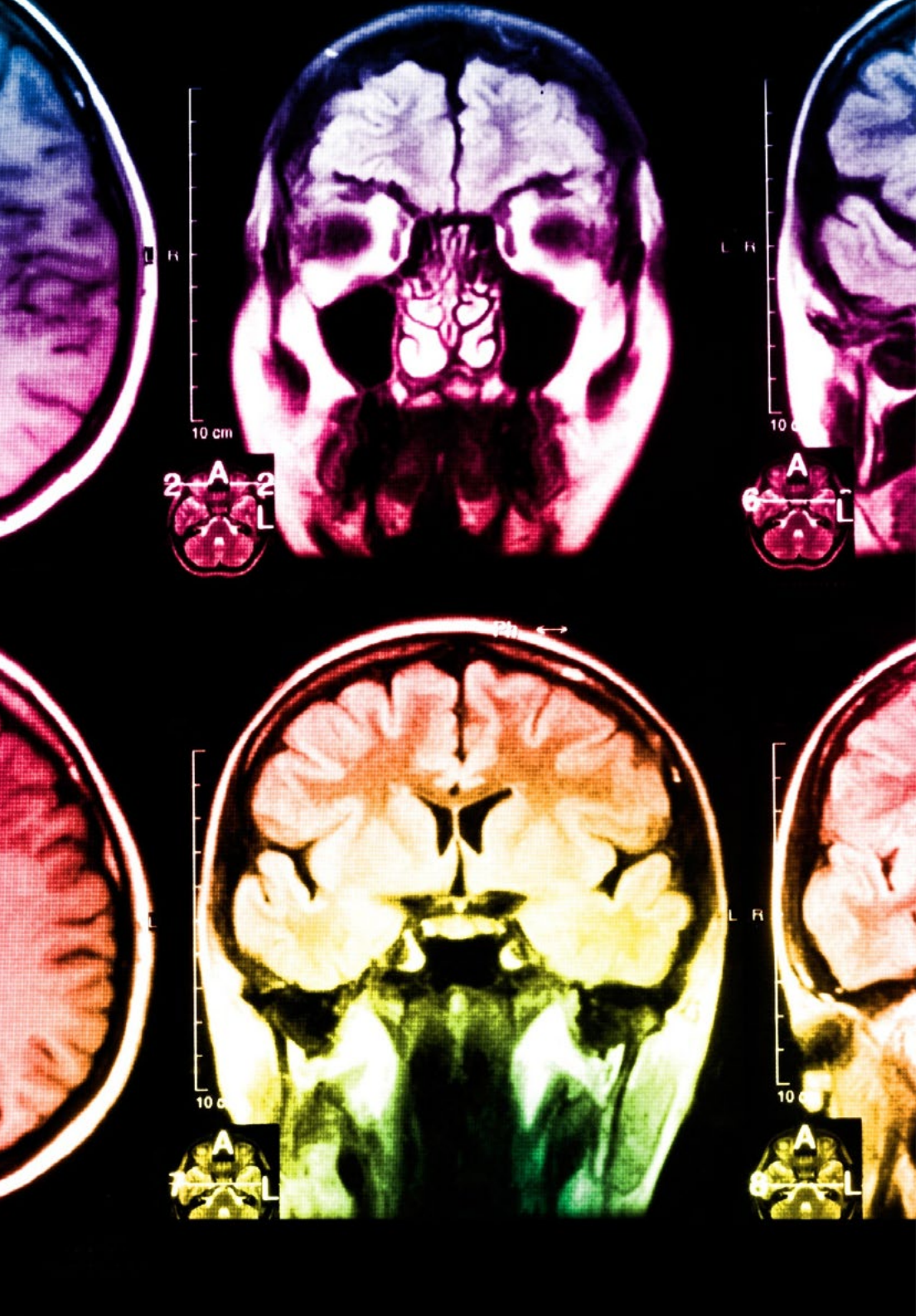
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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

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

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

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



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

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

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

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

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

### Study Material

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

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

### Classes

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

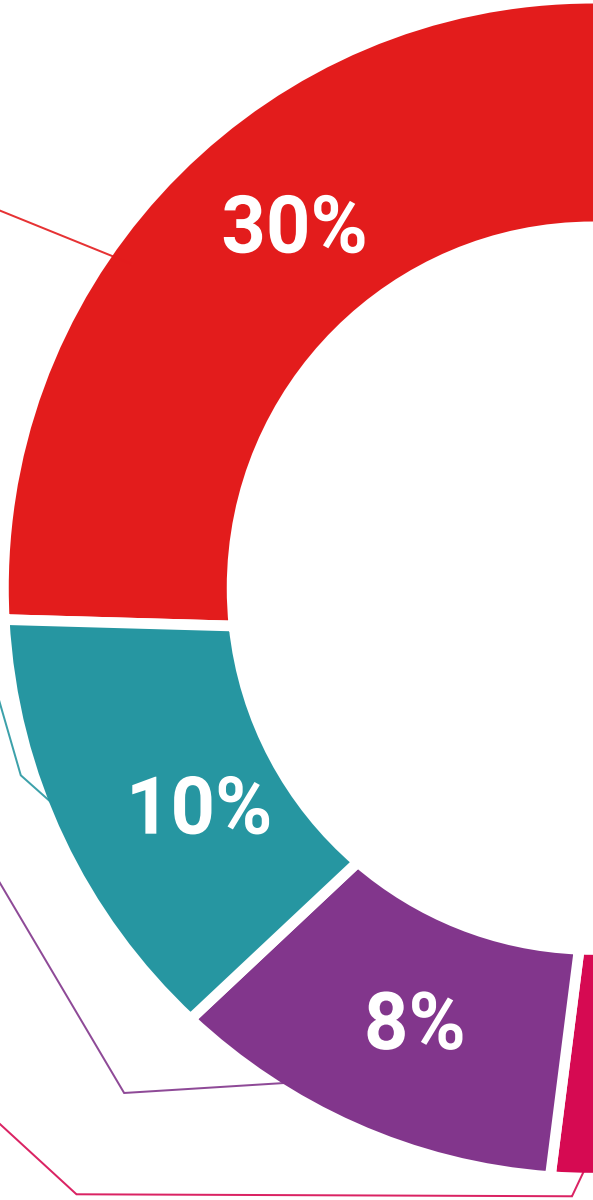
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

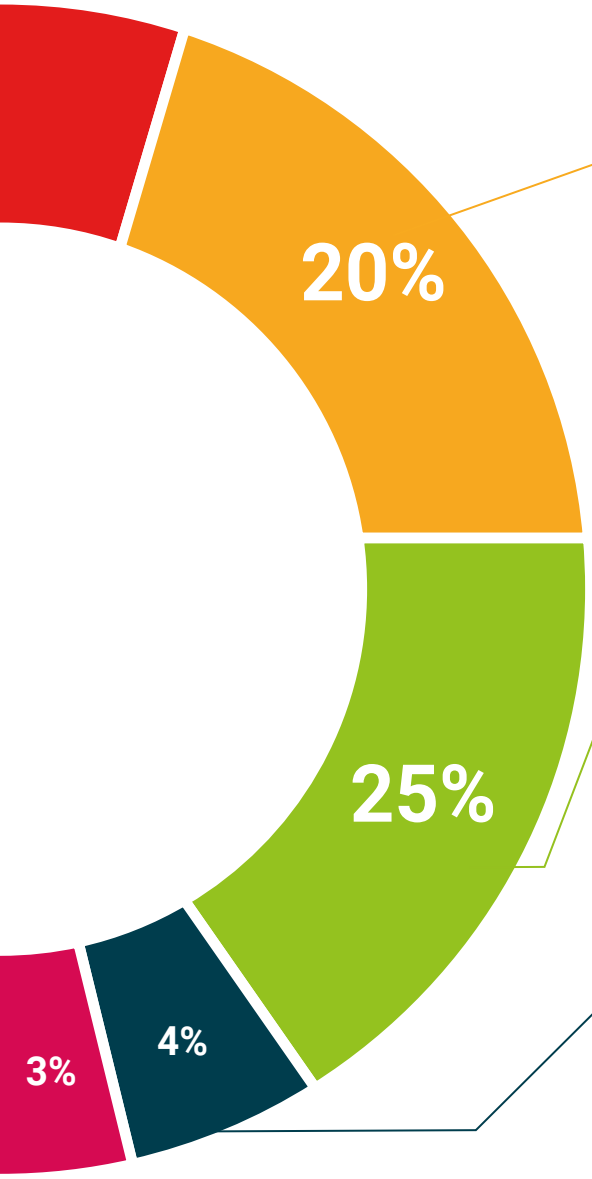
### Practising Skills and Abilities

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

### Additional Reading

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






### Case Studies

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

### Interactive Summaries

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

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

### Testing & Retesting

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

07

# Certificate

The Professional Master's Degree in Artificial Intelligence in Artificial Intelligence in Translation and Interpreting guarantees students, in addition to the most rigorous and up-to-date education, access to a Professional Master's Degree issued by TECH Technological University.

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

This **Professional Master's Degree in Artificial Intelligence in Translation and Interpreting** contains the most complete and up-to-date scientific program on the market.

After the student has passed the assessments, they will receive their corresponding **Professional Master's Degree** issued by **TECH Technological University** via tracked delivery*.

The diploma issued by **TECH Technological University** will reflect the qualification obtained in the Professional Master's Degree, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Professional Master's Degree in Artificial Intelligence in Translation and Interpreting**

Modality: **online**

Duration: **12 months**


tech technological university

Awards the following

DIPLOMA

to

Mr./Ms. _____ with identification number _____.

For having successfully passed and accredited the following program

PROFESSIONAL MASTER'S DEGREE

in

Artificial Intelligence in Translation and Interpreting

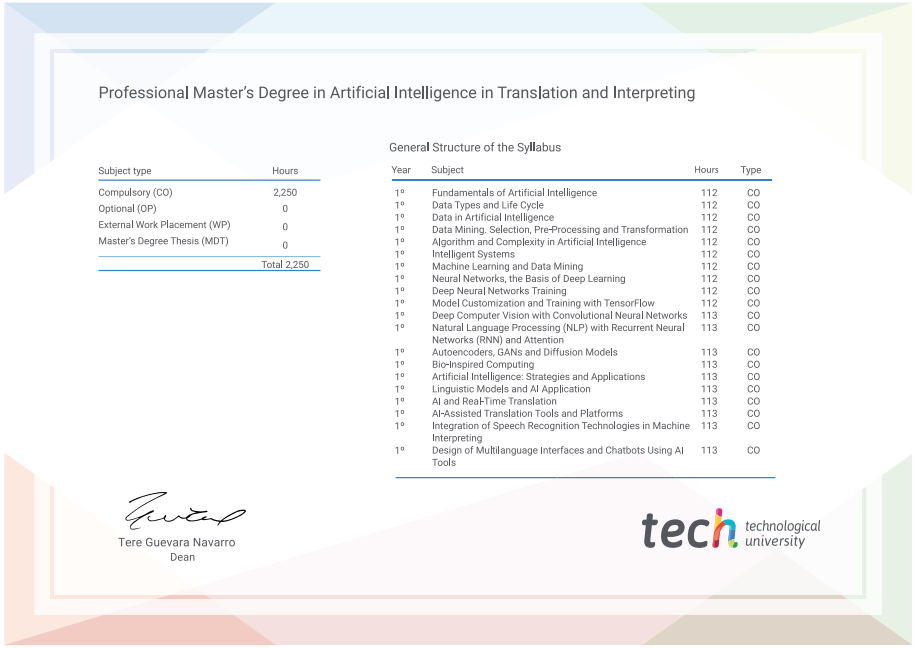
This is a qualification awarded by this University, equivalent to 2,250 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

June 17, 2020

Tere Guevara Navarro
Dean

Unique TECH Code: AFWORD23S techtitute.com/certificates


Professional Master's Degree in Artificial Intelligence in Translation and Interpreting

| Subject type | Hours |
|---|---|
| Compulsory (CO) | 2,250 |
| Optional (OP) | 0 |
| External Work Placement (WP) | 0 |
| Master's Degree Thesis (MDT) | 0 |
| | Total 2,250 |

General Structure of the Syllabus

| Year | Subject | Hours | Type |
|---|---|---|---|
| 1º | Fundamentals of Artificial Intelligence | 112 | CO |
| 1º | Data Types and Life Cycle | 112 | CO |
| 1º | Data in Artificial Intelligence | 112 | CO |
| 1º | Data Mining. Selection, Pre-Processing and Transformation | 112 | CO |
| 1º | Algorithm and Complexity in Artificial Intelligence | 112 | CO |
| 1º | Intelligent Systems | 112 | CO |
| 1º | Machine Learning and Data Mining | 112 | CO |
| 1º | Neural Networks, the Basis of Deep Learning | 112 | CO |
| 1º | Deep Neural Networks Training | 112 | CO |
| 1º | Model Customization and Training with TensorFlow | 112 | CO |
| 1º | Deep Computer Vision with Convolutional Neural Networks | 113 | CO |
| 1º | Natural Language Processing (NLP) with Recurrent Neural Networks (RNN) and Attention | 113 | CO |
| 1º | Autoencoders, GANs and Diffusion Models | 113 | CO |
| 1º | Bio-Inspired Computing | 113 | CO |
| 1º | Artificial Intelligence: Strategies and Applications | 113 | CO |
| 1º | Linguistic Models and AI Application | 113 | CO |
| 1º | AI and Real-Time Translation | 113 | CO |
| 1º | AI-Assisted Translation Tools and Platforms | 113 | CO |
| 1º | Integration of Speech Recognition Technologies in Machine Interpreting | 113 | CO |
| 1º | Design of Multilanguage Interfaces and Chatbots Using AI Tools | 113 | CO |

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

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# Professional Master's Degree

## Artificial Intelligence in Translation and Interpreting

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Technological University**
- Schedule: **at your own pace**
- Exams: **online**

# Professional Master's Degree

## Artificial Intelligence in Translation and Interpreting

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