Professional Master's Degree

Artificial Intelligence in Dentistry

Accreditation/Membership

The Society for the Study of Artificial Intelligence and Simulation of Behaviour

tech global university

tech global university

Professional Master's Degree
Artificial Intelligence in Dentistry

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

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

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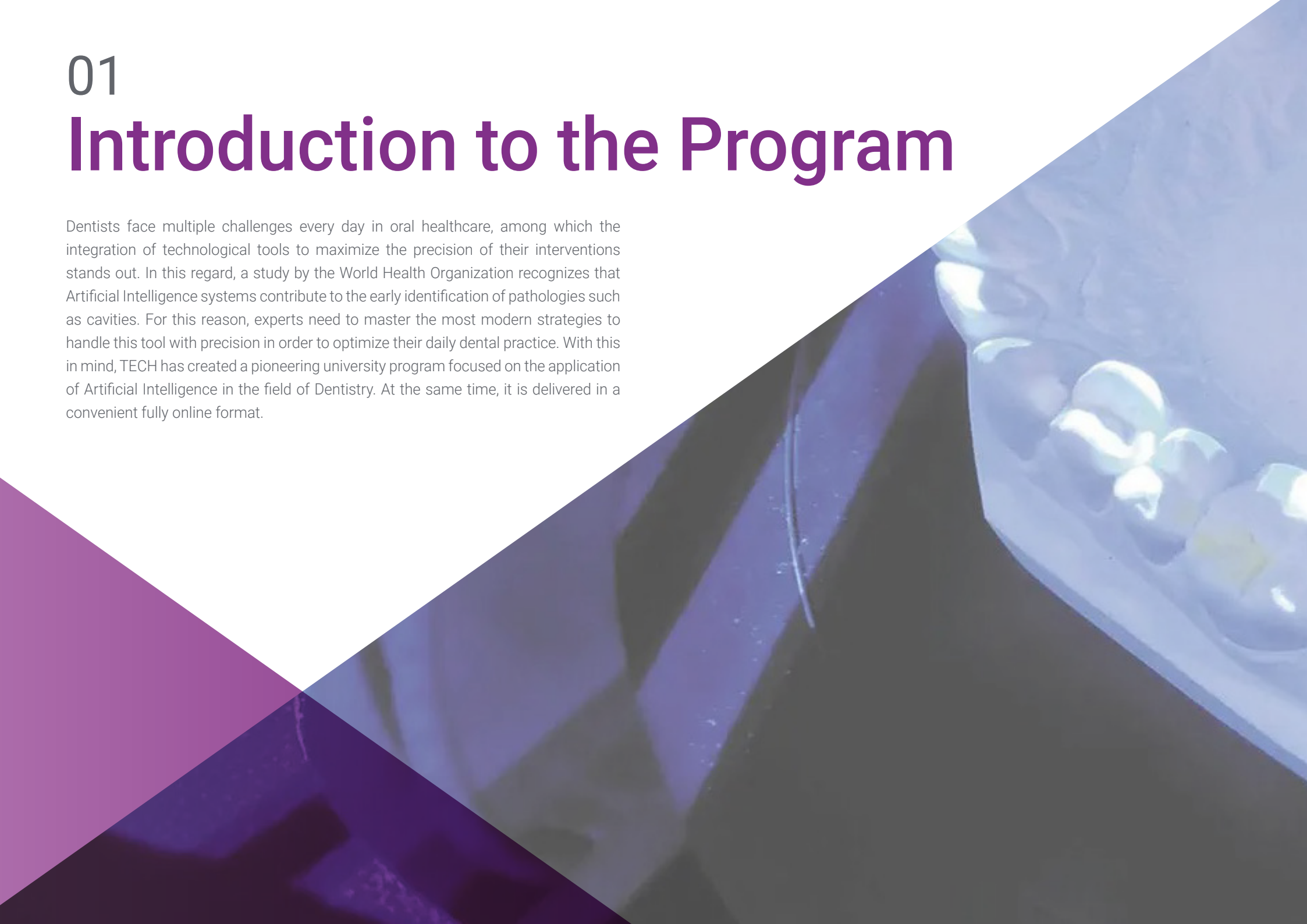
01

Introduction to the Program

Dentists face multiple challenges every day in oral healthcare, among which the integration of technological tools to maximize the precision of their interventions stands out. In this regard, a study by the World Health Organization recognizes that Artificial Intelligence systems contribute to the early identification of pathologies such as cavities. For this reason, experts need to master the most modern strategies to handle this tool with precision in order to optimize their daily dental practice. With this in mind, TECH has created a pioneering university program focused on the application of Artificial Intelligence in the field of Dentistry. At the same time, it is delivered in a convenient fully online format.



A comprehensive and 100% online program, exclusive to TECH, with an international perspective supported by our membership with The Society for the Study of Artificial Intelligence and Simulation of Behaviour"

Artificial Intelligence is revolutionizing the field of Dentistry by providing specialists with cutting-edge tools to enhance both early diagnostics and the individualized treatment of major oral diseases. In this context, dentists must develop advanced competencies to lead the digital transformation of their practice and apply intelligent systems with precision, ensuring more effective, personalized, and patient-centered care.

In response to this need, TECH launches an innovative Professional Master's Degree in Artificial Intelligence Applied to Dentistry. Designed by experts in the field, the academic pathway delves into the fundamental principles of intelligent systems and their implementation in diagnostic and therapeutic processes. Aligned with this perspective, the curriculum addresses advanced applications such as 3D printing, robotics, clinical management, and big data analytics. Furthermore, the learning materials provide professionals with multiple tools to seamlessly integrate these technologies into their daily practice. As a result, graduates will acquire specialized skills to lead the digital transformation of the dental environment.

Moreover, TECH applies its disruptive Relearning methodology, which ensures professionals update their knowledge in a natural and progressive way. As such, graduates will not need to invest long hours in study or rely on traditional memorization techniques. In addition, they will benefit from a variety of multimedia resources, including explanatory videos, interactive summaries, and specialized readings.

Thanks to TECH's membership with the **Society for the Study of Artificial Intelligence and Simulation of Behaviour (AISB)**, students will have access to digital publications such as AISB and Discussions, as well as a weekly newsletter with news and job offers. Additionally, they will enjoy discounted rates for AISB and ECAI conferences, receive travel support, and training to create local groups.

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

- The development of practical case studies presented by experts in dentistry
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- Practical exercises where self-assessment can be used 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 develop the skills to integrate machine learning algorithms into the management of radiological images and clinical records in Dentistry"

You will promote the ethical use of Artificial Intelligence, ensuring patient data privacy and strict compliance with current regulations at all times"

You will master advanced machine learning techniques to analyze large volumes of clinical data, identify patterns, and make highly informed dental decisions.

Enroll in this university program to update your knowledge at your own pace and without time constraints, thanks to the Relearning system provided by TECH.

The faculty includes professionals from the field of Dentistry who bring their practical experience to the program, as well as renowned specialists from leading professional 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 an immersive learning experience designed to prepare for real-life situations.

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

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Why Study at TECH?

TECH is the world's largest online university. With an impressive catalog of more than 14,000 university programs available in 11 languages, it is positioned as a leader in employability, with a 99% job placement rate. In addition, it relies on an enormous faculty of more than 6,000 professors of the highest international renown.

Study at the world's largest online university and guarantee your professional success. The future starts at TECH"

The world's best online university, according to FORBES

The prestigious Forbes magazine, specialized in business and finance, has highlighted TECH as "the best online university in the world" This is what they have recently stated in an article in their digital edition in which they echo the success story of this institution, "thanks to the academic offer it provides, the selection of its teaching staff, and an innovative learning method oriented to form the professionals of the future".

The best top international faculty

TECH's faculty is made up of more than 6,000 professors of the highest international prestige. Professors, researchers and top executives of multinational companies, including Isaiah Covington, performance coach of the Boston Celtics; Magda Romanska, principal investigator at Harvard MetaLAB; Ignacio Wistumba, chairman of the department of translational molecular pathology at MD Anderson Cancer Center; and D.W. Pine, creative director of TIME magazine, among others.

The world's largest online university

TECH is the world's largest online university. We are the largest educational institution, with the best and widest digital educational catalog, one hundred percent online and covering most areas of knowledge. We offer the largest selection of our own degrees and accredited online undergraduate and postgraduate degrees. In total, more than 14,000 university programs, in ten different languages, making us the largest educational institution in the world.

The most complete syllabuses on the university scene

TECH offers the most complete syllabuses on the university scene, with programs that cover fundamental concepts and, at the same time, the main scientific advances in their specific scientific areas. In addition, these programs are continuously updated to guarantee students the academic vanguard and the most demanded professional skills. and the most in-demand professional competencies. In this way, the university's qualifications provide its graduates with a significant advantage to propel their careers to success.

A unique learning method

TECH is the first university to use Relearning in all its programs. This is the best online learning methodology, accredited with international teaching quality certifications, provided by prestigious educational agencies. In addition, this innovative academic model is complemented by the "Case Method", thereby configuring a unique online teaching strategy. Innovative teaching resources are also implemented, including detailed videos, infographics and interactive summaries.

The official online university of the NBA

TECH is the official online university of the NBA. Thanks to our agreement with the biggest league in basketball, we offer our students exclusive university programs, as well as a wide variety of educational resources focused on the business of the league and other areas of the sports industry. Each program is made up of a uniquely designed syllabus and features exceptional guest hosts: professionals with a distinguished sports background who will offer their expertise on the most relevant topics.

Leaders in employability

TECH has become the leading university in employability. Ninety-nine percent of its students obtain jobs in the academic field they have studied within one year of completing any of the university's programs. A similar number achieve immediate career enhancement. All this thanks to a study methodology that bases its effectiveness on the acquisition of practical skills, which are absolutely necessary for professional development.

Google Premier Partner

The American technology giant has awarded TECH the Google Premier Partner badge. This award, which is only available to 3% of the world's companies, highlights the efficient, flexible and tailored experience that this university provides to students. The recognition not only accredits the maximum rigor, performance and investment in TECH's digital infrastructures, but also places this university as one of the world's leading technology companies.

The top-rated university by its students

Students have positioned TECH as the world's top-rated university on the main review websites, with a highest rating of 4.9 out of 5, obtained from more than 1,000 reviews. These results consolidate TECH as the benchmark university institution at an international level, reflecting the excellence and positive impact of its educational model.

03

Syllabus

This Professional Master's Degree will provide dentists with a comprehensive understanding of the application of Artificial Intelligence in their professional practice. The syllabus delves into the key foundations of deep neural networks, offering advanced techniques for their optimal training. In addition, graduates will be trained to design mobile applications aimed at the personalized monitoring of dental hygiene. The program also explores the use of intelligent systems for the early detection of complex Periodontal Diseases. In this way, professionals will acquire advanced skills to master machine learning–based solutions that optimize clinical decision-making.

You will lead digital transformation processes in dental clinics through the incorporation of intelligent technologies that significantly enhance patient care"

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, Inferential Statistics
- 2.1.2. Population, Sample, Individual
- 2.1.3. Variables: Definition, Measurement Scales

2.2. Types of Statistical Data
- 2.2.1. By 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. By Form
  - 2.2.2.1. Numerical
  - 2.2.2.2. Text
  - 2.2.2.3. Logical
- 2.2.3. By Source
  - 2.2.3.1. Primary
  - 2.2.3.2. Secondary

2.3. Data Lifecycle
- 2.3.1. Lifecycle Stages
- 2.3.2. Lifecycle Milestones
- 2.3.3. FAIR Principles

2.4. Initial Stages of the Cycle
- 2.4.1. Goal Definition
- 2.4.2. Determination of Required Resources
- 2.4.3. Gantt Chart
- 2.4.4. Data Structure

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

2.6. Data Cleaning
- 2.6.1. Data Cleaning Phases
- 2.6.2. Data Quality
- 2.6.3. Data Manipulation (using R)

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

2.8. Data Warehouse
- 2.8.1. Components of a Data Warehouse
- 2.8.2. Design
- 2.8.3. Aspects to Consider

2.9. Data Availability
- 2.9.1. Access
- 2.9.2. Usefulness
- 2.9.3. Security

2.10. Regulatory Aspects
- 2.10.1. Data Protection Law
- 2.10.2. Best 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. Types of Data
- 3.2.2. 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. Methods
- 3.8.2. Classification with Unsupervised Models

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

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

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

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

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

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

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

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

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

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

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

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

4.10. Data Pre-Processing in Big Data Environments

Module 5. Algorithm and Complexity in Artificial Intelligence

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

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

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

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

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

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

5.7. Greedy Algorithms
- 5.7.1. Greedy Strategy
- 5.7.2. Greedy Strategy Elements
- 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. Minimum Spanning 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 Algorithm
- 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. Languages for Ontologies and Software for Ontology Creation
- 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 Matrices
- 7.4.2. Numerical Evaluation Matrices
- 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. Operations
- 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

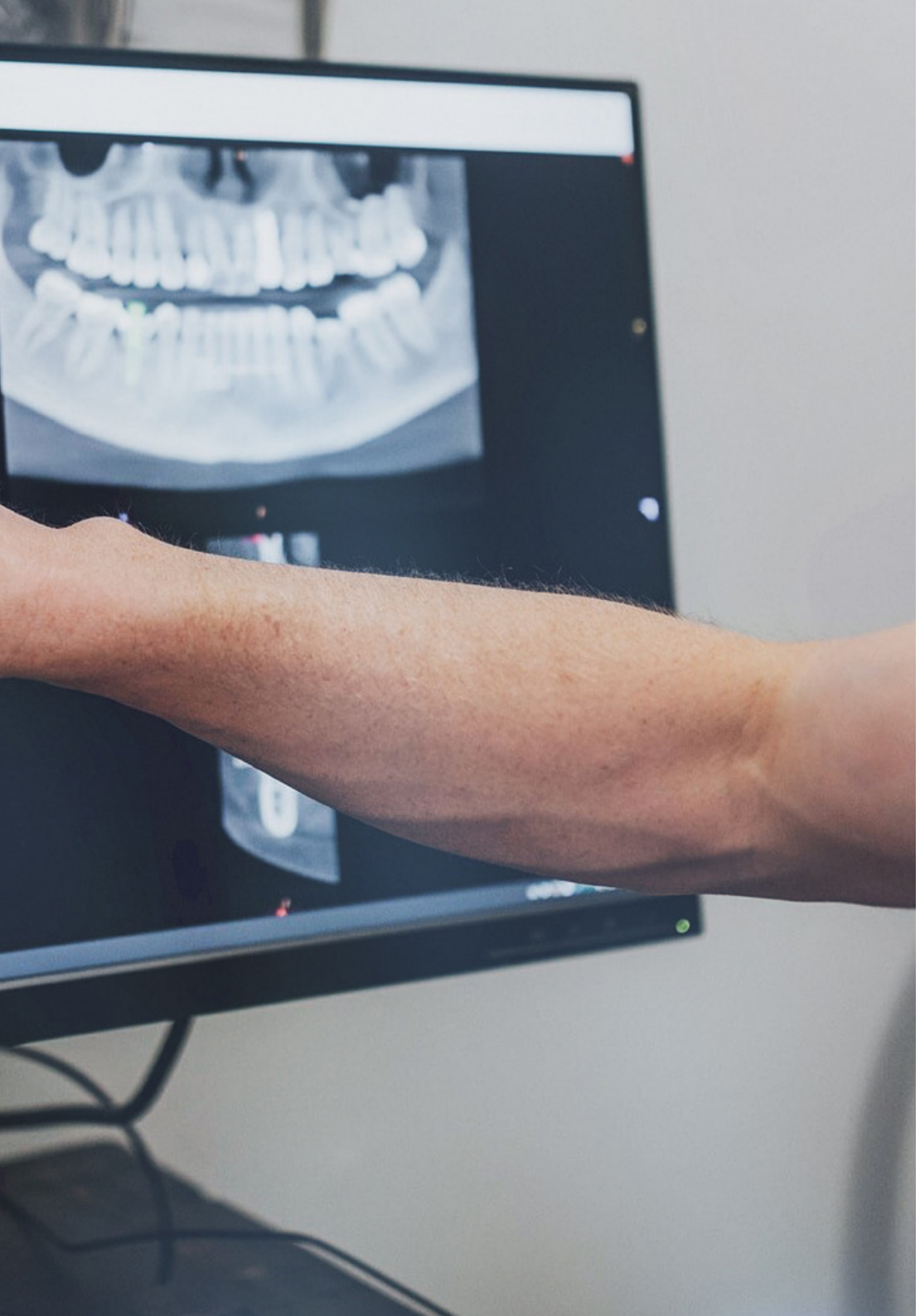
9.2. Reuse of Pre-Trained Layers
- 9.2.1. Transfer Learning Training
- 9.2.2. Feature Extraction
- 9.2.3. Deep Learning

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. Using the TensorFlow Library
- 10.1.2. Model Education with TensorFlow
- 10.1.3. Operations with Graphs in TensorFlow

10.2. TensorFlow and NumPy
- 10.2.1. NumPy Computational 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 Functions and Graphs
- 10.4.1. Functions with TensorFlow
- 10.4.2. Use of Graphs for Model Training
- 10.4.3. Optimization of Graphs with TensorFlow Operations

10.5. Data Loading and Pre-Processing with TensorFlow
- 10.5.1. Loading Datasets with TensorFlow
- 10.5.2. Data Pre-Processing with TensorFlow
- 10.5.3. Using TensorFlow Tools for Data Manipulation

10.6. The tf.data 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. Loading TFRecord Files with TensorFlow
- 10.7.3. Using TFRecord Files for Training Models

10.8. Keras Pre-Processing Layers
- 10.8.1. Using the Keras Pre-Processing 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 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 Application
- 10.10.2. Building a Deep Learning App with TensorFlow
- 10.10.3. Training a Model with TensorFlow
- 10.10.4. Using 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 Pre-Processing
- 12.7.3. Training a Transformers Model for Vision

12.8. Hugging Face Transformer Library
- 12.8.1. Using the Hugging Face Transformers Library
- 12.8.2. Application of the Hugging Face Transformers Library
- 12.8.3. Advantages of the Hugging Face Transformers Library

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

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

Module 13. Autoencoders, GANs and Diffusion Models

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

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

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

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

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

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

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

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

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

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

Module 14. Bio-Inspired Computing

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

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

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

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

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

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

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

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

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

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

Module 15. Artificial Intelligence: Strategies and Applications

15.1. Financial Services
- 15.1.1. The Implications of Artificial Intelligence (AI) in Financial Services. Opportunities and Challenges
- 15.1.2. Use Cases
- 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. Use Cases

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. Use Cases
- 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. Use Cases

15.6. Potential Risks Related to the Use of AI in Industry
- 15.6.1. Use Cases
- 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. Use Cases
- 15.7.3. Potential Risks Related to the Use of AI
- 15.7.4. Potential Future Developments/Uses of AI

15.8. Education
- 15.8.1. AI Implications for Education. Opportunities and Challenges
- 15.8.2. Use Cases
- 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. Use Cases
- 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 in Human Resources. Opportunities and Challenges
- 15.10.2. Use Cases
- 15.10.3. Potential Risks Related to the Use of AI
- 15.10.4. Potential Future Developments/Uses of AI

Module 16. Monitoring and Control of Dental Health using Artificial Intelligence

16.1. AI Applications for Patient's Dental Health Monitoring with Dentem
- 16.1.1. Design of Mobile Applications for Dental Hygiene Monitoring
- 16.1.2. AI Systems for the Early Detection of Caries and Periodontal Diseases
- 16.1.3. Use of AI in the Personalization of Dental Treatments
- 16.1.4. Image Recognition Technologies for Automated Dental Diagnostics

16.2. Integration of Clinical and Biomedical Information as a Basis for Dental Health Monitoring
- 16.2.1. Platforms for Integration of Clinical and Radiographic Data
- 16.2.2. Analysis of Medical Records to Identify Dental Risks
- 16.2.3. Systems for Correlating Biomedical Data with Dental Conditions
- 16.2.4. Tools for the Unified Management of Patient Information

16.3. Definition of Indicators for the Control of the Patient's Dental Health
- 16.3.1. Establishment of Parameters for the Evaluation of Oral Health
- 16.3.2. Systems for Monitoring Progress in Dental Treatments
- 16.3.3. Development of Risk Indexes for Dental Disease
- 16.3.4. AI Methods for Prediction of Future Dental Problems with Pearl

16.4. Natural Language Processing of Dental Health Records for Indicator Extraction
- 16.4.1. Automatic Extraction of Relevant Data from Dental Records
- 16.4.2. Analysis of Clinical Notes to Identify Dental Health Trends
- 16.4.3. Use of NLP to Summarize Long Medical Records
- 16.4.4. Early Warning Systems Based on Clinical Text Analysis

16.5. AI Tools for the Monitoring and Control of Dental Health Indicators
- 16.5.1. Development of Applications for Monitoring Oral Hygiene and Oral Health
- 16.5.2. AI-based Personalized Patient Alerting Systems with CarePredict
- 16.5.3. Analytical Tools for Continuous Assessment of Dental Health
- 16.5.4. Use of Wearables and Sensors for Real-Time Dental Monitoring

16.6. Development of Dashboards for the Monitoring of Dental Indicators
- 16.6.1. Creation of Intuitive Interfaces for Dental Health Monitoring
- 16.6.2. Integration of Data from Different Clinical Sources into a Single Dashboard
- 16.6.3. Data Visualization Tools for Treatment Monitoring
- 16.6.4. Customization of Dashboards According to the Needs of the Dental Professional

16.7. Interpretation of Dental Health Indicators and Decision Making
- 16.7.1. Data-driven Clinical Decision Support Systems
- 16.7.2. Predictive Analytics for Dental Treatment Planning
- 16.7.3. AI for the Interpretation of Complex Oral Health Indicators with Overjet
- 16.7.4. Tools for the Evaluation of Treatment Effectiveness

16.8. Generation of Dental Health Reports using AI Tools
- 16.8.1. Automation of the Creation of Detailed Dental Reports
- 16.8.2. Customized Report Generation Systems for Patients
- 16.8.3. AI Tools for Summarizing Clinical Findings
- 16.8.4. Integration of Clinical and Radiological Data into Automated Reports

16.9. AI-enabled Platforms for Patient Monitoring of Dental Health
- 16.9.1. Applications for Oral Health Self-monitoring
- 16.9.2. AI-based Interactive Dental Education Platforms
- 16.9.3. Tools for Symptom Tracking and Personalized Dental Advice
- 16.9.4. Gamification Systems to Encourage Good Dental Hygiene Habits

16.10. Security and Privacy in the Treatment of Dental Information
- 16.10.1. Security Protocols for the Protection of Patient Data
- 16.10.2. Encryption and Anonymization Systems in the Management of Clinical Data
- 16.10.3. Regulations and Legal Compliance in the Management of Dental Information
- 16.10.4. Privacy Education and Awareness for Professionals and Patients

Module 17. AI-Assisted Dental Diagnostics and Treatment Planning

17.1. AI in Oral Disease Diagnosis with Pearl
- 17.1.1. Use of Machine Learning Algorithms to Identify Oral Diseases 17.1.2. Integration of AI in Diagnostic Equipment for Real-Time Analysis
- 17.1.3. AI-assisted Diagnostic Systems to Improve Accuracy
- 17.1.4. Analysis of Symptoms and Clinical Signals through AI for Rapid Diagnostics

17.2. AI Dental Image Analysis with Aidoc and overjet.ai
- 17.2.1. Development of Software for the Automatic Interpretation of Dental Radiographs
- 17.2.2. AI in the Detection of Abnormalities in Oral MRI Images
- 17.2.3. Improvement in the Quality of Dental Imaging through AI Technologies
- 17.2.4. Deep Learning Algorithms for Classifying Dental Conditions in Imaging

17.3. AI in Caries and Dental Pathology Detection
- 17.3.1. Pattern Recognition Systems for Identifying Early Cavities
- 17.3.2. AI for Dental Pathology Risk Assessment with Overjet.ai
- 17.3.3. Computer Vision Technologies in the Detection of Periodontal Diseases
- 17.3.4. AI Tools for Caries Monitoring and Progression

17.4. 3D Modeling and AI Treatment Planning with Materialise Mimics
- 17.4.1. Using AI to Create Accurate 3D Models of the Oral Cavity
- 17.4.2. AI Systems in the Planning of Complex Dental Surgeries
- 17.4.3. Simulation Tools for Predicting Treatment Outcomes
- 17.4.4. AI in the Customization of Prosthetics and Dental Appliances

17.5. Optimization of Orthodontic Treatments using AI
- 17.5.1. AI in Orthodontic Treatment Planning and Follow-Up with Dental Monitoring
- 17.5.2. Algorithms for the Prediction of Tooth Movements and Orthodontic Adjustments
- 17.5.3. AI Analysis to Reduce Orthodontic Treatment Time
- 17.5.4. Real-time Remote Monitoring and Treatment Adjustment Systems

17.6. Risk Prediction in Dental Treatments
- 17.6.1. AI Tools for Risk Assessment in Dental Procedures
- 17.6.2. Decision Support Systems for Identifying Potential Complications
- 17.6.3. Predictive Models for Anticipating Treatment Reactions
- 17.6.4. AI-enabled Medical Record Analysis to Personalize Treatments using ChatGPT and Amazon Comprehend Medical

17.7. Personalizing Treatment Plans with AI with IBM Watson Health
- 17.7.1. AI in the Adaptation of Dental Treatments to Individual Needs
- 17.7.2. AI-based Treatment Recommender Systems
- 17.7.3. Analysis of Oral Health Data for Personalized Treatment Planning
- 17.7.4. AI Tools for Adjusting Treatments Based on Patient Response

17.8. Oral Health Monitoring with Intelligent Technologies
- 17.8.1. Smart Devices for Oral Hygiene Monitoring
- 17.8.2. AI-enabled Mobile Apps for Dental Health Monitoring with Dental Care App
- 17.8.3. Wearables with Sensors to Detect Changes in Oral Health
- 17.8.4. AI-based Early Warning Systems to Prevent Oral Diseases

17.9. AI in Oral Disease Prevention
- 17.9.1. AI Algorithms to Identify Oral Disease Risk Factors with AutoML
- 17.9.2. Oral Health Education and Awareness Systems with AI
- 17.9.3. Predictive Tools for the Early Prevention of Dental Problems
- 17.9.4. AI in the Promotion of Healthy Habits for Oral Prevention

17.10. Case Studies: Diagnostic and Planning Successes with AI
- 17.10.1. Analysis of Real Cases where AI Improved Dental Diagnosis
- 17.10.2. Successful Case Studies on the Implementation of AI for Treatment Planning
- 17.10.3. Treatment Comparisons with and without the Use of AI
- 17.10.4. Documentation of Improvements in Clinical Efficiency and Effectiveness with AI

Module 18. Innovations and Practical Applications of Artificial Intelligence in Dentistry

18.1. 3D Printing and Digital Fabrication in Dentistry
- 18.1.1. Use of 3D Printing for the Creation of Customized Dental Prostheses.
- 18.1.2. Fabrication of Orthodontic Splints and Aligners using 3D Technology
- 18.1.3. Development of Dental Implants using 3D Printing
- 18.1.4. Application of Digital Fabrication Techniques in Dental Restoration

18.2. Robotics in Dental Procedures
- 18.2.1. Implementation of Robotic Arms for Precision Dental Surgeries
- 18.2.2. Use of Robots in Endodontic and Periodontic Procedures
- 18.2.3. Development of Robotic Systems for Dental Operations Assistance
- 18.2.4. Integration of Robotics in the Practical Teaching of Dentistry

18.3. Development of AI-assisted Dental Materials
- 18.3.1. Use of AI to Innovate in Dental Restorative Materials
- 18.3.2. Predictive Analytics for Durability and Efficiency of New Dental Materials
- 18.3.3. AI in the Optimization of Properties of Materials such as Resins and Ceramics
- 18.3.4. AI Systems to Customize Materials according to Patient's Needs

18.4. AI-enabled Dental Practice Management
- 18.4.1. AI Systems for Efficient Appointment and Scheduling Management
- 18.4.2. Data Analysis to Improve Quality of Dental Services
- 18.4.3. AI Tools for Inventory Management in Dental Clinics with ZenSupplies
- 18.4.4. Use of AI in the Evaluation and Continuous Improvement of Dental Practice

18.5. Teleodontology and Virtual Consultations
- 18.5.1. Tele-dentistry Platforms for Remote Consultations
- 18.5.2. Use of Videoconferencing Technologies for Remote Diagnosis
- 18.5.3. AI Systems for Online Preliminary Assessment of Dental Conditions
- 18.5.4. Tools for Secure Communication between Patients and Dentists

18.6. Automation of Administrative Tasks in Dental Clinics
- 18.6.1. Implementation of AI Systems for Billing and Accounting Automation
- 18.6.2. Use of AI Software in Patient Record Management
- 18.6.3. AI Tools for Optimization of Administrative Workflows
- 18.6.4. Automatic Scheduling and Reminder Systems for Dental Appointments

18.7. Sentiment Analysis of Patient Opinions
- 18.7.1. Using AI to Assess Patient Satisfaction through Online Feedback with Qualtrics
- 18.7.2. Natural Language Processing Tools for Analyzing Patient Feedback
- 18.7.3. AI Systems to Identify Areas for Improvement in Dental Services
- 18.7.4. Analysis of Patient Trends and Perceptions using AI

18.8. AI in Marketing and Patient Relationship Management
- 18.8.1. Implementation of AI Systems to Personalize Dental Marketing Strategies
- 18.8.2. AI Tools for Customer Behavior Analysis with Qualtrics
- 18.8.3. Use of AI in the Management of Marketing Campaigns and Promotions
- 18.8.4. AI-based Patient Recommendation and Loyalty Systems

18.9. Safety and Maintenance of AI Dental Equipment
- 18.9.1. AI Systems for Monitoring and Predictive Maintenance of Dental Equipment.
- 18.9.2. Use of AI in Ensuring Compliance with Safety Regulations
- 18.9.3. Automated Diagnostic Tools for Equipment Failure Detection
- 18.9.4. Implementation of AI-assisted Safety Protocols in Dental Practices

18.10. Integration of AI in Dental Education and Training with Dental Care App
- 18.10.1. Use of AI in Simulators for Hands-on Training in Dentistry
- 18.10.2. AI Tools for the Personalization of Learning in Dentistry
- 18.10.3. Systems for Evaluation and Monitoring of Educational Progress using AI
- 18.10.4. Integration of AI Technologies in the Development of Curricula and Didactic Materials

Module 19. Advanced Analytics and Data Processing in Dentistry

19.1. Big Data in Dentistry: Concepts and Applications
- 19.1.1. The Explosion of Data in Dentistry
- 19.1.2. Concept of Big Data
- 19.1.3. Applications of Big Data in Dentistry

19.2. Data Mining in Dental Records with KNIME and Python
- 19.2.1. Main Methodologies for Data Mining
- 19.2.2. Integration of Data from Dental Records
- 19.2.3. Detection of Patterns and Anomalies in Dental Records

19.3. Advanced Predictive Analytics in Oral Health with KNIME and Python
- 19.3.1. Classification Techniques for Oral Health Analysis
- 19.3.2. Regression Techniques for Oral Health Analytics
- 19.3.3. Deep Learning for Oral Health Analysis

19.4. AI Models for Dental Epidemiology with KNIME and Python
- 19.4.1. Classification Techniques for Dental Epidemiology
- 19.4.2. Regression Techniques for Dental Epidemiology
- 19.4.3. Unsupervised Techniques for Dental Epidemiology

19.5. AI in Clinical and Radiographic Data Management with KNIME and Python
- 19.5.1. Integration of Clinical Data for Effective Management with AI Tools
- 19.5.2. Transformation of Radiographic Diagnosis using Advanced AI Systems
- 19.5.3. Integrated Management of Clinical and Radiographic Data

19.6. Machine Learning Algorithms in Dental Research with KNIME and Python
- 19.6.1. Classification Techniques in Dental Research
- 19.6.2. Regression Techniques in Dental Research
- 19.6.3. Unsupervised Techniques in Dental Research

19.7. Social Media Analysis in Oral Health Communities with KNIME and Python
- 19.7.1. Introduction to Social Media Analysis
- 19.7.2. Analysis of Opinions and Sentiment in Social Networks in Oral Health Communities
- 19.7.3. Analysis of Social Media Trends in Oral Health Communities

19.8. AI in Monitoring Oral Health Trends and Patterns with KNIME and Python
- 19.8.1. Early Detection of Epidemiologic Trends with AI
- 19.8.2. Continuous Monitoring of Oral Hygiene Patterns with AI Systems
- 19.8.3. Prediction of Changes in Oral Health with AI Models

19.9. AI Tools for Cost Analysis in Dentistry with KNIME and Python
- 19.9.1. Optimization of Resources and Costs with AI Tools
- 19.9.2. Efficiency and Cost-Effectiveness Analysis in Dental Practices with AI
- 19.9.3. Cost Reduction Strategies Based on AI-Analyzed Data

19.10. Innovations in AI for Dental Clinical Research
- 19.10.1. Implementation of Emerging Technologies in Dental Clinical Research
- 19.10.2. Improving the Validation of Dental Clinical Research Results with AI
- 19.10.3. Multidisciplinary Collaboration in AI-powered Detailed Clinical Research

Module 20. Ethics, Regulation and the Future of Artificial Intelligence in Dentistry

20.1. Ethical Challenges in the Use of AI in Dentistry
- 20.1.1. Ethics in AI-assisted Clinical Decision Making
- 20.1.2. Patient Privacy in Intelligent Dentistry Environments
- 20.1.3. Professional Accountability and Transparency in AI Systems

20.2. Ethical Considerations in the Collection and Use of Dental Data
- 20.2.1. Informed Consent and Ethical Data Management in Dentistry
- 20.2.2. Security and Confidentiality in the Handling of Sensitive Data
- 20.2.3. Ethics in Research with Large Datasets in Dentistry

20.3. Fairness and Bias in AI Algorithms in Dentistry
- 20.3.1. Addressing Bias in Algorithms to Ensure Fairness
- 20.3.2. Ethics in the Implementation of Predictive Algorithms in Oral Health
- 20.3.3. Ongoing Monitoring to Mitigate Bias and Promote Equity

20.4. Regulations and Standards in Dental AI
- 20.4.1. Regulatory Compliance in the Development and Use of AI Technologies
- 20.4.2. Adaptation to Legal Changes in the Deployment of IA Systems
- 20.4.3. Collaboration with Regulatory Authorities to Ensure Compliance

20.5. AI and Professional Responsibility in Dentistry
- 20.5.1. Development of Ethical Standards for Professionals using AI
- 20.5.2. Professional Responsibility in the Interpretation of AI Results
- 20.5.3. Continuing Education in Ethics for Oral Health Professionals

20.6. Social Impact of AI in Dental Care
- 20.6.1. Social Impact Assessment for Responsible Introduction of AI
- 20.6.2. Effective Communication about AI Technologies with Patients
- 20.6.3. Community Participation in the Development of Dental Technologies

20.7. AI and Access to Dental Care
- 20.7.1. Improving Access to Dental Services through AI Technologies
- 20.7.2. Addressing Accessibility Challenges with AI Solutions
- 20.7.3. Equity in the Distribution of AI-assisted Dental Services

20.8. AI and Sustainability in Dental Practices
- 20.8.1. Energy Efficiency and Waste Reduction with AI Implementation
- 20.8.2. Sustainable Practice Strategies Enhanced by AI Technologies
- 20.8.3. Environmental Impact Assessment in the Integration of AI Systems

20.9. AI Policy Development for the Dental Sector
- 20.9.1. Collaboration with Institutions for the Development of Ethical Policies
- 20.9.2. Creation of Best Practice Guidelines on the Use of AI
- 20.9.3. Active Participation in the Formulation of AI-related Government Policies

20.10. Ethical Risk and Benefit Assessment of AI in Dentistry
- 20.10.1. Ethical Risk Analysis in the Implementation of AI Technologies
- 20.10.2. Ongoing Assessment of Ethical Impact on Dental Care
- 20.10.3. Long-term Benefits and Risk Mitigation in the Deployment of AI Systems

You will lead multidisciplinary research projects involving the use of Artificial Intelligence in the field of Dentistry, contributing to the scientific validation of its clinical applications"

04

Teaching Objectives

This Professional Master's Degree from TECH is designed to provide dentists with the most cutting-edge techniques in the application of Artificial Intelligence to the clinical setting. In this regard, graduates will develop advanced competencies to personalize dental treatments, employ image recognition technologies, and automate diagnoses with high accuracy. In addition, they will be trained to implement next-generation algorithms for the automation of clinical processes such as the segmentation of oral structures in radiographs, the detection of caries, and assisted orthodontic planning.

You will implement technological solutions that improve efficiency in the management of clinical records, scheduling, and postoperative follow-up in the dental field"

General Objectives

- Understand the theoretical, ethical, and practical foundations of Artificial Intelligence with an emphasis on its applicability in Dentistry
- Analyze the main machine learning tools used in the diagnosis, planning, and follow-up of dental treatments
- Develop advanced competencies to handle image recognition technologies, deep neural networks, and machine learning algorithms
- Design customized digital solutions to improve patient care, such as clinical monitoring platforms
- Automate routine clinical processes ranging from radiographic segmentation or detection of early lesions to the interpretation of 3D images
- Evaluate the impact of intelligent systems on the quality of care, reduction of diagnostic errors, and more precise therapeutic decision-making
- Master the legal and ethical aspects of the use of Artificial Intelligence in Dentistry, ensuring the confidentiality of clinical data and compliance with current regulations
- Promote clinical innovation through the use of advanced digital tools, with a patient-centered and evidence-based approach

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
- Delve into the applications of genetic algorithms, analyzing their usefulness in solving complex problems
- Explore the concept of the semantic web and its influence on the organization and understanding of information in digital environments

Module 2. Data Types and Life Cycle

- Understand the fundamental concepts of statistics and their application in data analysis
- Identify the different types of statistical data, from quantitative to qualitative
- Analyze the life cycle of data, from generation to disposal, identifying key stages
- Examine the initial stages of the data life cycle, emphasizing the importance of planning and data structure
- Explore the concept of data warehouse, with emphasis on its components and design

Module 3. Data in Artificial Intelligence

- Master the essential foundations of Data Science, taking into account the various sources for information analysis
- Explore the process of transforming data into information using data mining and visualization techniques
- Address the characteristics of datasets, understanding their importance in the preparation and use of data for Artificial Intelligence models

Module 4. Data Mining. Selection, Preprocessing and Transformation

- Master cutting-edge statistical inference techniques to apply data mining methods
- Conduct detailed exploratory analysis of datasets to identify patterns, anomalies, and relevant trends
- Develop skills for data preparation, including cleaning, integration, and processing

Module 5. Algorithm and Complexity in Artificial Intelligence

- Implement algorithm design strategies, providing a solid understanding of the fundamental approaches to problem-solving
- Analyze the efficiency and complexity of algorithms, applying analysis techniques to evaluate performance in terms of time and space
- Master the backtracking technique for the systematic resolution of problems, analyzing its effectiveness in diverse scenarios

Module 6. Intelligent Systems

- Delve into agent theory, understanding the fundamental concepts of their functioning and their application in Artificial Intelligence and software engineering
- Explore knowledge representation, 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

Module 7. Machine Learning and Data Mining

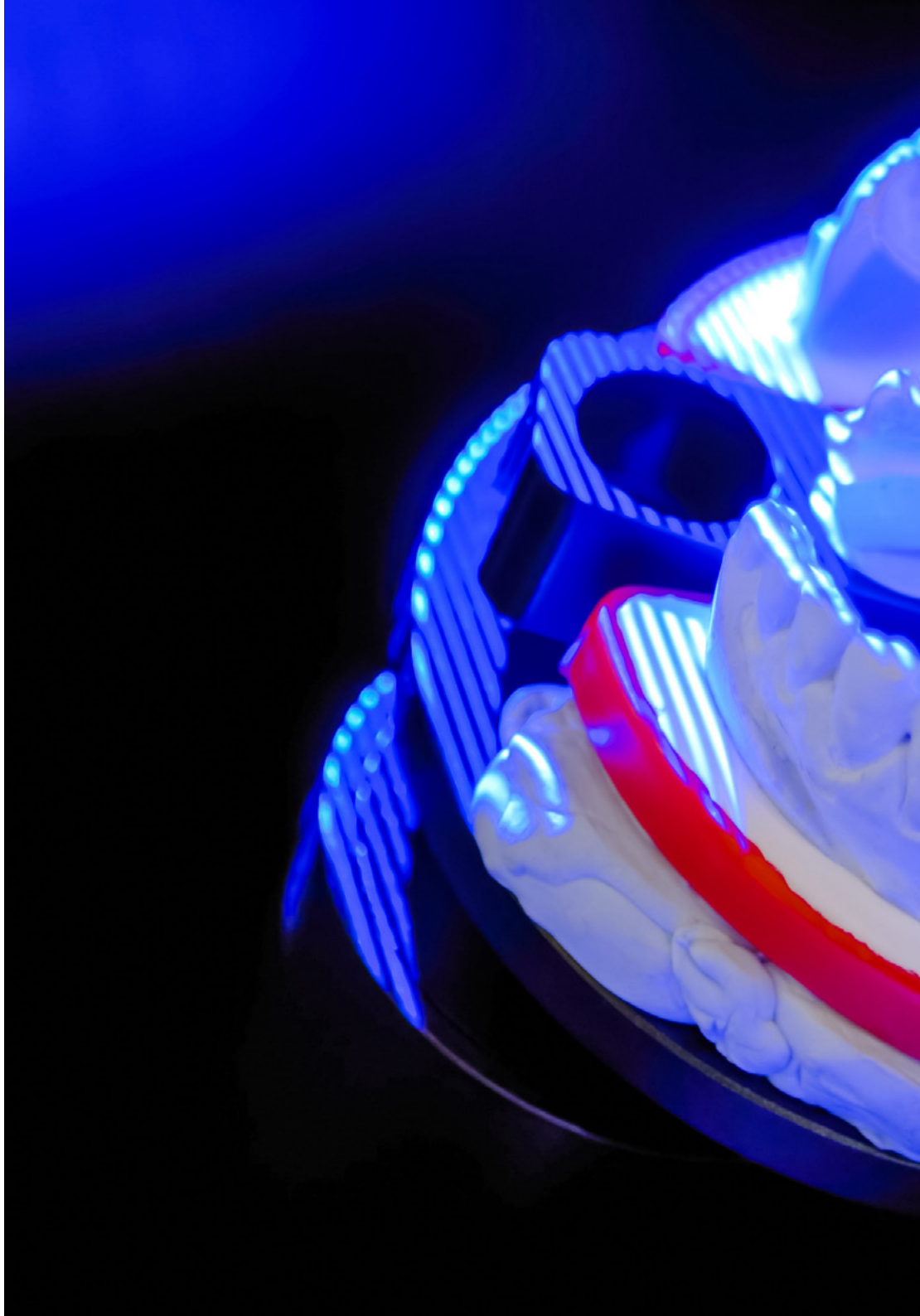
- Analyze the processes of knowledge discovery and the fundamental concepts of machine learning
- Examine decision trees as supervised learning models, understanding their structure and applications
- Evaluate classifiers using specific techniques to measure their performance and accuracy in data classification
- Investigate the use of neural networks, understanding their functioning and architecture for solving complex machine learning problems

Module 8. Neural Networks, the Basis of Deep Learning

- Master the fundamentals of deep learning, understanding its essential role in advanced machine learning
- Examine the fundamental operations in neural networks and their application in model construction
- Analyze the different layers used in neural networks and select them appropriately
- Adjust hyperparameters for fine-tuning neural networks, optimizing their performance in specific tasks

Module 9. Deep Neural Networks Training

- Solve gradient-related problems in the training of deep neural networks
- Apply different optimizers to improve model efficiency and convergence
- Adapt practical guidelines to ensure efficient and effective training of deep neural networks
- Implement transfer learning as an advanced method to improve model performance in specific tasks



Module 10. Model Customization and Training with TensorFlow

- Manage TensorFlow and its integration with NumPy for efficient data handling
- Customize 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

Module 11. Deep Computer Vision with Convolutional Neural Networks

- Explore the architecture of the visual cortex and its relevance in deep computer vision
- Establish convolutional layers to extract key features from images
- Implement pooling layers and their use in deep computer vision models with Keras
- Develop and implement a CNN ResNet using the Keras library to improve model efficiency and performance
- Implement semantic segmentation techniques to understand and classify objects in images in detail

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

- Develop skills in text generation using recurrent neural networks
- Understand and apply attention mechanisms in natural language processing models
- Explore the application of transformer models in the context of image processing and computer vision
- Compare different transformer libraries to evaluate their suitability for specific tasks

Module 13. Autoencoders, GANs and Diffusion Models

- Develop efficient representations of data using Autoencoders, GANs and Diffusion Models
- Delve into the functioning of stacked autoencoders
- Apply convolutional autoencoders for efficient representations of visual data
- Analyze the effectiveness of sparse autoencoders in data representation

Module 14. Bio-Inspired Computing

- Master the essential concepts of bio-inspired computing
- Explore social adaptation algorithms as a key approach in bio-inspired computing
- Analyze space exploration-exploitation strategies in genetic algorithms
- Delve into the implementation and usefulness of neural networks in bio-inspired computing

Module 15. Artificial Intelligence: Strategies and Applications

- Analyze the implications of artificial intelligence in the delivery of healthcare services
- Identify and assess the risks associated with the use of AI in the healthcare field

Module 16. Monitoring and Control of Dental Health using Artificial Intelligence

- Apply Artificial Intelligence technologies to optimize diagnosis, treatment, and monitoring of patients' dental health
- Integrate clinical, biomedical, and behavioral data into intelligent systems for personalized management of oral health
- Develop indicators, monitoring tools, and visualization techniques that facilitate clinical decision-making in Dentistry
- Ensure security, privacy, and regulatory compliance in the use of dental information supported by machine learning

Module 17. AI-Assisted Dental Diagnostics and Treatment Planning

- Analyze different algorithmic models applied to the interpretation of dental images such as radiographs, computed tomography scans, and intraoral scans
- Evaluate the accuracy of intelligent systems for the automatic detection of dental caries, periodontal disease, and other oral pathologies
- Develop skills to interpret the results generated by intelligent software, differentiating between automated recommendations and professional clinical judgment

Module 18. Innovations and Practical Applications of Artificial Intelligence in Dentistry

- Identify the main AI-based technological innovations that are transforming dental practice globally
- Evaluate clinical tools based on intelligent systems for therapeutic outcome prediction, automated occlusal analysis, and digital prosthesis design
- Integrate tele-dentistry platforms with intelligent systems for remote assistance and digital patient monitoring
- Promote a critical and up-to-date vision of the role of Artificial Intelligence in the evolution of Dentistry, assessing its emerging applications on a scientific basis

Module 19. Advanced Analytics and Data Processing in Dentistry

- Delve into the most advanced data processing techniques applied to the management of clinical information, diagnostic imaging, and patients' digital records
- Use statistical and data mining tools to detect relevant patterns in the progression of oral pathologies
- Apply specialized software for the segmentation, classification, and analysis of large volumes of data generated in dental practices
- Evaluate the quality, integrity, and security of data in computerized clinical systems, ensuring compliance with health data protection regulations

Module 20. Ethics, Regulation and the Future of Artificial Intelligence in Dentistry

- Understand and address the ethical challenges related to the use of Artificial Intelligence in Dentistry, promoting responsible professional practices
- Examine relevant regulations and policies regarding the application of intelligent systems in Dentistry, developing skills in policy formulation to ensure safe and ethical practices
- Understand the ethical challenges related to the use of machine learning in Dentistry, promoting responsible professional practices

You will extract valuable lessons through real dental cases in simulated learning environments"

05

Career Opportunities

This university program at TECH represents a unique opportunity for dentists who wish to update their competencies in the use of Artificial Intelligence in the clinical field. Upon completion of the curriculum, graduates will master the types of statistical data and their application in complex dental contexts. In addition, specialists will be equipped to use systems that correlate biomedical data with dental conditions, employing tools for unified patient information management. Thanks to this specialized knowledge, they will be prepared to interpret results with precision and optimize diagnostic and therapeutic processes in daily practice.

You will apply criteria of safety, confidentiality, and informed consent in the use of intelligent systems in Dentistry"

Graduate Profile

Graduates of this Professional Master's Degree from TECH will be highly trained professionals in the application of Artificial Intelligence in Dentistry. They will also employ personalized patient alert systems through modern platforms such as CarePredict. Likewise, they will use various wearables and sensors for real-time dental monitoring, optimizing the clinical follow-up of patients. Furthermore, they will be prepared to develop specialized dashboards to visualize key dental indicators, facilitating therapeutic decision-making based on concrete data.

You will manage cutting-edge software based on Artificial Intelligence for the rigorous analysis of imaging tests such as computed tomography.

- **Technological Integration in Dental Practice:** Ability to incorporate Artificial Intelligence tools into clinical procedures, enhancing diagnostic precision and the personalization of dental treatments
- **Clinical Data Analysis:** Aptitude for interpreting large volumes of information through intelligent systems, facilitating real-time, evidence-based decision-making
- **Application of Predictive Technologies:** Competence in using machine learning algorithms and predictive models for the early detection of complex oral diseases, optimizing prevention and prognosis
- **Professional Ethics and Data Confidentiality:** Commitment to the responsible use of Artificial Intelligence, ensuring patient data protection and compliance with legal and ethical regulations in the dental field

After completing the university program, you will be able to apply your knowledge and skills in the following positions:

1. **Advisor in Intelligent Systems for Dental Diagnosis:** Responsible for guiding dental clinics in the implementation of Artificial Intelligence–based tools for enhancing imaging diagnostics, facilitating the early detection of oral pathologies.
2. **Specialist in Digital Analysis of Dental Images:** Expert in the use of machine learning software for the segmentation, enhancement, and analysis of imaging tests.
3. **Consultant in the Design of AI-Assisted Personalized Dental Interventions:** Collaborates with clinical teams to implement algorithms that personalize dental treatments based on the analysis of patients' clinical and historical data.
4. **Administrator of Intelligent Dental Platforms:** Focused on managing advanced computer systems that employ Artificial Intelligence for the organization of medical records, treatment planning, and automated patient follow-up.

You will implement sophisticated algorithms capable of personalizing dental therapies according to the patient's clinical and historical data"

06

Software Licenses Included

TECH is a leading reference in the academic world for combining the latest technology with teaching methodologies to enhance the teaching-learning process. To achieve this, it has established a network of alliances that allows it to access the most advanced software tools used in the professional world.

Upon enrolling, you will receive, completely free of charge, academic credentials for the following professional software applications"

TECH has established a network of professional alliances with the leading providers of software applied to various professional fields. These alliances allow TECH to access hundreds of software applications and licenses, making them available to its students.

The academic software licenses will allow students to use the most advanced applications in their professional field, so they can become familiar with them and master their use without incurring additional costs. TECH will manage the licensing process so that students may use the software without limitation for the entire duration of their Professional Master's Degree in Artificial Intelligence in Dentistry, and they will also be able to do so completely free of charge.

TECH will provide free access to the following software applications:

Open for Innovation
KNIME

Google Career Launchpad

Google Career Launchpad is a solution for developing digital skills in technology and data analysis. With an estimated value of **5,000 dollars**, it is included **for free** in TECH's university program, providing access to interactive labs and certifications recognized in the industry.

This platform combines technical training with practical cases, using technologies such as BigQuery and Google AI. It offers simulated environments to work with real data, along with a network of experts for personalized guidance.

Key Features:

- **Specialized Courses:** Updated content in cloud computing, machine learning, and data analysis
- **Live Labs:** Hands-on practice with real Google Cloud tools, no additional configuration required
- **Integrated Certifications:** Preparation for official exams with international validity
- **Professional Mentoring:** Sessions with Google experts and technology partners
- **Collaborative Projects:** Challenges based on real-world problems from leading companies

In conclusion, **Google Career Launchpad** connects users with the latest market technologies, facilitating their entry into fields such as artificial intelligence and data science with industry-backed credentials.

KNIME

Throughout this university program, graduates will have access to a **KNIME** license, a powerful data analysis platform with a visual and intuitive approach. This tool, valued at approximately **100 euros**, will be available **free of charge** during the course.

KNIME is designed for users of all levels, from those just starting in analytics to professionals aiming to optimize processes with modern tools. Its availability during the program will enable the application of acquired knowledge in diverse, real-world scenarios. This solution simplifies the connection to multiple data sources, data processing, and the implementation of advanced analysis models.

Key Features:

- **Code-Free Workflow Design:** Visual flows using a modular logic and drag-and-drop nodes.
- **Access to Multiple Sources:** Integration with files, databases, APIs, and cloud services.
- **Predictive Analytics Tools:** Machine learning and data mining applied in an accessible way.
- **Data Cleaning and Transformation:** Essential operations for preparing datasets.
- **Combined Use with Code:** Option to integrate Python or R scripts within the workflow.

Having access to **KNIME** during this program represents an excellent opportunity to explore professional tools and acquire key skills in data management.

06

Study Methodology

TECH is the world's first university to combine the **case study** methodology with **Relearning**, a 100% online learning system based on guided repetition.

This disruptive pedagogical strategy has been conceived to offer professionals the opportunity to update their knowledge and develop their skills in an intensive and rigorous way. A learning model that places students at the center of the educational process giving them the leading role, adapting to their needs and leaving aside more conventional methodologies.

TECH will prepare you to face new challenges in uncertain environments and achieve success in your career"

The student: the priority of all TECH programs

In TECH's study methodology, the student is the main protagonist.
The teaching tools of each program have been selected taking into account the demands of time, availability and academic rigor that, today, not only students demand but also the most competitive positions in the market.

With TECH's asynchronous educational model, it is students who choose the time they dedicate to study, how they decide to establish their routines, and all this from the comfort of the electronic device of their choice. The student will not have to participate in live classes, which in many cases they will not be able to attend. The learning activities will be done when it is convenient for them. They can always decide when and from where they want to study.

"At TECH you will NOT have live classes (which you might not be able to attend)"

The most comprehensive study plans at the international level

TECH is distinguished by offering the most complete academic itineraries on the university scene. This comprehensiveness is achieved through the creation of syllabi that not only cover the essential knowledge, but also the most recent innovations in each area.

By being constantly up to date, these programs allow students to keep up with market changes and acquire the skills most valued by employers. In this way, those who complete their studies at TECH receive a comprehensive education that provides them with a notable competitive advantage to further their careers.

And what's more, they will be able to do so from any device, pc, tablet or smartphone.

> *TECH's model is asynchronous, so it allows you to study with your pc, tablet or your smartphone wherever you want, whenever you want and for as long as you want"*

Case Studies and Case Method

The case method has been the learning system most used by the world's best business schools. Developed in 1912 so that law students would not only learn the law based on theoretical content, its function was also to present them with real complex situations. In this way, they could make informed decisions and value judgments about how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

With this teaching model, it is students themselves who build their professional competence through strategies such as Learning by Doing or Design Thinking, used by other renowned institutions such as Yale or Stanford.

This action-oriented method will be applied throughout the entire academic itinerary that the student undertakes with TECH. Students will be confronted with multiple real-life situations and will have to integrate knowledge, research, discuss and defend their ideas and decisions. All this with the premise of answering the question of how they would act when facing specific events of complexity in their daily work.

Relearning Methodology

At TECH, case studies are enhanced with the best 100% online teaching method: Relearning.

This method breaks with traditional teaching techniques to put the student at the center of the equation, providing the best content in different formats. In this way, it manages to review and reiterate the key concepts of each subject and learn to apply them in a real context.

In the same line, and according to multiple scientific researches, reiteration is the best way to learn. For this reason, TECH offers between 8 and 16 repetitions of each key concept within the same lesson, presented in a different way, with the objective of ensuring that the knowledge is completely consolidated during the study process.

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.

A 100% online Virtual Campus with the best teaching resources

In order to apply its methodology effectively, TECH focuses on providing graduates with teaching materials in different formats: texts, interactive videos, illustrations and knowledge maps, among others. All of them are designed by qualified teachers who focus their work on combining real cases with the resolution of complex situations through simulation, the study of contexts applied to each professional career and learning based on repetition, through audios, presentations, animations, images, etc.

The latest scientific evidence in the field of Neuroscience points to the importance of taking into account the place and context where the content is accessed before starting a new learning process. Being able to adjust these variables in a personalized way helps people to remember and store knowledge in the hippocampus to retain it in the long term. This is a model called Neurocognitive context-dependent e-learning that is consciously applied in this university qualification.

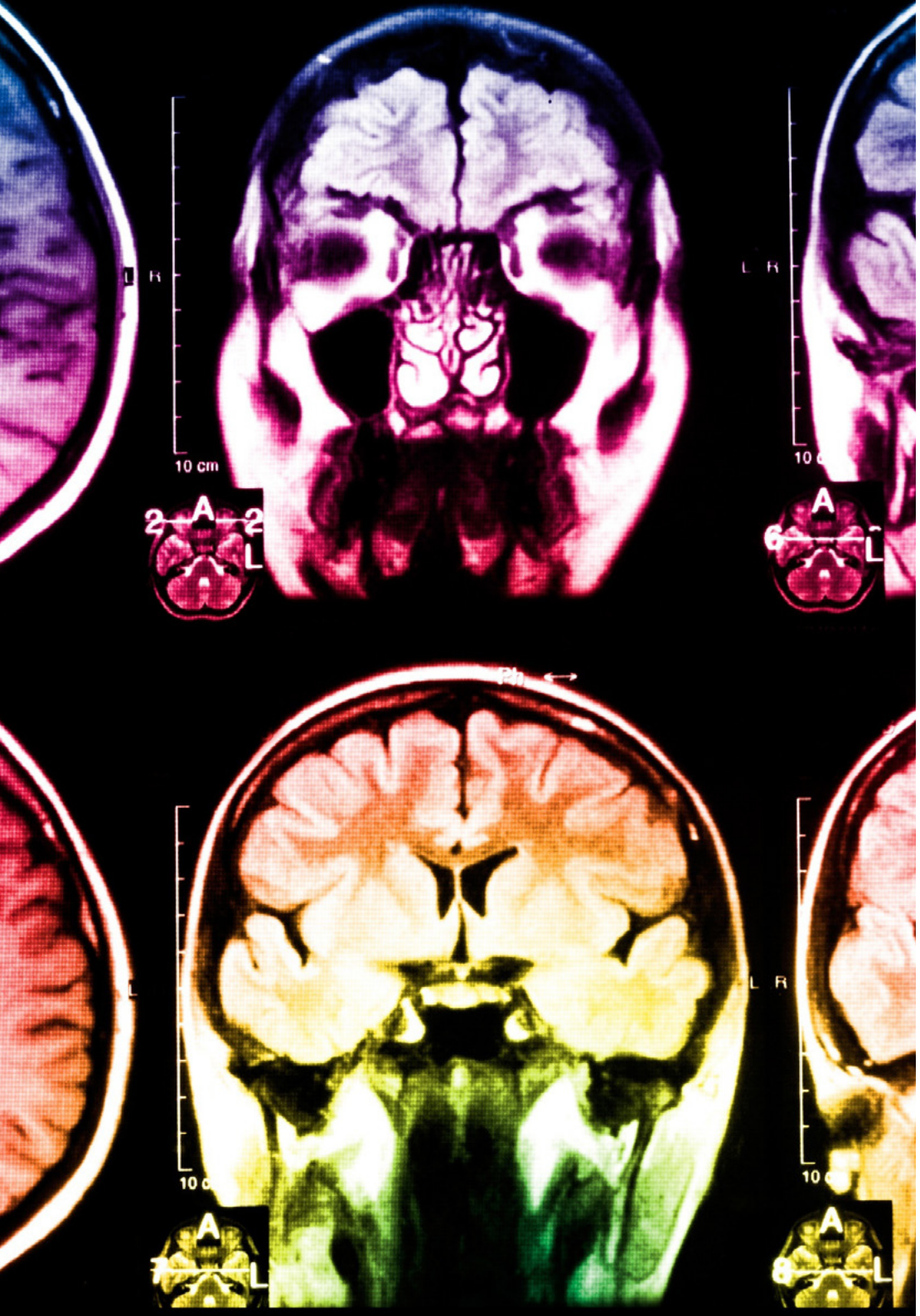
In order to facilitate tutor-student contact as much as possible, you will have a wide range of communication possibilities, both in real time and delayed (internal messaging, telephone answering service, email contact with the technical secretary, chat and videoconferences).

Likewise, this very complete Virtual Campus will allow TECH students to organize their study schedules according to their personal availability or work obligations. In this way, they will have global control of the academic content and teaching tools, based on their fast-paced professional update.

The online study mode of this program will allow you to organize your time and learning pace, adapting it to your schedule"

The effectiveness of the method is justified by four fundamental achievements:

1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that assess real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.



The university methodology top-rated by its students

The results of this innovative teaching model can be seen in the overall satisfaction levels of TECH graduates.

The students' assessment of the teaching quality, the quality of the materials, the structure of the program and its objectives is excellent. Not surprisingly, the institution became the top-rated university by its students according to the global score index, obtaining a 4.9 out of 5.

Access the study contents from any device with an Internet connection (computer, tablet, smartphone) thanks to the fact that TECH is at the forefront of technology and teaching.

You will be able to learn with the advantages that come with having access to simulated learning environments and the learning by observation approach, that is, Learning from an expert.

As such, the best educational materials, thoroughly prepared, will be available in this program:

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.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.

Practicing Skills and Abilities

You will carry out activities to develop specific competencies and skills in each thematic field. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop within the framework of the globalization we live in.

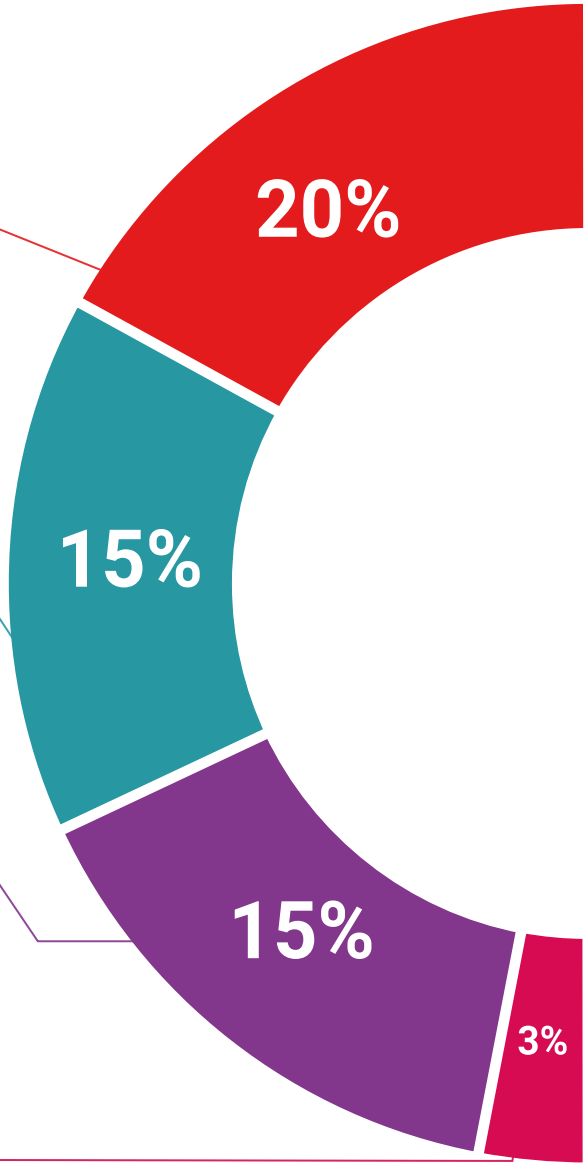
Interactive Summaries

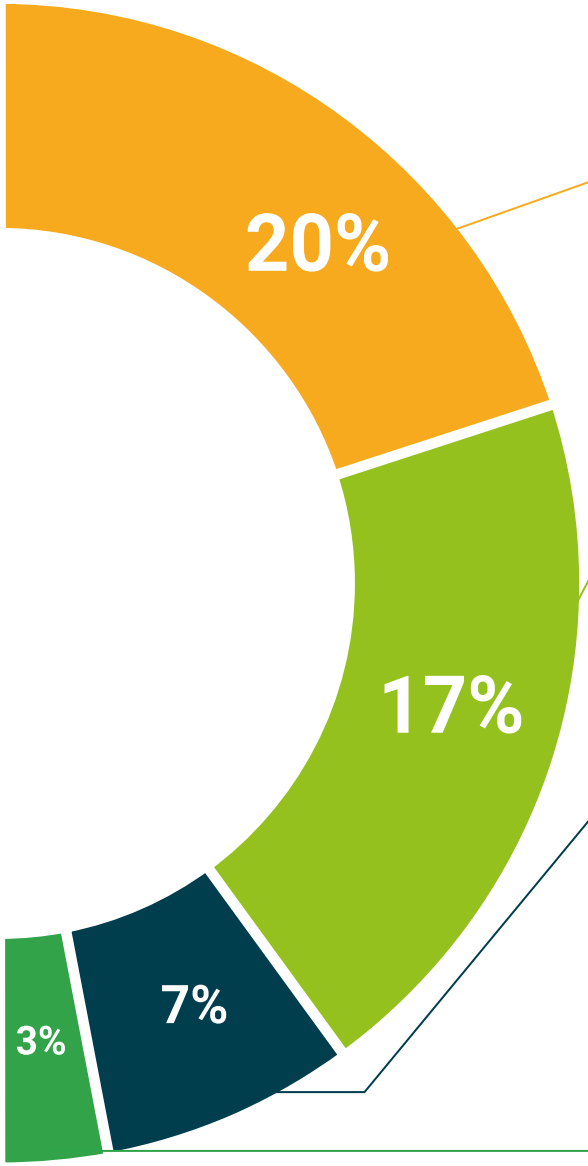
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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

Additional Reading

Recent articles, consensus documents, international guides... In our virtual library you will have access to everything you need to complete your education.





Case Studies

Students will complete a selection of the best case studies in the field. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Testing & Retesting

We periodically assess and re-assess your knowledge throughout the program. We do this on 3 of the 4 levels of Miller's Pyramid.

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 for future difficult decisions.

Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical and effective way to help students progress in their learning.

07

Teaching Staff

The faculty selected by TECH to teach this university program possess extensive professional experience in the application of Artificial Intelligence in Dentistry. They have participated in innovative projects focused on adapting dental treatments to the individual needs of each patient. In this way, they have developed multiple didactic resources that stand out not only for their exceptional quality, but also for addressing the current challenges of the digital clinical environment. As a result, graduates will engage in an immersive learning experience that will enable them to apply more precise therapeutic strategies and ensure highly effective oral healthcare.

The teaching staff of this academic degree is composed of leading experts in the use of Artificial Intelligence in Dentistry"

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
- Doctorate in Psychology from the University of Castilla La Mancha
- Doctorate in Economics, Business and Finance from the Camilo José Cela University
- Doctorate 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 from the 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

Dr. Martín-Palomino Sahagún, Patricia

- Orthodontist in a Private Clinic
- Specialist and Researcher in Dentistry and Orthodontics
- Ph.D. in Dentistry from the University Alfonso X El Sabio
- Postgraduate in Orthodontics from the University Alfonso X El Sabio
- Degree in Dentistry at the University of Alfonso X El Sabio

Teachers

Dr. Carrasco González, Ramón Alberto

- Head of Business Intelligence (Marketing) at Caja General de Ahorros de Granada and Banco Mare Nostrum
- Head of Information Systems (*Data Warehousing and Business Intelligence*) at Caja General de Ahorros de Granada and Banco Mare Nostrum.
- Computer Science and Artificial Intelligence Specialist and Researcher
- Doctorate in Artificial Intelligence from the University of Granada
- Senior Engineer in Computer Science from the University of Granada

Mr. Popescu Radu, Daniel Vasile

- Independent Specialist in Pharmacology, Nutrition and Dietetics
- Freelance Producer of Didactic and Scientific Content
- Nutritionist and Community Dietitian
- Community Pharmacist
- Researcher
- Master's Degree in Nutrition and Health from the Open University of Catalonia
- Master's Degree in Psychopharmacology from the University of Valencia
- Pharmacist from the Complutense University of Madrid
- Nutritionist-Dietitian by the European University Miguel de Cervantes

08

Certificate

This Professional Master's Degree in Artificial Intelligence in Dentistry guarantees students, in addition to the most rigorous and up-to-date education, access to a diploma for the Professional 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 **Professional Master's Degree diploma in Artificial Intelligence in Dentistry** 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 private qualification from **TECH Global University** is a European continuing education and professional development program that guarantees the acquisition of competencies in its area of expertise, providing significant curricular value to the student who successfully completes the program.

TECH is a member of the **Society for the Study of Artificial Intelligence and Simulation of Behaviour (AISB)**, the largest European organization dedicated to the development of Artificial Intelligence. This membership reaffirms its active role in scientific advancements related to new technologies.

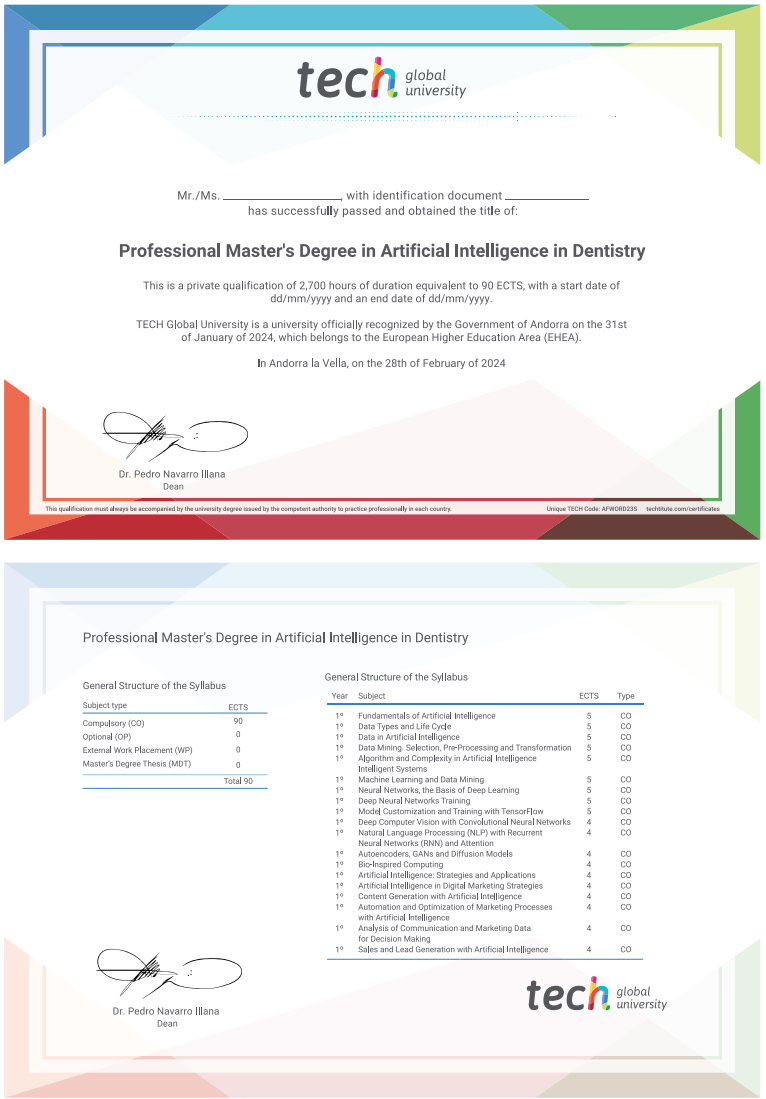
Accreditation/Membership

Title: **Professional Master's Degree in Artificial Intelligence in Dentistry**

Modality: **online**

Duration: **12 months**

Accreditation: **90 ECTS**



tech global university

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

Professional Master's Degree in Artificial Intelligence in Dentistry

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

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates

Professional Master's Degree in Artificial Intelligence in Dentistry

General Structure of the Syllabus

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

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Fundamentals of Artificial Intelligence	5	CO
1º	Data Types and Life Cycle	5	CO
1º	Data in Artificial Intelligence	5	CO
1º	Data Mining. Selection, Pre-Processing and Transformation	5	CO
1º	Algorithm and Complexity in Artificial Intelligence	5	CO
1º	Intelligent Systems		
1º	Machine Learning and Data Mining	5	CO
1º	Neural Networks, the Basis of Deep Learning	5	CO
1º	Deep Neural Networks Training	5	CO
1º	Model Customization and Training with TensorFlow	5	CO
1º	Deep Computer Vision with Convolutional Neural Networks	4	CO
1º	Natural Language Processing (NLP) with Recurrent	4	CO
1º	Neural Networks (RNN) and Attention		
1º	Autoencoders, GANs and Diffusion Models	4	CO
1º	Bio-Inspired Computing	4	CO
1º	Artificial Intelligence: Strategies and Applications	4	CO
1º	Artificial Intelligence in Digital Marketing Strategies	4	CO
1º	Content Generation with Artificial Intelligence	4	CO
1º	Automation and Optimization of Marketing Processes	4	CO
1º	with Artificial Intelligence		
1º	Analysis of Communication and Marketing Data	4	CO
1º	for Decision Making		
1º	Sales and Lead Generation with Artificial Intelligence	4	CO

Dr. Pedro Navarro Illana
Dean

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

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Professional Master's Degree
Artificial Intelligence in Dentistry

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

Professional Master's Degree

Artificial Intelligence in Dentistry

Accreditation/Membership

The Society for the Study of Artificial Intelligence and Simulation of Behaviour

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