Master's Degree

Artificial Intelligence in Diagnostic Imaging

tech global university

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Master's Degree
Artificial Intelligence in Diagnostic Imaging

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

Website: **www.techtitute.com/us/artificial-intelligence/master-degree/master-artificial-intelligence-diagnostic-imaging**

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01

Introduction

Artificial Intelligence is emerging as one of the most promising technologies in the field of Diagnostic Imaging. The ability of algorithms to analyze large volumes of radiological test data and detect subtle patterns enables specialists to diagnose a wide range of conditions early. In this way, practitioners can create individualized therapeutic plans to significantly improve clinical outcomes. However, the adoption of these tools also poses numerous technical and ethical challenges for clinicians. For this reason, TECH presents an innovative 100% online university program that will provide physicians with the necessary skills to get the most out of these booming instruments.

Through this 100% online program, you will master the main tools of Artificial Intelligence and use them to optimize the quality of your clinical analyses"

A recent report by the World Health Organization predicts that the global burden of chronic diseases will increase in the coming years. Faced with this situation, the organization urges physicians to use the most accurate and efficient tools for early diagnosis. In this context, Artificial Intelligence is a useful tool for early identification of pathologies such as Lung Cancer, Heart Failure and even Alzheimer's Disease. Hence the importance for professionals to incorporate advanced techniques such as Deep Learning or Bio-inspired Computing into their daily clinical practice in order to reduce diagnostic errors and personalize the treatment of users.

In this context, TECH is developing a pioneering program in Artificial Intelligence in Diagnostic Imaging. Designed by references in this field, the syllabus will delve into the fundamentals of Neural Networks and genetic algorithms. In tune with this, the didactic materials will offer the keys to apply the most sophisticated techniques of Data Mining. In this way, specialists will acquire advanced skills to improve accuracy in the detection of diseases and medical conditions, which will enable them to make more accurate diagnoses. Likewise, the syllabus will delve into the management of Bio-inspired Computing models so that doctors can apply them to the resolution of complex clinical problems and the optimization of clinical treatments.

TECH offers a 100% online academic environment that fits the needs of physicians seeking to advance their careers. Likewise, it uses its disruptive Relearning methodology, based on the repetition of key concepts to lock in knowledge with efficiency and immediacy. In addition, the only thing experts will need is a device with Internet access (such as a cell phone, computer or tablet) to enter the Virtual Campus and enjoy an experience that will significantly raise their professional horizons.

This **Postgraduate Diploma in Artificial Intelligence in Diagnostic Imaging** contains the most complete and up-to-date program on the market. The most important features include:

- Development of practical cases presented by experts in Artificial Intelligence
- The graphic, schematic and eminently practical contents with which it is conceived gather scientific and practical information on those disciplines that are indispensable 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

An intensive syllabus that gives you the opportunity to update your knowledge in a real scenario, with the maximum scientific rigor of an institution at the forefront of technology"

You will use Convolutional Neural Networks to adjust treatments to the specific needs of patients and significantly improve their prognoses"

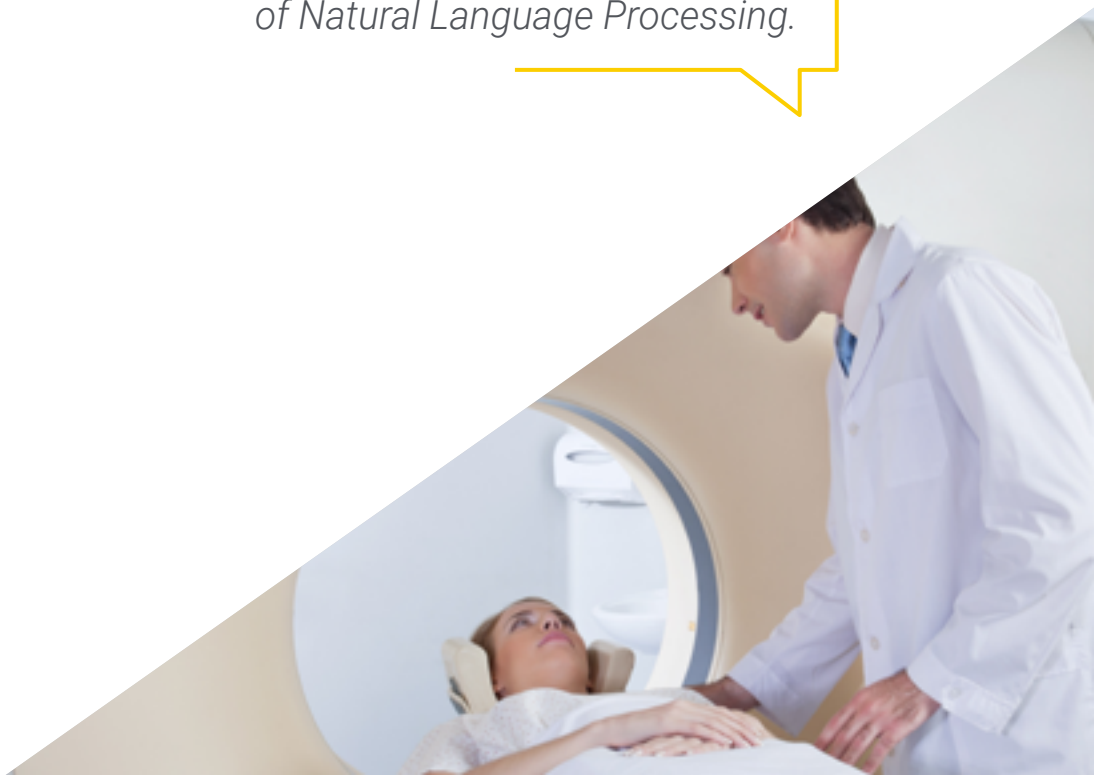
You will acquire advanced skills to evaluate the accuracy, validity and clinical applicability of Artificial Intelligence models in the medical field.

The interactive summaries of each module will allow you to consolidate in a more dynamic way the concepts of Natural Language Processing.

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.



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Objectives

With this program, physicians will have a comprehensive knowledge of the application of Artificial Intelligence technologies in Diagnostic Imaging. Likewise, graduates will develop advanced competencies to employ emerging techniques such as Data Mining, Big Data or Deep Learning in the clinical setting. Also, healthcare professionals will handle tools such as Convolutional Neural Networks to interpret medical images of different modalities. In this way, specialists will detect anomalies in the imaging tests obtained and will be able to carry out more accurate diagnoses in order to improve patient recovery.

You will handle Artificial Intelligence to automate routine tasks such as anomaly detection in large volumes of images, allowing you to focus on the most complex clinical cases"

General Objectives

- Understand the theoretical foundations of Artificial Intelligence
- Study the different types of data and understand the data life cycle
- 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
- Develop skills to use and apply advanced Artificial Intelligence tools in the interpretation and analysis of medical images, improving diagnostic accuracy
- Implement Artificial Intelligence solutions that allow the automation of processes and the personalization of diagnostics
- Apply Data Mining and Predictive Analytics techniques to make evidence-based clinical decisions
- Acquire research skills that allow experts to contribute to the advancement of Artificial Intelligence in medical imaging

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, Pre-Processing 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

- Develop 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's 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, GANsand 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. Artificial Intelligence Innovations in Diagnostic Imaging

- Master tools such as IBM Watson Imaging and NVIDIA Clara to automatically interpret clinical tests
- Gain competencies to perform clinical experiments and results analysis using Artificial Intelligence, with an approach based on improving diagnostic accuracy

Module 17. Advanced Applications of Artificial Intelligence in Medical Imaging Studies and Medical Images Analysis

- Execute observational studies in imaging using Artificial Intelligence, validating and calibrating the models efficiently
- Integrate medical imaging data with other biomedical sources, using tools such as Enlitic Curie to conduct multidisciplinary research

Module 18. Personalization and Automation in Medical Diagnostics using Artificial Intelligence

- Acquire skills to personalize diagnoses using Artificial Intelligence, correlating imaging findings with genomic and other biomarker data
- Master automation in medical image acquisition and processing, applying advanced Artificial Intelligence technologies

Module 19. Big Data and Predictive Analytics in Medical Imaging

- Manage large volumes of data using Data Mining techniques and Machine Learning algorithms
- Create clinical prognostic tools based on Big Data analysis in order to optimize clinical decisions

Module 20. Ethical and Legal Aspects of Artificial Intelligence in Diagnostic Imaging

- Have a holistic understanding of the regulatory and deontological principles governing the use of Artificial Intelligence in the field of Health, including aspects such as informed consent
- Be able to audit Artificial Intelligence models used in clinical practice, ensuring their transparency and accountability in medical decision making

You will learn valuable lessons by solving real clinical cases in simulated learning environments"

03

Skills

Upon completion of this program, physicians will be able to implement advanced Artificial Intelligence technologies in their daily clinical practice. In line with this, graduates will develop technical competences to handle tools such as Deep Learning or Bio-inspired Computing. In this way, specialists will obtain valuable insights to interpret various diagnostic tests and detect a wide range of diseases at an early stage. Therefore, professionals will design highly personalized intervention plans that will significantly improve patients' quality of life.

You will master Data Mining to anticipate the evolution of a disease or the response of individuals to treatments, allowing you to make highly informed clinical decisions"

General Skills

- Effectively apply fundamental Artificial Intelligence techniques (Big Data, Deep Learning, Neural Networks, etc.) to optimize the analysis of diagnostic images
- Critically interpret the results generated by Artificial Intelligence systems, ensuring both the validity and clinical relevance of the predictions or classifications
- Handle AI programming languages such as Phyton to ensure the quality of the data obtained
- Develop advanced skills to identify opportunities for improvement in Diagnostic Imaging and design innovative technological solutions
- Customize Artificial Intelligence models for the diagnosis of specific pathologies such as tumors, taking into account individual variations and population characteristics
- Communicate clearly and accurately the results of clinical analysis to different audiences

Specific Skills

- Train Deep Neural Networks for classification, segmentation and pattern detection in radiological images
- Apply advanced image processing methods such as filtering, normalization and contrast enhancement
- Manage medical software incorporating Artificial Intelligence algorithms for automated analysis of clinical tests, ensuring usability and compliance with health regulations
- Perform clinical validation studies to ensure that Artificial Intelligence tools can be used for the analysis of clinical tests

You will lead research projects that explore new applications of Artificial Intelligence in Diagnostic Imaging and drive innovation in the medical field"

04

Course Management

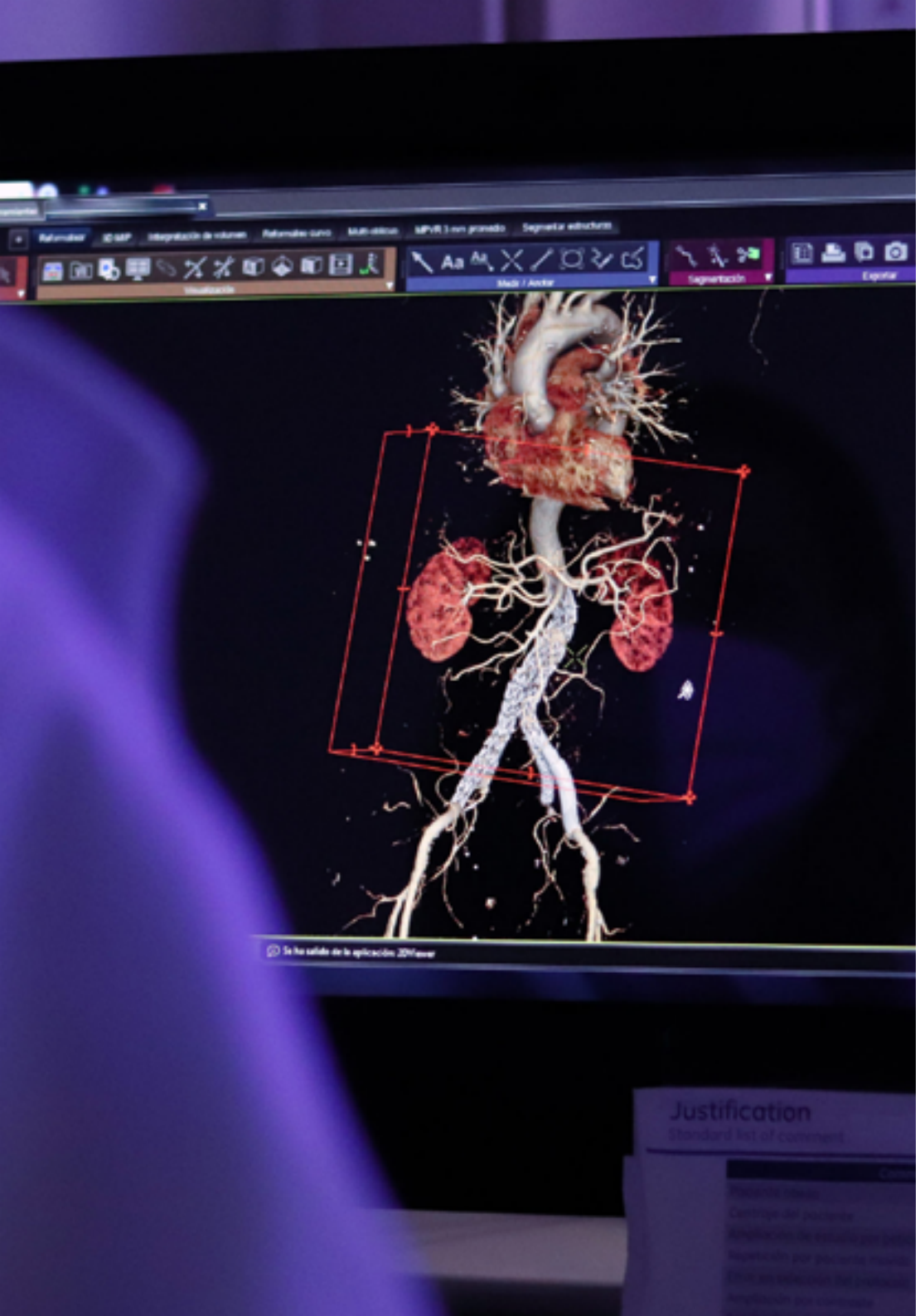
TECH's philosophy is based on offering the most comprehensive and pragmatic degrees in the academic panorama, which is why it carries out a meticulous process to form its teaching staff. For this program, it has the collaboration of the best experts in the field of Artificial Intelligence applied to Diagnostic Imaging. These professionals have a vast professional career, where they have contributed to optimize the quality of life of many patients. Therefore, graduates have the guarantees they demand to access an experience that will allow them to experience a leap in quality in their clinical practice.

You will have the support of a teaching team made up of authentic references in Artificial Intelligence in Diagnostic Imaging"

Management

Dr. Peralta Martín-Palomino, Arturo

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



Professors

Mr. Popescu Radu, Daniel Vasile

- Independent Specialist in Pharmacology, Nutrition and Dietetics
- Freelance Producer of Teaching and Scientific Content
- Nutritionist and Community Dietitian
- Community Pharmacist
- Researcher
- Master's Degree in Nutrition and Health at 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

A unique, crucial and decisive learning experience to boost your professional development"

05

Structure and Content

The didactic materials that make up this university program have been designed by specialists in the use of Artificial Intelligence in clinical contexts. Thanks to this, the academic itinerary will delve into the management of various emerging tools such as Deep Learning, Deep Neural Networks or Natural Language Processing. In this way, graduates will develop advanced skills to integrate these instruments into their daily practice and analyze the results of imaging tests in a comprehensive manner. In addition, this will allow practitioners to optimize the accuracy of their diagnoses and personalize treatments to contribute to the overall well-being of patients.

You will use the most sophisticated Big Data techniques to detect early severe pathologies such as Cancer and design individualized therapeutic plans to optimize the recovery of patients"

Module 1. Fundamentals of Artificial Intelligence

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

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

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

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

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

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

1.7. Expert Systems and DSS
  1.7.1. Expert Systems
  1.7.2. Decision Support Systems
1.8. Chatbots and Virtual Assistants
  1.8.1. Types of Assistants: Voice and Text Assistants
  1.8.2. Fundamental Parts for the Development of an Assistant: Intents, Entities and Dialog Flow
  1.8.3. Integrations: Web, Slack, Whatsapp, Facebook
  1.8.4. Assistant Development Tools: *Dialog Flow, Watson Assistant*
1.9. AI Implementation Strategy
1.10. Future of Artificial Intelligence
  1.10.1. Understand How to Detect Emotions Using Algorithms
  1.10.2. Creating a Personality: Language, Expressions and Content
  1.10.3. Trends of Artificial Intelligence
  1.10.4. Reflections

Module 2. Data Types and Data Life Cycle

2.1. Statistics
  2.1.1. Statistics: Descriptive Statistics, Statistical Inferences
  2.1.2. Population, Sample, Individual
  2.1.3. Variables: Definition, Measurement Scales
2.2. Types of Data Statistics
  2.2.1. According to Type
    2.2.1.1. Quantitative: Continuous Data and Discrete Data
    2.2.1.2. Qualitative: Binomial Data, Nominal Data and Ordinal Data
  2.2.2. According to their Shape
    2.2.2.1. Numeric
    2.2.2.2. Text:
    2.2.2.3. Logical
  2.2.3. According to its Source
    2.2.3.1. Primary
    2.2.3.2. Secondary
2.3. Life Cycle of Data
  2.3.1. Stages of the Cycle
  2.3.2. Milestones of the Cycle
  2.3.3. FAIR Principles
2.4. Initial Stages of the Cycle
  2.4.1. Definition of Goals
  2.4.2. Determination of Resource Requirements
  2.4.3. Gantt Chart
  2.4.4. Data Structure
2.5. Data Collection
  2.5.1. Methodology of Data Collection
  2.5.2. Data Collection Tools
  2.5.3. Data Collection Channels
2.6. Data Cleaning
  2.6.1. Phases of Data Cleansing
  2.6.2. Data Quality
  2.6.3. Data Manipulation (with R)
2.7. Data Analysis, Interpretation and Evaluation of Results
  2.7.1. Statistical Measures
  2.7.2. Relationship Indexes
  2.7.3. Data Mining
2.8. Datawarehouse
  2.8.1. Elements that Comprise it
  2.8.2. Design
  2.8.3. Aspects to Consider
2.9. Data Availability
  2.9.1. Access
  2.9.2. Uses
  2.9.3. Security
2.10. Regulatory Framework
  2.10.1. Data Protection Law
  2.10.2. Good Practices
  2.10.3. Other Regulatory Aspects

Module 3. Data in Artificial Intelligence

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4.10. Data Pre-processing in Big Data Environments

Module 5. Algorithm and Complexity in Artificial Intelligence

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

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

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

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

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

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

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

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

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

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

Module 6. Intelligent Systems

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

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

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

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

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

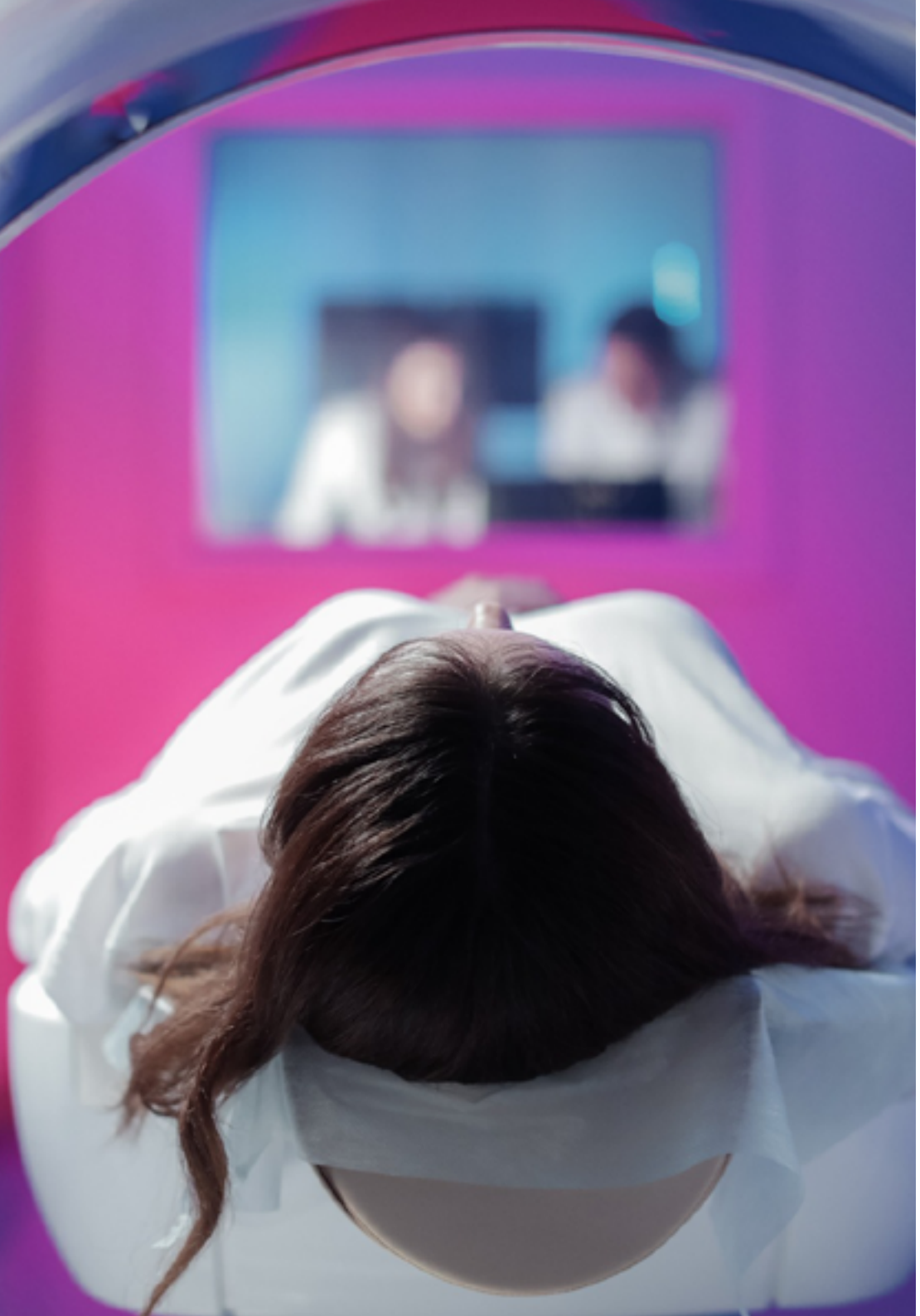
6.6. Ontology Languages and Ontology Creation Software
- 6.6.1. Triple RDF, Turtle and N
- 6.6.2. RDF Schema
- 6.6.3. OWL
- 6.6.4. SPARQL
- 6.6.5. Introduction to Ontology Creation Tools
- 6.6.6. Installing and Using Protégé

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

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

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

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



Module 7. Machine Learning and Data Mining

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

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

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

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

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

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

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

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

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

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

Module 8. Neural Networks, the Basis of Deep Learning

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

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

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

8.4. Union of Layers and Operations
- 8.4.1. Architecture Design
- 8.4.2. Connection between Layers
- 8.4.3. Forward Propagation

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

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

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

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

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

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

Module 9. Deep Neural Networks Training

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

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

9.3. Optimizers
- 9.3.1. Stochastic Gradient Descent Optimizers
- 9.3.2. 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 Tfdata API for Data Processing
- 10.6.2. Construction of Data Streams with Tfdata
- 10.6.3. Using the Tfdata API for Model Training

10.7. The TFRecord Format
- 10.7.1. Using the TFRecord API for Data Serialization
- 10.7.2. 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. Preprocessing Data with TensorFlow Datasets
- 10.9.3. Using TensorFlow Datasets for Model Training

10.10. Building a Deep Learning App with TensorFlow
- 10.10.1. Practical Application
- 10.10.2. Building a Deep Learning App with TensorFlow
- 10.10.3. 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
- 11.10.2. Edge Detection
- 11.10.3. Rule-Based Segmentation Methods

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

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

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

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

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

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

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

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

12.8. Hugging Face's Transformers Bookstore
- 12.8.1. Using the Hugging Face's Transformers Library
- 12.8.2. Hugging Face´s Transformers Library Application
- 12.8.3. Advantages of Hugging Face´s Transformers Library

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

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

Module 13. Autoencoders, GANs and Diffusion Models

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

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

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

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

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

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

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

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

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

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

Module 14. Bio-Inspired Computing

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

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

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

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

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

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

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

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

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

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

Module 15. Artificial Intelligence: Strategies and Applications

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

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

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

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

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

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

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

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

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

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

Module 16. Artificial Intelligence Innovations in Diagnostic Imaging

16.1. Artificial Intelligence Technologies and Tools in Diagnostic Imaging with IBM Watson Imaging Clinical Review
- 16.1.1. Leading Software Platforms for Medical Image Analysis
- 16.1.2. Radiology-Specific Deep Learning Tools
- 16.1.3. Innovations in Hardware to Accelerate Image Processing
- 16.1.4. Integration of Artificial Intelligence Systems in Existing Hospital Infrastructures

16.2. Statistical Methods and Algorithms for Medical Image Interpretation with DeepMind AI for Breast Cancer Analysis
- 16.2.1. Image Segmentation Algorithms
- 16.2.2. Classification and Detection Techniques in Medical Images
- 16.2.3. Use of Convolutional Neural Networks in Radiology
- 16.2.4. Noise Reduction and Image Quality Improvement Methods

16.3. Design of Experiments and Analysis of Results in Diagnostic Imaging with Google Cloud Healthcare API
- 16.3.1. Design of Validation Protocols for Artificial Intelligence Algorithms
- 16.3.2. Statistical Methods for Comparing the Performance of Artificial Intelligence and Radiologists
- 16.3.3. Setting Up Multicenter Studies for Artificial Intelligence Testing
- 16.3.4. Interpretation and Presentation of Performance Test Results

16.4. Detection of Subtle Patterns in Low-Resolution Images
- 16.4.1. Artificial Intelligence for Early Diagnosis of Neurodegenerative Diseases
- 16.4.2. Artificial Intelligence Applications in Interventional Cardiology
- 16.4.3. Use of Artificial Intelligence for the Optimization of Imaging Protocols

16.5. Biomedical Image Analysis and Processing
- 16.5.1. Pre-Processing Techniques to Improve Automatic Interpretation
- 16.5.2. Texture and Pattern Analysis in Histological Images
- 16.5.3. Extraction of Clinical Features from Ultrasound Images
- 16.5.4. Methods for Longitudinal Analysis of Images in Clinical Studies

16.6. Advanced Data Visualization in Diagnostic Imaging with OsiriX MD
- 16.6.1. Development of Graphical Interfaces for 3D Image Exploration
- 16.6.2. Tools for Visualization of Temporal Changes in Medical Images
- 16.6.3. Augmented Reality Techniques for the Teaching of Anatomy
- 16.6.4. Real-Time Visualization Systems for Surgical Procedures

16.7. Natural Language Processing in Medical Image Documentation and Reporting with Nuance PowerScribe 360
- 16.7.1. Automatic Generation of Radiological Reports
- 16.7.2. Extraction of Relevant Information from Electronic Medical Records
- 16.7.3. Semantic Analysis for the Correlation of Imaging and Clinical Findings
- 16.7.4. Image Search and Retrieval Tools Based on Textual Descriptions

16.8. Integration and Processing of Heterogeneous Data in Medical Imaging
- 16.8.1. Fusion of Imaging Modalities for Complete Diagnostics
- 16.8.2. Integration of Laboratory and Genetic Data in the Image Analysis
- 16.8.3. Systems for Handling Large Volumes of Imaging Data
- 16.8.4. Strategies for Normalization of Datasets from Multiple Sources

16.9. Applications of Neural Networks in Medical Image Interpretation with Zebra Medical Vision
- 16.9.1. Use of Generative Networks for the Creation of Synthetic Medical Images
- 16.9.2. Neural Networks for Automatic Tumor Classification
- 16.9.3. Deep Learning for the Analysis of Time Series in Functional Imaging
- 16.9.4. Fitting of Pre-Trained Models on Specific Medical Image Datasets

16.10. Predictive Modeling and its Impact on Diagnostic Imaging with IBM Watson Oncology
- 16.10.1. Predictive Models for Risk Assessment in Oncology Patients
- 16.10.2. Predictive Tools for Chronic Disease Follow-Up
- 16.10.3. Survival Analysis Using Medical Imaging Data
- 16.10.4. Prediction of Disease Progression using Machine Learning Techniques

Module 17. Advanced AI Applications in Medical Imaging Studies and Analysis of Medical Images

17.1. Design and Execution of Observational Studies using Artificial Intelligence in Medical Imaging with Flatiron Health
- 17.1.1. Criteria for the Selection of Populations in Artificial Intelligence Observational Studies
- 17.1.2. Methods for Controlling Confounding Variables in Imaging Studies
- 17.1.3. Strategies for Long-Term Follow-Up in Observational Studies
- 17.1.4. Analysis of Results and Validation of Artificial Intelligence Models in Real Clinical Settings

17.2. Validation and Calibration of AI Models in Image Interpretation with Arterys Cardio AI
- 17.2.1. Cross-Validation Techniques Applied to Diagnostic Imaging Models
- 17.2.2. Methods for Probability Calibration in AI Predictions
- 17.2.3. Performance Standards and Accuracy Metrics for AI Evaluation
- 17.2.4. Implementation of Robustness Testing in Different Populations and Conditions

17.3. Methods of Integrating Imaging Data with other Biomedical Sources
- 17.3.1. Data Fusion Techniques to Improve Image Interpretation
- 17.3.2. Joint Analysis of Images and Genomic Data for Accurate Diagnoses
- 17.3.3. Integration of Clinical and Laboratory Information in Artificial Intelligence Systems
- 17.3.4. Development of User Interfaces for Integrated Visualization of Multidisciplinary Data

17.4. Use of Medical Imaging Data in Multidisciplinary Research with Enlitic Curie
- 17.4.1. Interdisciplinary Collaboration for Advanced Image Analysis
- 17.4.2. Application of Artificial Intelligence Techniques from other Fields in Diagnostic Imaging
- 17.4.3. Challenges and Solutions in the Management of Large and Heterogeneous Data
- 17.4.4. Case Studies of Successful Multidisciplinary Applications

17.5. Specific Deep Learning Algorithms for Medical Imaging with Aidoc
- 17.5.1. Development of Image-Specific Neural Network Architectures
- 17.5.2. Optimization of Hyperparameters for Medical Imaging Models
- 17.5.3. Transfer of Learning and its Applicability in Radiology

17.6. Challenges in the Interpretation and Visualization of Features Learned by Deep Models
- 17.6.1. Optimization of the Interpretation of Medical Images by Automation with Viz.ai
- 17.6.2. Automation of Diagnostic Routines for Operational Efficiency
- 17.6.3. Early Warning Systems for Anomaly Detection
- 17.6.4. Reduction of Radiologists' Workload by Means of Artificial Intelligence Tools
- 17.6.5. Impact of Automation on the Accuracy and Speed of Diagnostics

17.7. Simulation and Computational Modeling in Diagnostic Imaging
- 17.7.1. Simulations for Training and Validation of Artificial Intelligence Algorithms
- 17.7.2. Modeling of Diseases and their Representation in Synthetic Images
- 17.7.3. Use of Simulations for Treatment and Surgery Planning
- 17.7.4. Advances in Computational Techniques for Real-Time Image Processing

17.8. Virtual and Augmented Reality in Medical Image Visualization and Analysis
- 17.8.1. Virtual Reality Applications for Diagnostic Imaging Education
- 17.8.2. Use of Augmented Reality in Image-Guided Surgical Procedures
- 17.8.3. Advanced Visualization Tools for Therapeutic Planning
- 17.8.4. Development of Immersive Interfaces for the Review of Radiological Studies

17.9. Data Mining Tools Applied to Diagnostic Imaging with Radiomics
- 17.9.1. Techniques for Data Mining of Large Medical Image Repositories
- 17.9.2. Pattern Analysis Applications for Image Data Collections
- 17.9.3. Biomarker Identification through Image Data Mining
- 17.9.4. Integration of Data Mining and Machine Learning for Clinical Discovery

17.10. Development and Validation of Biomarkers using Image Analysis with Oncimmune
- 17.10.1. Strategies to Identify Imaging Biomarkers in Various Diseases
- 17.10.2. Clinical Validation of Imaging Biomarkers for Diagnostic Use
- 17.10.3. Impact of Imaging Biomarkers on Treatment Personalization
- 17.10.4. Emerging Technologies in the Detection and Analysis of Biomarkers by Means of Artificial Intelligence

Module 18. Personalization and Automation in Medical Diagnosis through Artificial Intelligence

18.1. Application of Artificial Intelligence in Genomic Sequencing and Correlation with Imaging Findings using Fabric Genomics
- 18.1.1. Artificial Intelligence Techniques for the Integration of Genomic and Imaging Data
- 18.1.2. Predictive Models to Correlate Genetic Variants with Pathologies Visible in Images
- 18.1.3. Development of Algorithms for the Automatic Analysis of Sequences and their Representation in Images
- 18.1.4. Case Studies on the Clinical Impact of Genomics-Imaging Fusion

18.2. Advances in Artificial Intelligence for the Detailed Analysis of Biomedical Images with PathAI
- 18.2.1. Innovations in Image Processing and Analysis Techniques at the Cellular Level
- 18.2.2. Application of Artificial Intelligence for Resolution Enhancement in Microscopy Images
- 18.2.3. Deep Learning Algorithms Specialized in the Detection of Submicroscopic Patterns
- 18.2.4. Impact of Advances in Artificial Intelligence on Biomedical Research and Clinical Diagnosis

18.3. Automation in Medical Image Acquisition and Processing with Butterfly Network
- 18.3.1. Automated Systems for the Optimization of Image Acquisition Parameters
- 18.3.2. Artificial Intelligence in the Management and Maintenance of Imaging Equipment
- 18.3.3. Algorithms for Real-Time Processing of Images during Medical Procedures
- 18.3.4. Successful Cases in the Implementation of Automated Systems in Hospitals and Clinics

18.4. Personalization of Diagnoses using Artificial Intelligence and Precision Medicine with Tempus AI
- 18.4.1. Artificial Intelligence Models for Personalized Diagnostics Based on Genetic and Imaging Profiles
- 18.4.2. Strategies for the Integration of Clinical and Imaging Data in Therapeutic Planning
- 18.4.3. Impact of Precision Medicine on Clinical Outcomes Via AI
- 18.4.4. Ethical and Practical Challenges in Implementing Personalized Medicine

18.5. Innovations in AI-Assisted Diagnostics with Caption Health
- 18.5.1. Development of New Artificial Intelligence Tools for the Early Detection of Diseases
- 18.5.2. Advances in Artificial Intelligence Algorithms for the Interpretation of Complex Pathologies
- 18.5.3. Integration of AI-Assisted Diagnostics in Routine Clinical Practice
- 18.5.4. Evaluation of the Effectiveness and Acceptance of Diagnostic Artificial Intelligence by Healthcare Professionals

18.6. Applications of Artificial Intelligence in Microbiome Image Analysis with DayTwo AI
- 18.6.1. Artificial Intelligence Techniques for Image Analysis in Microbiome Studies
- 18.6.2. Correlation of Microbiome Imaging Data with Health Indicators
- 18.6.3. Impact of Microbiome Findings on Therapeutic Decisions
- 18.6.4. Challenges in the Standardization and Validation of Microbiome Imaging

18.7. Use of Wearables to Improve the Interpretation of Diagnostic Images with AliveCor
- 18.7.1. Integration of Wearable Data with Medical Images for Complete Diagnostics
- 18.7.2. AI Algorithms for the Analysis of Continuous Data and its Representation in Images
- 18.7.3. Technological Innovations in Wearable Devices for Health Monitoring
- 18.7.4. Case Studies on Improving Quality of Life Through Wearables and Imaging Diagnostics

18.8. Management of Diagnostic Imaging Data in Clinical Trials using Artificial Intelligence
- 18.8.1. AI Tools for the Efficient Management of Large Volumes of Image Data
- 18.8.2. Strategies to Ensure the Quality and Integrity of Data in Multicenter Studies
- 18.8.3. Artificial Intelligence Applications for Predictive Analytics in Clinical Trials
- 18.8.4. Challenges and Opportunities in the Standardization of Imaging Protocols in Global Trials

18.9. Development of Treatments and Vaccines Assisted by Advanced AI Diagnostics
- 18.9.1. Use of Artificial Intelligence to Design Personalized Treatments Based on Imaging and Clinical Data
- 18.9.2. Artificial Intelligence Models in the Accelerated Development of Vaccines Supported by Diagnostic Imaging
- 18.9.3. Evaluation of the Effectiveness of Treatments by Means of Image Monitoring
- 18.9.4. Impact of Artificial Intelligence in the Reduction of Time and Costs in the Development of New Therapies

18.10. AI Applications in Immunology and Immune Response Studies with ImmunoMind
- 18.10.1. AI Models for the Interpretation of Images Related to the Immune Response
- 18.10.2. Integration of Imaging Data and Immunological Analysis for Accurate Diagnoses
- 18.10.3. Development of Imaging Biomarkers for Autoimmune Diseases
- 18.10.4. Advances in the Personalization of Immunological Treatments through the Use of Artificial Intelligence

Module 19. Big Data and Predictive Analytics in Medical Imaging

19.1. Big Data in Diagnostic Imaging: Concepts and Tools with GE Healthcare Edison
- 19.1.1. Fundamentals of Big Data applied to Imaging
- 19.1.2. Technological Tools and Platforms for Handling Large Volumes of Imaging Data
- 19.1.3. Challenges in the Integration and Analysis of Big Data in Imaging
- 19.1.4. Use Cases of Big Data in Diagnostic Imaging

19.2. Data Mining in Biomedical Image Registries with IBM Watson Imaging
- 19.2.1. Advanced Data Mining Techniques to Identify Patterns in Medical Images
- 19.2.2. Strategies for Extracting Relevant Features in Large Image Databases
- 19.2.3. Applications of Clustering and Classification Techniques in Image Registries
- 19.2.4. Impact of Data Mining on Improving Diagnosis and Treatment

19.3. Machine Learning Algorithms in Image Analysis with Google DeepMind Health
- 19.3.1. Development of Supervised and Unsupervised Algorithms for Medical Imaging
- 19.3.2. Innovations in Machine Learning Techniques for Recognition of Disease Patterns
- 19.3.3. Applications of Deep Learning in Image Segmentation and Classification
- 19.3.4. Evaluation of the Efficacy and Accuracy of Machine Learning Algorithms in Clinical Studies

19.4. Predictive Analytics Techniques Applied to Diagnostic Imaging with Predictive Oncology
- 19.4.1. Predictive Models for the Early Identification of Diseases from Images
- 19.4.2. Use of Predictive Analytics for Monitoring and Treatment Evaluation
- 19.4.3. Integration of Clinical and Imaging Data to Enrich Predictive Models
- 19.4.4. Challenges in the Implementation of Predictive Techniques in Clinical Practice

19.5. Image-Based Artificial Intelligence Models for Epidemiology with BlueDot
- 19.5.1. Application of Artificial Intelligence in the Analysis of Epidemic Outbreaks Using Images
- 19.5.2. Models of Disease Spread Visualized by Imaging Techniques
- 19.5.3. Correlation Between Epidemiological Data and Imaging Findings
- 19.5.4. Contribution of Artificial Intelligence to the Study and Control of Pandemics

19.6. Analysis of Biological Networks and Disease Patterns from Images
- 19.6.1. Application of Network Theory in the Analysis of Images to Understand Pathologies
- 19.6.2. Computational Models to Simulate Biological Networks Visible in Images
- 19.6.3. Integration of Image Analysis and Molecular Data for Mapping Diseases
- 19.6.4. Impact of these Analyses on the Development of Personal Therapies

19.7. Development of Image-Based Tools for Clinical Prognosis
- 19.7.1. Artificial Intelligence Tools for the Prediction of Clinical Course from Diagnostic Images
- 19.7.2. Advances in the Generation of Automated Prognostic Reports
- 19.7.3. Integration of Prognostic Models in Clinical Systems
- 19.7.4. Validation and Clinical Acceptance of AI-Based Prognostic Tools

19.8. Advanced Visualization and Communication of Complex Data with Tableau
- 19.8.1. Visualization Techniques for the Multidimensional Representation of Image Data
- 19.8.2. Interactive Tools for the Exploration of Large Image Datasets
- 19.8.3. Strategies for Effective Communication of Complex Findings Through Visualizations
- 19.8.4. Impact of Advanced Visualization on Medical Education and Decision Making

19.9. Data Security and Challenges in Big Data Management
- 19.9.1. Security Measures to Protect Large Volumes of Medical Imaging Data
- 19.9.2. Challenges in Privacy and Ethics of Large-Scale Image Data Management
- 19.9.3. Technological Solutions for the Secure Management of Healthcare Big Data
- 19.9.4. Case Studies on Security Breaches and how they Were Addressed

19.10. Practical Applications and Case Studies on Biomedical Big Data
- 19.10.1. Examples of Successful Applications of Big Data in the Diagnosis and Treatment of Diseases
- 19.10.2. Case Studies on the Integration of Big Data
- 19.10.3. Lessons Learned from Big Data Projects in the Biomedical Field
- 19.10.4. Future Directions and Potentials of Big Data in Medicine

Module 20. Ethical and Legal Aspects of Artificial Intelligence in Diagnostic Imaging

20.1. Ethics in the Application of Artificial Intelligence in Diagnostic Imaging with Ethics and Algorithms Toolkit
- 20.1.1. Fundamental Ethical Principles in the Use of Artificial Intelligence for Diagnosis
- 20.1.2. Algorithmic Bias Management and its Impact on Diagnostic Fairness
- 20.1.3. Informed Consent in the Era of Diagnostic Artificial Intelligence
- 20.1.4. Ethical Challenges in the International Implementation of Artificial Intelligence Technologies

20.2. Legal and Regulatory Considerations in Artificial Intelligence Applied to Medical Imaging with Compliance.ai
- 20.2.1. Current Regulatory Framework for Artificial Intelligence in Diagnostic Imaging
- 20.2.2. Compliance with Privacy and Data Protection Regulations
- 20.2.3. Validation and Certification Requirements for Artificial Intelligence Algorithms in Healthcare
- 20.2.4. Legal Liability in Case of Diagnostic Errors due to Artificial Intelligence

20.3. Informed Consent and Ethical Aspects in the Use of Clinical Data
- 20.3.1. Review of Informed Consent Processes Adapted to Artificial Intelligence
- 20.3.2. Patient Education on the Use of Artificial Intelligence in their Medical Care
- 20.3.3. Transparency in the Use of Clinical Data for Artificial Intelligence Training
- 20.3.4. Respect for Patient Autonomy in Decisions Based on Artificial Intelligence

20.4. Artificial Intelligence and Accountability in Clinical Research
- 20.4.1. Assignment of Responsibilities in the Use of Artificial Intelligence for Diagnosis
- 20.4.2. Implications of Artificial Intelligence Errors in Clinical Practice
- 20.4.3. Insurance and Coverage for Risks Associated with the Use of Artificial Intelligence
- 20.4.4. Strategies for the Management of Incidents Related to Artificial Intelligence

20.5. Impact of Artificial Intelligence on Equity and Access to Health Care with AI for Good
- 20.5.1. Assessment of the Impact of Artificial Intelligence on the Distribution of Medical Services
- 20.5.2. Strategies to Ensure Equitable Access to AI Artificial Intelligence Technology
- 20.5.3. Artificial Intelligence as a Tool to Reduce Health Disparities
- 20.5.4. Case Studies on the Implementation of Artificial Intelligence in Resource-Limited Settings

20.6. Privacy and Data Protection in Research Projects using Duality SecurePlus
- 20.6.1. Strategies for Ensuring Data Confidentiality in Artificial Intelligence Projects
- 20.6.2. Advanced Techniques for Patient Data Anonymization
- 20.6.3. Legal and Ethical Challenges in the Protection of Personal Data
- 20.6.4. Impact of security breaches on public trust and confidence

20.7. Artificial Intelligence and Sustainability in Biomedical Research with Green Algorithm
- 20.7.1. Use of Artificial Intelligence to Improve Efficiency and Sustainability in Research
- 20.7.2. Life Cycle Assessment of Artificial Intelligence Technologies in Healthcare
- 20.7.3. Environmental Impact of Artificial Intelligence Technology Infrastructure
- 20.7.4. Sustainable Practices in the Development and Deployment of Artificial Intelligence

20.8. Auditing and Explainability of Artificial Intelligence Models in the Clinical Setting with IBM AI Fairness 360
- 20.8.1. Importance of Regular Auditing of AI Algorithms
- 20.8.2. Techniques to Improve the Explainability of AI Models
- 20.8.3. Challenges in Communicating AI-Based Decisions to Patients and Physicians
- 20.8.4. Regulations on the Transparency of Artificial Intelligence Algorithms in Healthcare

20.9. Innovation and Entrepreneurship in the Field of Clinical Artificial Intelligence with Hindsait
- 20.9.1. Opportunities for Startups in Artificial Intelligence Technologies for Healthcare
- 20.9.2. Collaboration Between the Public and Private Sectors in the Development of Artificial Intelligence
- 20.9.3. Challenges for Entrepreneurs in the Healthcare Regulatory Environment
- 20.9.4. Success Stories and Lessons Learned in Clinical Artificial Intelligence Entrepreneurship

20.10. Ethical Considerations in International Clinical Research Collaboration with Global Alliance for Genomics and Health with GA4GH
- 20.10.1. Ethical Coordination in International AI Projects
- 20.10.2. Managing Cultural and Regulatory Differences in International Collaborations
- 20.10.3. Strategies for Equitable Inclusion in Global Studies
- 20.10.4. Challenges and Solutions in Data Sharing

Do you want to increase your safety in clinical decision making through the use of Artificial Intelligence? Achieve it with this university program in less than a year"

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

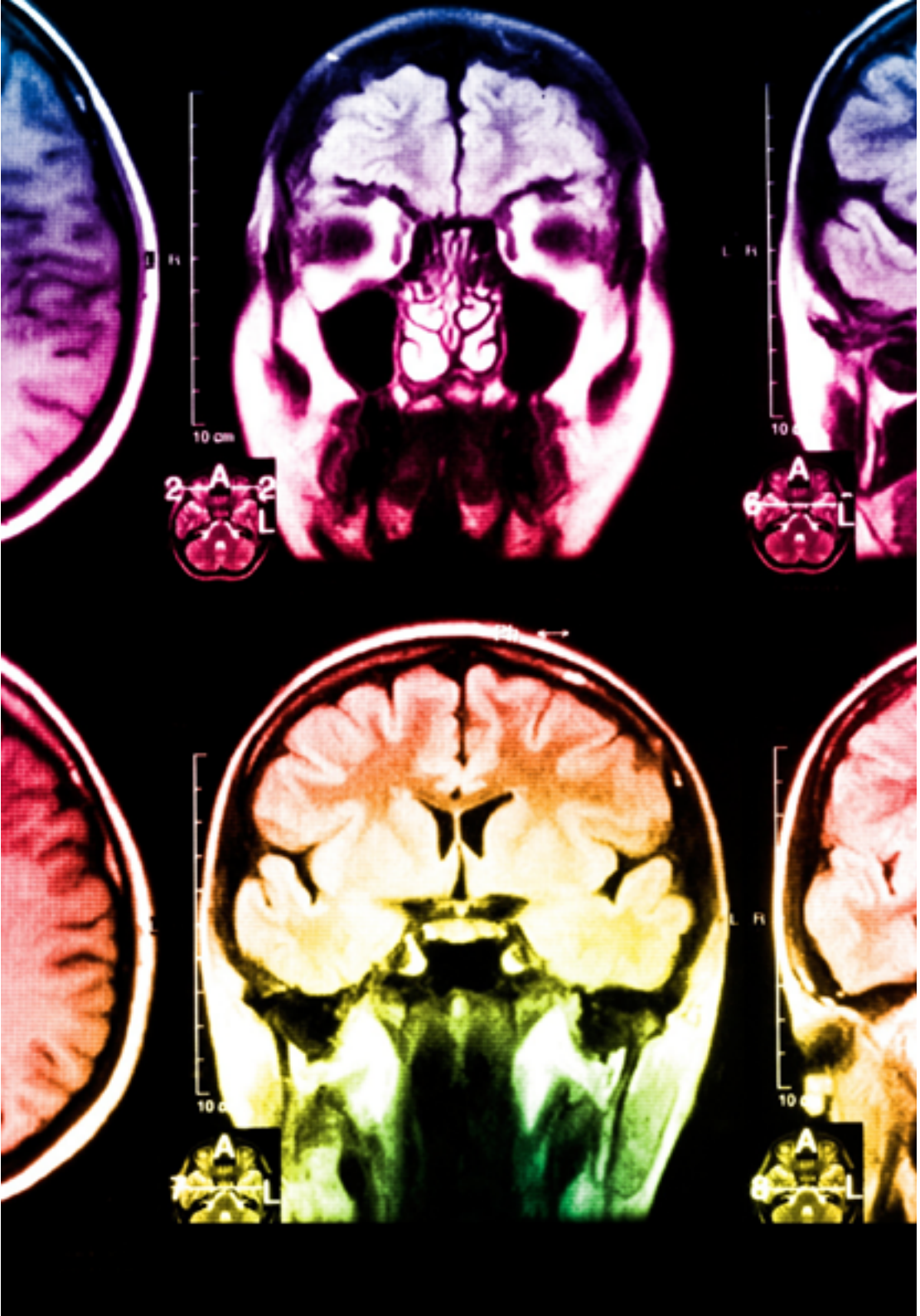
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

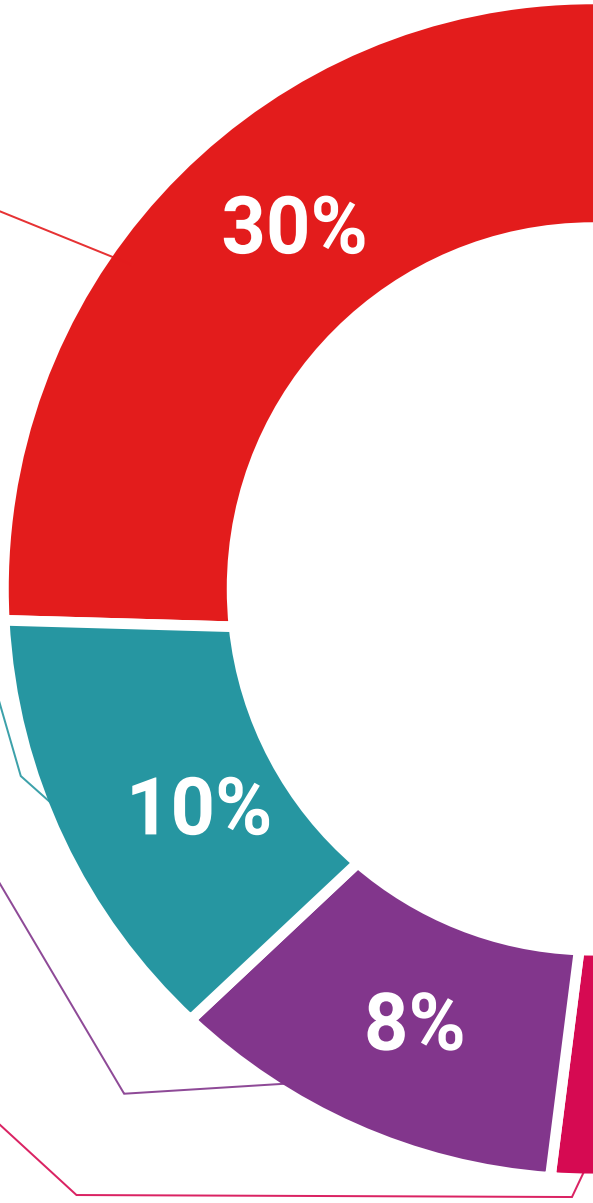
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

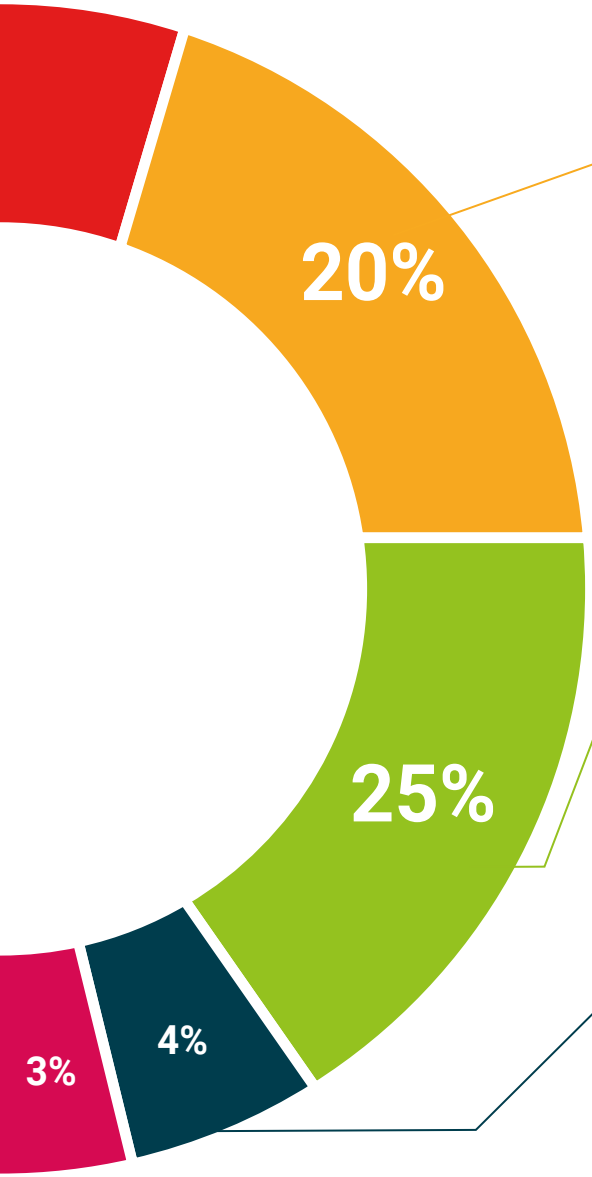
Practising Skills and Abilities

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 Master's Degree in Artificial Intelligence in Diagnostic Imaging guarantees students, in addition to the most rigorous and up-to-date education, access to a 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 **Master's Degree diploma in Artificial Intelligence in the Financial Department** endorsed by **TECH Global University**, the world's largest online university.

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

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

Title: **Master's Degree in Artificial Intelligence in Diagnostic Imaging**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**


tech global university

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

Master's Degree in Artificial Intelligence in Diagnostic Imaging

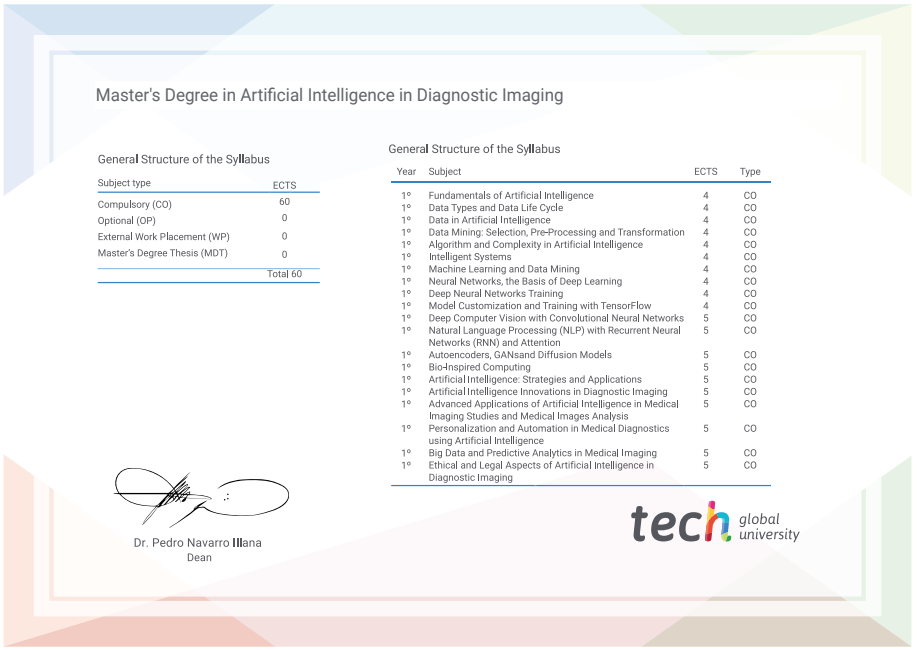
This is a private qualification of 1,800 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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

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

Dr. Pedro Navarro Illana
Dean

Unique TECH Code: AFWORD23S techtitute.com/certificates


Master's Degree in Artificial Intelligence in Diagnostic Imaging

General Structure of the Syllabus

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

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Fundamentals of Artificial Intelligence	4	CO
1º	Data Types and Data Life Cycle	4	CO
1º	Data in Artificial Intelligence	4	CO
1º	Data Mining: Selection, Pre-Processing and Transformation	4	CO
1º	Algorithm and Complexity in Artificial Intelligence	4	CO
1º	Intelligent Systems	4	CO
1º	Machine Learning and Data Mining	4	CO
1º	Neural Networks, the Basis of Deep Learning	4	CO
1º	Deep Neural Networks Training	4	CO
1º	Model Customization and Training with TensorFlow	4	CO
1º	Deep Computer Vision with Convolutional Neural Networks	5	CO
1º	Natural Language Processing (NLP) with Recurrent Neural Networks (RNN) and Attention	5	CO
1º	Autoencoders, GANsand Diffusion Models	5	CO
1º	Bio-Inspired Computing	5	CO
1º	Artificial Intelligence: Strategies and Applications	5	CO
1º	Artificial Intelligence Innovations in Diagnostic Imaging	5	CO
1º	Advanced Applications of Artificial Intelligence in Medical Imaging Studies and Medical Images Analysis	5	CO
1º	Personalization and Automation in Medical Diagnostics using Artificial Intelligence	5	CO
1º	Big Data and Predictive Analytics in Medical Imaging	5	CO
1º	Ethical and Legal Aspects of Artificial Intelligence in Diagnostic Imaging	5	CO

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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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Master's Degree
Artificial Intelligence in Diagnostic Imaging

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

Master's Degree

Artificial Intelligence in Diagnostic Imaging

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