Postgraduate Diploma

Deep Learning

tech technological university

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Postgraduate Diploma
Deep Learning

- Modality: **online**
- Duration: **6 months**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/in/artificial-intelligence/postgraduate-diploma/postgraduate-diploma-deep-learning**

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01

Introduction

Artificial Intelligence is a booming and developing field that is proving to have a major impact on the employment landscape. A clear example is Deep Learning, which is revolutionizing the ability of computers to both understand and process images. As such, it is leading to breakthroughs in a variety of fields, such as the manufacturing industry. Deep Learning is used to optimize creation processes, perform automated quality inspections, predict maintenance and improve efficiency. In this way, companies obtain benefits such as cost reduction, quality improvement and productivity increase. Given this, TECH has developed a fully digital program that will delve into this subset of Machine Learning.

You will master the principles of Deep Learning and generate the most accurate predictions with this 100% online Postgraduate Diploma"

Neural Networks are the fundamental basis of Deep Learning. Inspired by the functioning of the human brain and composed of neurons, these systems provide the computational foundation for machines to learn from data efficiently and automatically. In this way, they perform complex tasks with similar or even better performance than humans in multiple tasks such as machine translation or the analysis of large data sets. However, these tools still face several challenges that limit their effectiveness and applicability in certain areas. It is therefore the responsibility of experts to update their knowledge frequently in order to keep abreast of all developments in this field and to incorporate them into their practice in order to optimize their procedures.

In this context, TECH creates a Postgraduate Diploma that will offer a solid understanding of how Deep Learning works, as well as the most advanced tools to build Neural Networks. The curriculum will range from key mathematical fundamentals (such as functions or derivatives) to the principles of Supervised Learning (including different models, evaluation metrics and hyperparameter selection). The syllabus will also focus on the numerous utilities of Deep Learning, so that graduates will be aware of the current situation of the labor market and multiply their chances of success in fields such as automotive, computer science, biology or finance. It should be noted that the university degree will include the analysis of real cases in simulated learning environments. Students will learn valuable lessons that they will incorporate into their procedures to ensure their viability.

To consolidate all these contents, TECH uses the innovative methodology of Relearning. This is based on constant feedback and adaptation to the individual needs of the students based on targeted repetition. With any electronic device with Internet access, students will be able to access the Virtual Campus and get the most complete didactic contents in the educational market.

This **Postgraduate Diploma in Deep Learning** contains the most complete and up-to-date program on the market. The most important features include:

- The development of case studies presented by experts in *deep learning*
- The graphical, schematic and practical contents with which it is conceived gather technological and practical information on those 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

Do you want to specialize in the use of Supervised Learning Machines? Get it through 450 hours of the best digital teaching"

You will delve into the world of deep learning algorithms and acquire technical knowledge that will allow you to excel in the area of Social Sciences."

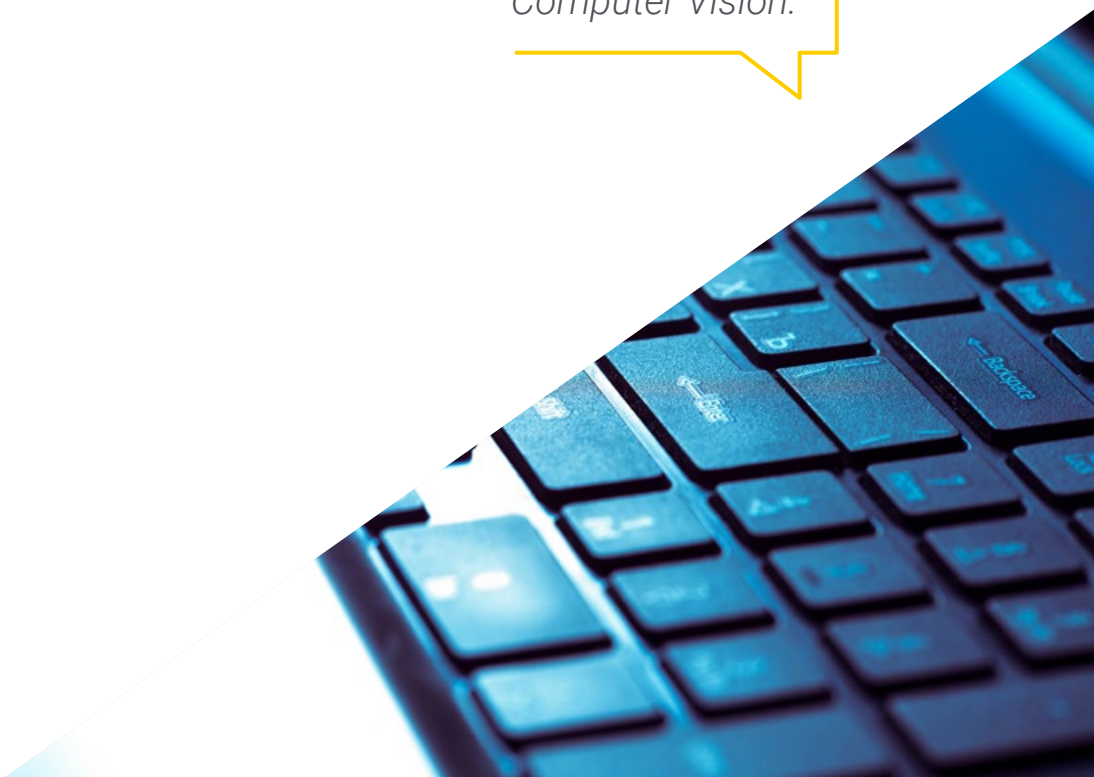
You will delve into the architecture of Neural Networks and their different types to solve everyday problems through Deep Learning.

A complete syllabus that incorporates all the knowledge you need to take a step towards the highest quality in Computer Vision.

The program's teaching staff includes professionals from the sector who contribute their work experience to this 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 academic year For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.



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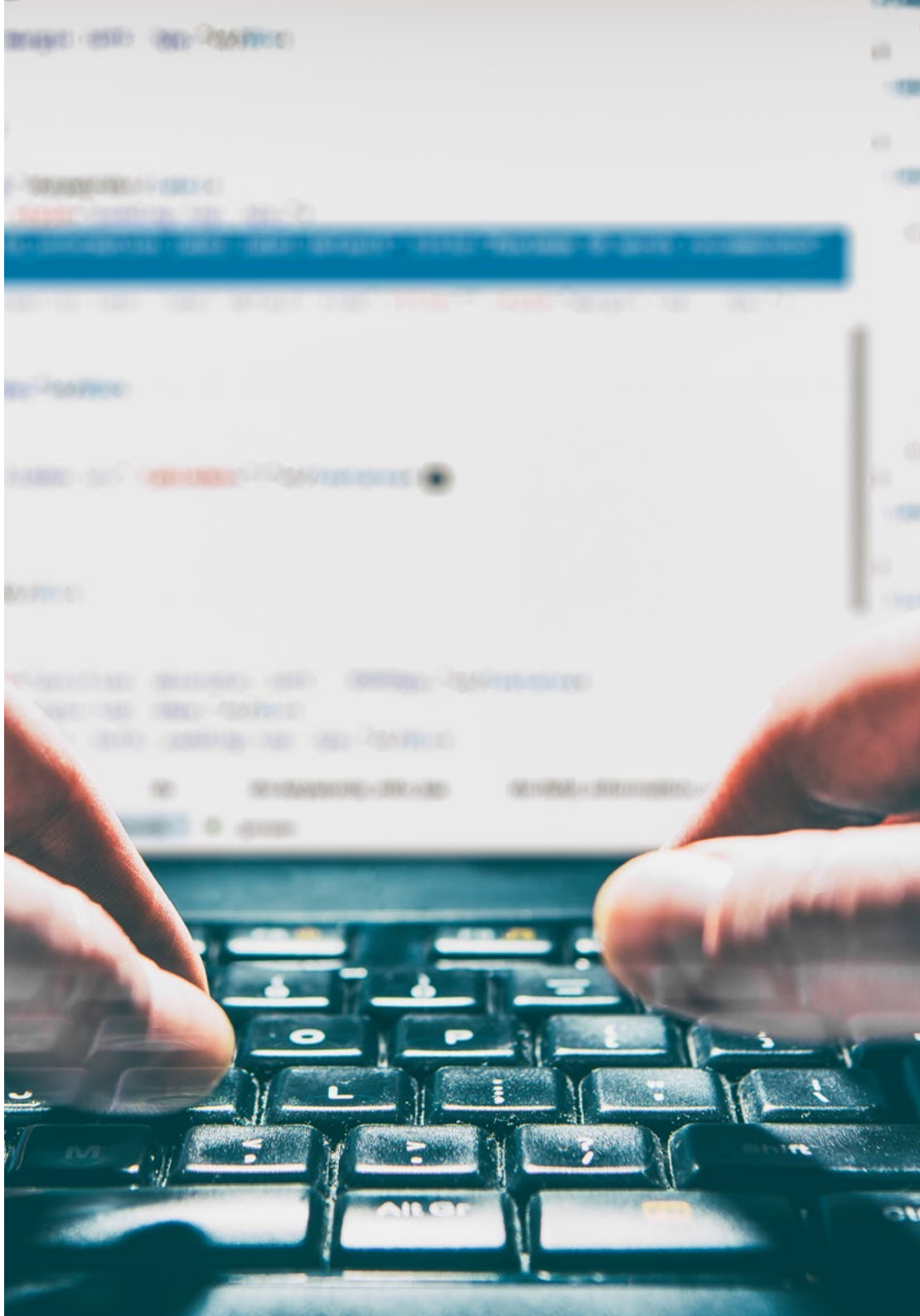
Objectives

The Postgraduate Diploma will turn graduates into true references in Deep Learning. At the end of the academic pathway, they will have gained solid knowledge of the subject and acquired new skills that will significantly improve their chances of progression in the technology industry. In addition, they will be highly prepared to successfully tackle any obstacle that may arise in the course of their activities. Experts will even be able to develop projects linked to Artificial Intelligence to offer the most prestigious companies in their environment highly innovative and creative solutions.

Get the keys to optimize Backward Pass parameters thanks to this Postgraduate Diploma"

General Objectives

- Fundamentalize the key concepts of mathematical functions and their derivatives
- Apply these principles to deep learning algorithms to learn automatically
- Examine the key concepts of Supervised Learning and how they apply to neural network models
- Analyze the program, evaluation and analysis of neural network models
- Fundamentals of the key concepts and main applications of deep learning
- Implement and optimize neural networks with Keras
- Develop expertise in the training of deep neural networks
- Analyze the optimization and regularization mechanisms required for deep neural network training



Specific Objectives

Module 1. Mathematical Basis of Deep Learning

- Develop the chain rule for calculating derivatives of nested functions
- Analyze how to create new functions from existing functions and how to compute the derivatives of these functions
- Examine the concept of *Backward Pass* and how derivatives of vector functions are applied to automatic learning
- Learn how to use TensorFlow to build custom models
- Understand how to load and process data using TensorFlow tools
- Fundamentalize the key concepts of NLP natural language processing with RNN and attention mechanisms
- Explore the functionality of Hugging Face *transformer* libraries and other natural language processing tools for application to vision problems
- Learn how to build and train autoencoder models, GANs, and diffusion models
- Understand how autoencoders can be used to efficiently encode data

Module 2. Deep Learning Principles

- Analyze how linear regression works and how it can be applied to neural network models
- Understand the rationale for optimizing hyperparameters to improve the performance of neural network models
- Determine how the performance of neural network models can be evaluated using the training set and the test set

Module 3. Neural Networks, the Basis of *Deep Learning*

- Analyze the architecture of neural networks and their principles of operation
- Determine how neural networks can be applied to a variety of problems
- Establish how to optimize the performance of deep learning models by tuning hyperparameters

A contextual and realistic educational experience that will immerse you in the reality of a profession full of challenges"

03

Course Management

Loyal to its philosophy of providing the most complete and updated university programs in the academic market, TECH has a highly qualified teaching team in the field of Artificial Intelligence. These professionals pour into the academic content both their solid knowledge and years of work experience. In addition, in their responsibility to offer top quality services, they remain at the forefront of the trends that have occurred in the field of *Deep Learning* in recent years. These teachers will accompany the students in their updating process, providing them with personalized attention and guiding them in their professional development.

Take a step forward in your professional career with this high-level training, taught by Deep Learning experts with extensive work experience"

Management

Mr. Gil Contreras, Armando

- Lead Big Data Scientist at Johnson Controls
- Data Scientist-Big Data at Opensistemas S.A
- Fund Auditor at Creatividad and Tecnología (CYTSA)
- Public Sector Auditor at PricewaterhouseCoopers Auditors
- Master's Degree in Data Science from the Centro Universitario de Tecnología y Arte
- MBA in International Relations and Business from the Centro de Estudios Financieros (CEF)
- Bachelor's Degree in Economics from Instituto Tecnológico de Santo Domingo

Professors

Ms. Delgado Feliz, Benedit

- Administrative Assistant and Electronic Surveillance Operator for the National Drug Control Directorate (DNCD)
- Customer Service at Cáceres y Equipos
- Claims and Customer Service at Express Parcel Services (EPS)
- Microsoft Office Specialist at the National School of Informatics (Escuela Nacional de Informática)
- Social Communicator from the Catholic University of Santo Domingo

Mr. Villar Valor, Javier

- Director and Founding Partner of Impulsa2
- *Chief Operations Officer* (COO) at Summa Insurance Brokers
- Director of Transformation and Operational Excellence at Johnson Controls
- Master in Professional *Coaching*
- Executive MBA from Emlyon Business School, France
- Master's Degree in Quality Management from EOI, Spain
- Computer Engineering from the Universidad Acción Pro-Education and Culture (UNAPEC)

Mr. Matos Rodríguez, Dionis

- Data Engineer at Wide Agency Sodexo
- Data Consultant at Tokiota
- Data Engineer at Devoteam
- BI Developer at Ibermática
- Applications Engineer at Johnson Controls
- Database Developer at Suncapital España
- Senior Web Developer at Deadlock Solutions
- QA Analyst at Metaconxept
- Master's Degree in Big Data & Analytics by EAE Business School
- Master's Degree in Systems Analysis and Design
- Bachelor's Degree in Computer Engineering from APEC University

Ms. Gil de León, María

- Co-Director of Marketing and Secretary at RAÍZ Magazine
- Copy Editor at Gauge Magazine
- Stork Magazine reader from Emerson College
- B.A. in Writing, Literature and Publishing from Emerson College

04

Structure and Content

The Postgraduate Diploma is designed to provide students with a comprehensive view of the various applications of Deep Learning. For this reason, the academic itinerary will cover from its mathematical principles to the training of deep neural networks. Furthermore, the curriculum will focus on the evaluation of Deep Learning models and the visualization of results. During the training, students will acquire advanced skills that will allow them to effectively implement the multilayer perceptron with Keras. In this way, graduates will perform learning tasks in different domains and carry out a variety of data processing tasks.

In just 6 months, you will be able to develop from start to finish a complete Neural Network"

Module 1. Mathematical Basis of Deep Learning

1.1. Functions and Derivatives
- 1.1.1. Linear Functions
- 1.1.2. Partial Derivative
- 1.1.3. Higher Order Derivatives

1.2. Multiple Nested Functions
- 1.2.1. Compound Functions
- 1.2.2. Inverse Functions
- 1.2.3. Recursive Functions

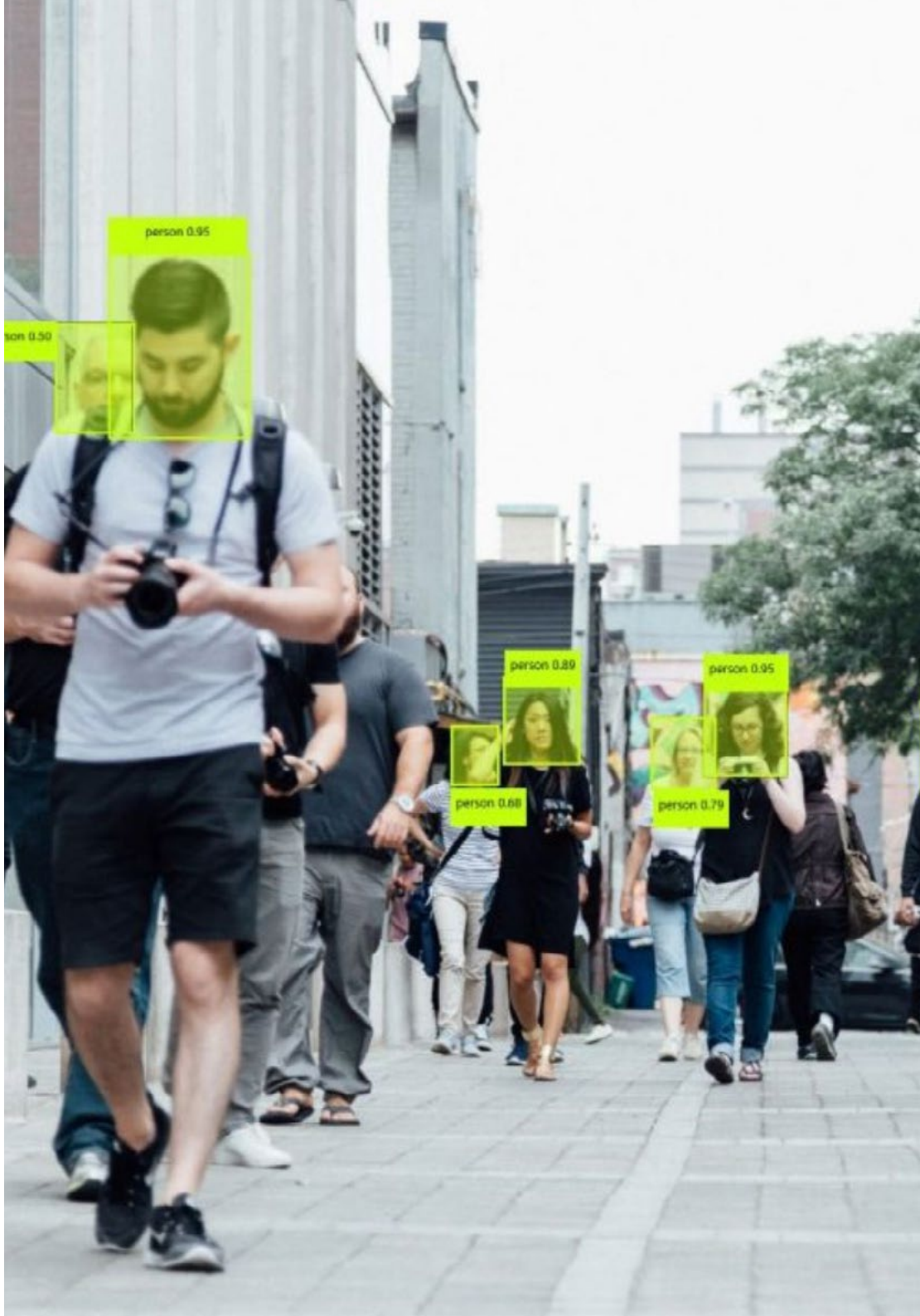
1.3. Chain Rule
- 1.3.1. Derivatives of Nested Functions
- 1.3.2. Derivatives of Compound Functions
- 1.3.3. Derivatives of Inverse Functions

1.4. Functions with Multiple Inputs
- 1.4.1. Multi-variable Functions
- 1.4.2. Vectorial Functions
- 1.4.3. Matrix Functions

1.5. Derivatives of Functions with Multiple Inputs
- 1.5.1. Partial Derivative
- 1.5.2. Directional Derivatives
- 1.5.3. Mixed Derivatives

1.6. Functions with Multiple Vector Inputs
- 1.6.1. Linear Vector Functions
- 1.6.2. Non-linear Vector Functions
- 1.6.3. Matrix Vector Functions

1.7. Creating New Functions from Existing Functions
- 1.7.1. Addition of Functions
- 1.7.2. Product of Functions
- 1.7.3. Composition of Functions



1.8. Derivatives of Functions with Multiple Vector Entries
- 1.8.1. Derivatives of Linear Functions
- 1.8.2. Derivatives of Nonlinear Functions
- 1.8.3. Derivatives of Compound Functions

1.9. Vector Functions and their Derivatives: A Step Further
- 1.9.1. Directional Derivatives
- 1.9.2. Mixed Derivatives
- 1.9.3. Matrix Derivatives

1.10. The Backward Pass
- 1.10.1. Error Propagation
- 1.10. 2 Application of Update Rules
- 1.10.3. Parameter Optimization

Module 2. Deep Learning Principles

2.1. Supervised Learning
- 2.1.1. Supervised Learning Machines
- 2.1.2. Uses of Supervised Learning
- 2.1.3. Differences between Supervised and Unsupervised Learning

2.2. Supervised Learning Models
- 2.2.1. Linear Models
- 2.2.2. Decision Tree Models
- 2.2.3. Neural Network Models

2.3. Linear Regression
- 2.3.1. Simple Linear Regression
- 2.3.2. Multiple Linear Regression
- 2.3.3. Regression Analysis

2.4. Model Training
- 2.4.1. Batch Learning
- 2.4.2. Online Learning
- 2.4.3. Optimization Methods

2.5. Model Evaluation: Training Set vs. Test Set
- 2.5.1. Evaluation Metrics
- 2.5.2. Cross Validation
- 2.5.3. Comparison of Data Sets

2.6. Model Evaluation: The Code
- 2.6.1. Prediction Generation
- 2.6.2. Error Analysis
- 2.6.3. Evaluation Metrics

2.7. Variables Analysis
- 2.7.1. Identification of Relevant Variables
- 2.7.2. Correlation Analysis
- 2.7.3. Regression Analysis

2.8. Explainability of Neural Network Models
- 2.8.1. Interpretable Models
- 2.8.2. Visualization Methods
- 2.8.3. Evaluation Methods

2.9. Optimization
- 2.9.1. Optimization Methods
- 2.9.2. Regularization Techniques
- 2.9.3. The Use of Graphs

2.10. Hyperparameters
- 2.10.1. Selection of Hyperparameters
- 2.10.2. Parameter Search
- 2.10.3. Hyperparameter Tuning

Module 3. Neural Networks, the Basis of Deep Learning

3.1. Deep Learning
- 3.1.1. Types of Deep Learning
- 3.1.2. Applications of Deep Learning
- 3.1.3. Advantages and Disadvantages of Deep Learning

3.2. Operations
- 3.2.1. Sum
- 3.2.2. Product
- 3.2.3. Transfer

3.3. Layers
- 3.3.1. Input Layer
- 3.3.2. Cloak
- 3.3.3. Output Layer

3.4. Union of Layers and Operations
- 3.4.1. Architecture Design
- 3.4.2. Connection between Layers
- 3.4.3. Forward Propagation

3.5. Construction of the First Neural Network
- 3.5.1. Network Design
- 3.5.2. Establish the Weights
- 3.5.3. Network Training

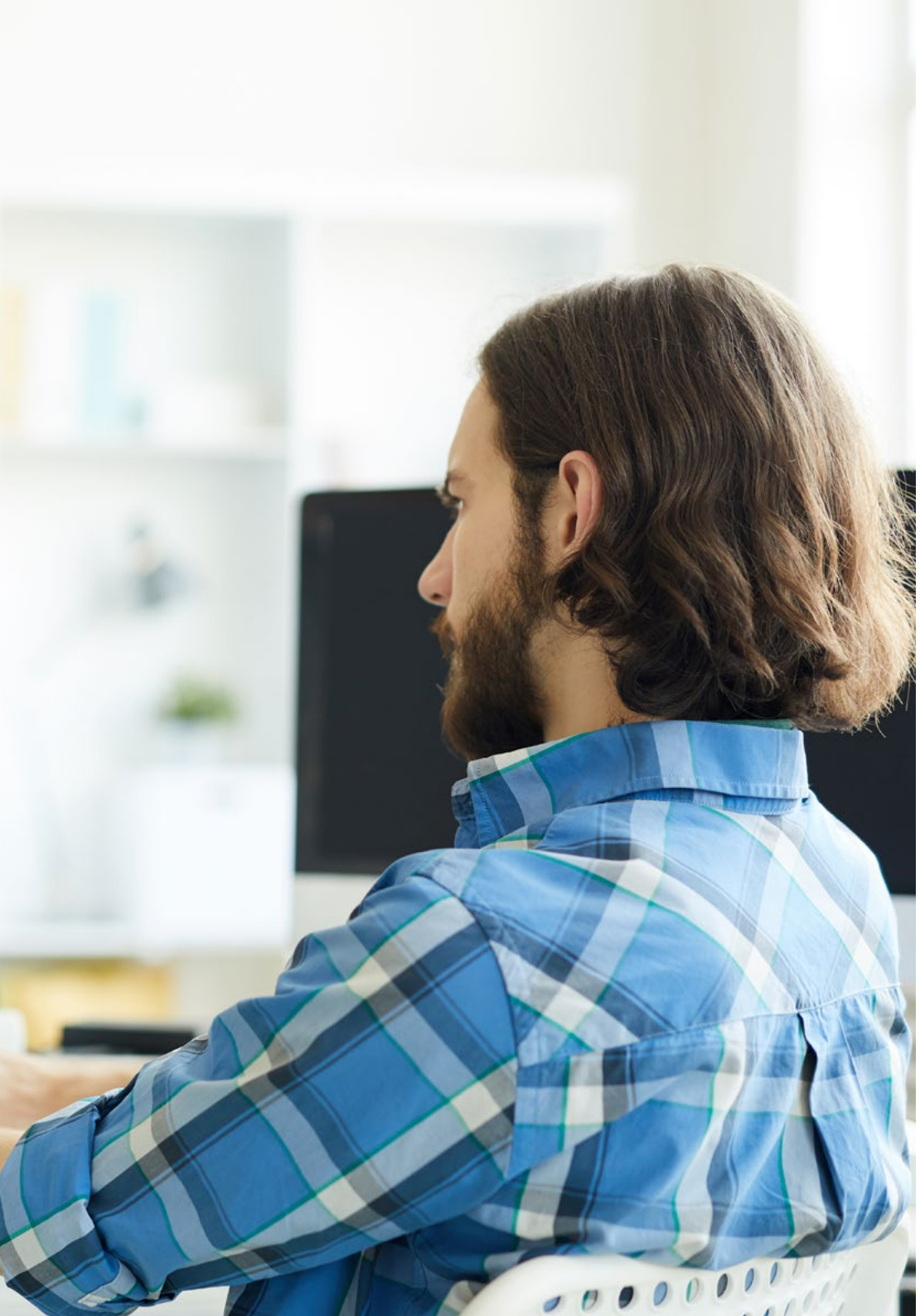
3.6. Trainer and Optimizer
- 3.6.1. Optimizer Selection
- 3.6.2. Establishment of a Loss Function
- 3.6.3. Establishing a Metric

3.7. Application of the Principles of Neural Networks
- 3.7.1. Activation Functions
- 3.7.2. Backward Propagation
- 3.7.3. Parameter Adjustment

3.8. From Biological to Artificial Neurons
- 3.8.1. Functioning of a Biological Neuron
- 3.8.2. Transfer of Knowledge to Artificial Neurons
- 3.8.3. Establish Relations between the Two

3.9. Implementation of MLP (Multilayer Perceptron) with Keras
- 3.9.1. Definition of the Network Structure
- 3.9.2. Model Compilation
- 3.9.3. Model Training

3.10. Fine Tuning Hyperparameters of Neural Networks
- 3.10.1. Selection of the Activation Function
- 3.10.2. Set the Learning Rate
- 3.10.3. Adjustment of Weights



You have a wide range of learning resources You will 24 hours a day, 7 days a week"

05

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

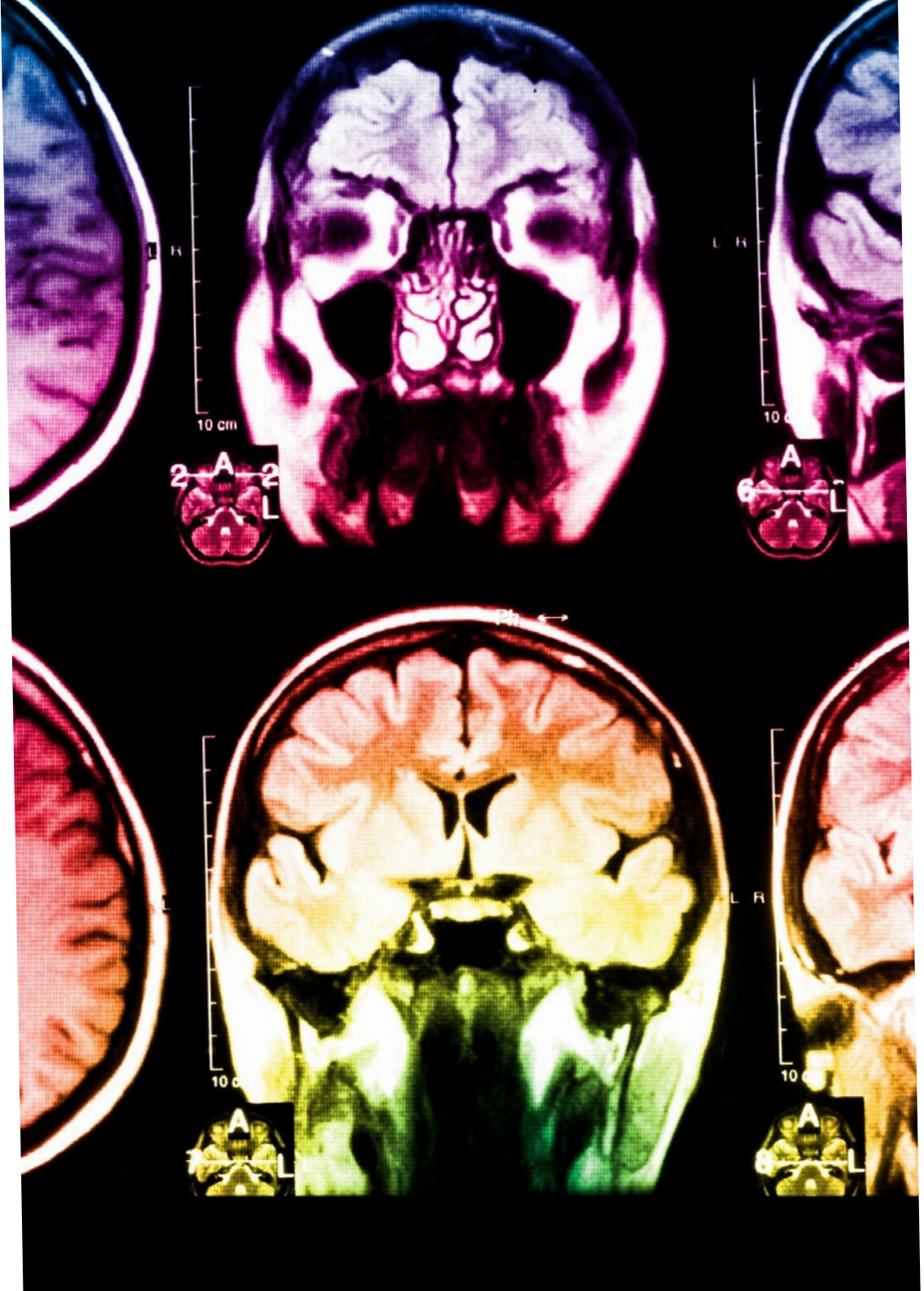
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

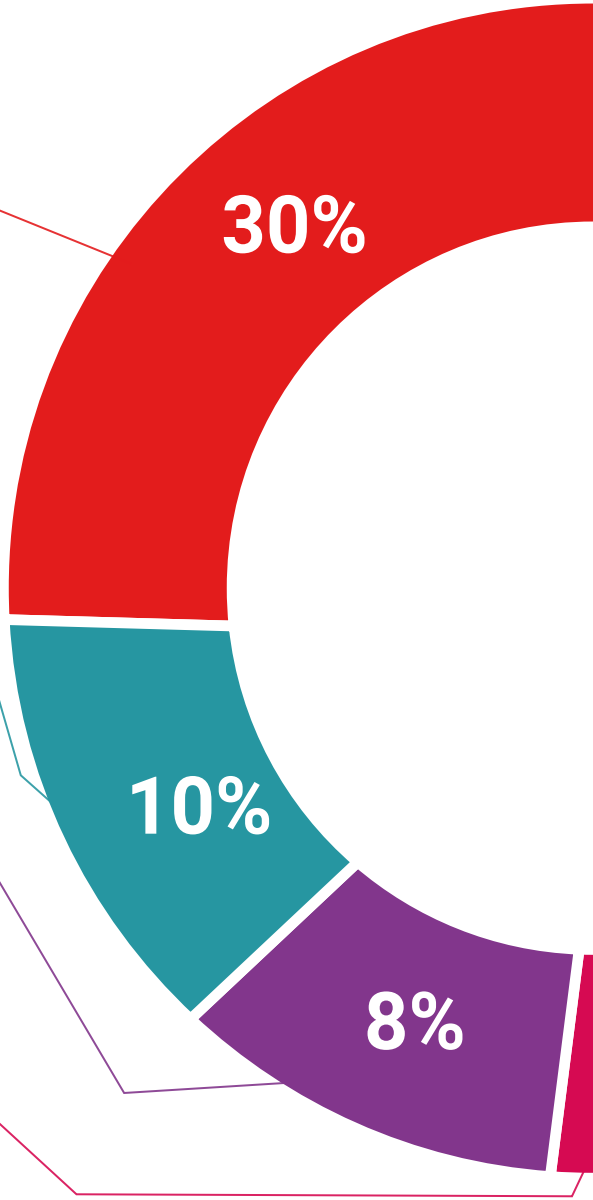
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

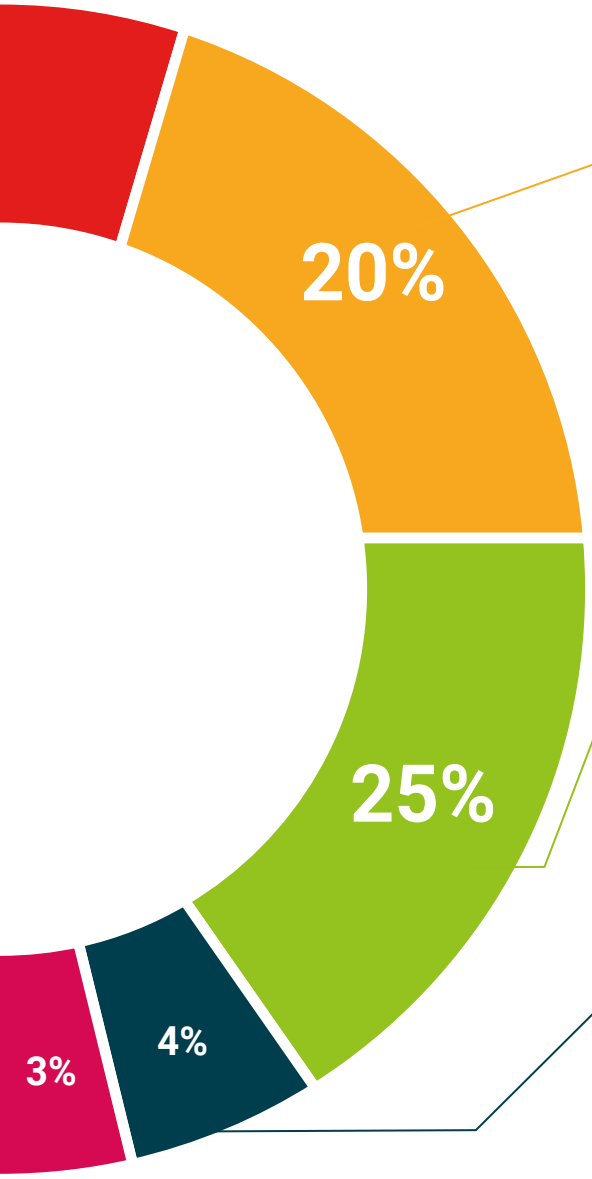
Practising Skills and Abilities

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.

06

Certificate

The Postgraduate Diploma in Deep Learning guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma issued by TECH Technological University.

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

This **Postgraduate Diploma in Deep Learning** contains the most complete and up-to-date program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Diploma** issued by **TECH Technological University** via tracked delivery*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Diploma, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Diploma in Deep Learning**

Official Nº of Hours: **450 h.**


tech technological university

Awards the following

CERTIFICATE

to

Mr./Ms. _____, with identification number _____.

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

in

Deep Learning

This is a qualification awarded by this University, equivalent to 450 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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

June 17, 2020

Tere Guevara Navarro

Dean

Unique TECH Code: AFWORD23S techtitute.com/certificates

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

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- Schedule: **at your own pace**
- Exams: **online**

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