Postgraduate Certificate

Deep Computer Vision with Convolutional Neural Networks

tech global university

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Postgraduate Certificate

Deep Computer Vision with Convolutional Neural Networks

- Modality: **online**
- Duration: **6 weeks**
- Certificate: **TECH Global University**
- Accreditation: **6 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/artificial-intelligence/postgraduate-certificate/deep-computer-vision-convolutional-neural-networks**

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01

Introduction

Within the field of Artificial Intelligence, Deep Computer Vision is booming and is playing a key role in society. According to a recent Quote Data Report, spending by governments and institutions to implement these technological solutions will exceed $500 billion next year. This is evidence that the future of companies will be closely linked to advances in this branch of technology. Therefore, it is necessary for specialists to keep abreast of the latest trends in Deep Learning to improve the consumer experience by personalizing goods or services. In view of this, TECH is creating an online program that will delve into the advances in Computer Vision.

Specialize in Transfer Learning to raise your professional horizons and make the leap to the powerful computer industry, through this 100% online Postgraduate Certificate"

Deep Computer Vision is one of the most important areas of Deep Learning, because it focuses on training Neural Network models to both understand and analyze images in an automated way. Among its main benefits is the automatic extraction of relevant features from visual resources during the architecture training process. In this way, it eliminates the need to manually design algorithms to extract the information.In turn, it simplifies this process while reducing aspects such as the time or effort required. In addition, this system has a wide range of applications such as the identification and tracking of human faces in videos. This is especially useful in biometric in biometric security procedures.

In this scenario, TECH is launching a state-of-the-art Postgraduate Certificate in Deep Computer Vision with Convolutional Neural Networks. The program will allow students to renew their knowledge, while acquiring new skills in image processing and Deep Learning. The curriculum will delve into essential issues such as the functions of the visual cortex, the reuse of weights in convolution or the principles of activation. The syllabus will also provide students with the keys to implement grouping layers with the Keras tool. This will enable graduates to appropriately reduce the dimensionality of features previously extracted by convolution layers. Also the didactic materials will highlight the importance of pre-rendered models for Transfer Learning, as well as the localization of objects in images and their corresponding tracking by means of algorithms or tracking techniques.

To reinforce these contents, the methodology of this program reinforces its innovative character. TECH offers a 100% online learning environment, adapted to the needs of busy professionals. It also uses the Relearning methodology, based on the repetition of key concepts to fix knowledge and facilitate learning. In this way, the combination of flexibility and a robust pedagogical approach makes it highly accessible.

This **Postgraduate Certificate in Deep Computer Vision with Convolutional Neural Networks** 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 Computer Vision* with Convolutional Neural Networks
- The graphic, schematic and practical contents of the program provide Sports and practical information on those disciplines that are essential for professional practice
- Practical exercises where the self-assessment process can be carried out to improve learning
- Its special emphasis on innovative methodologies
- Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- Content that is accessible from any fixed or portable device with an Internet connection

You will get the most out of the Keras tool and experiment with a plurality of Neural Network architectures in an efficient way"

You will expertly handle 2D Convulsion and extract the most important features from an image"

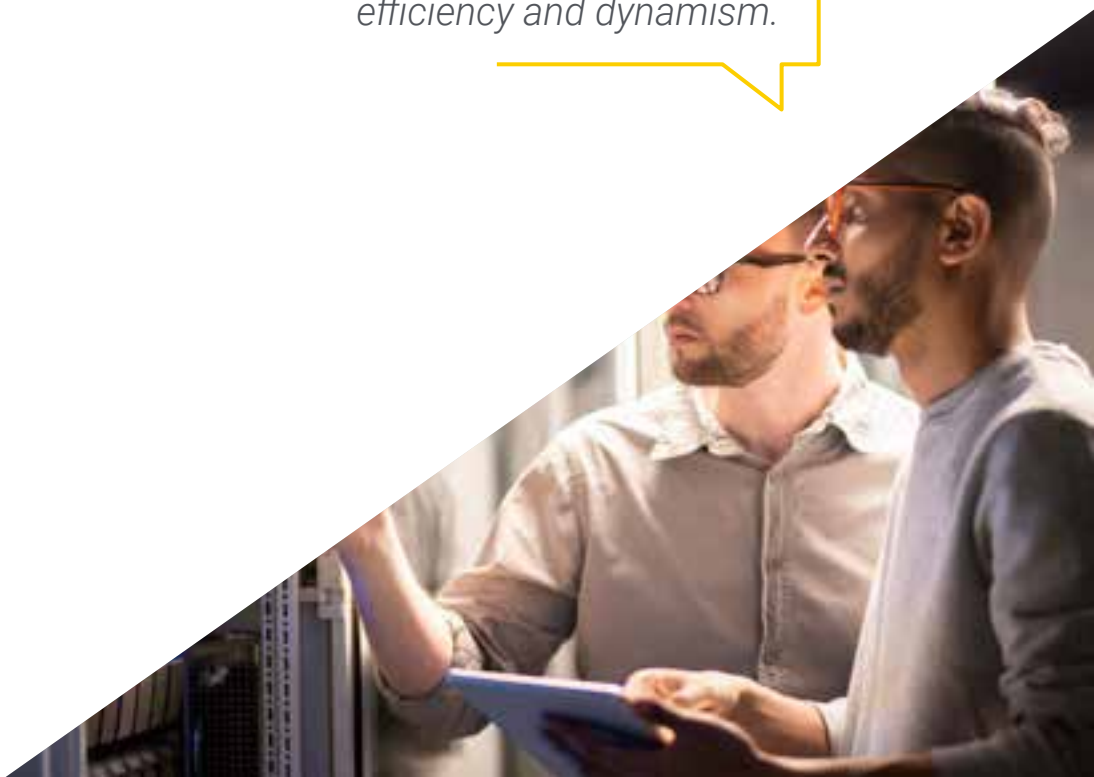
You will have the opportunity to consult your doubts directly with the teaching staff, who will provide you with personalized tutoring according to your needs and demands.

A study plan based on the revolutionary Relearning methodology, which will allow you to consolidate complex concepts with efficiency and dynamism.

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

After completing this Postgraduate Certificate in Deep Computer Vision with Convolutional Neural Networks, graduates will strengthen their regular professional practices by having a holistic approach to the advances that have been made in this area of Artificial Intelligence. In this sense, they will master the basic principles of Computer Vision, including image acquisition and semantic segmentation. In addition, professionals will obtain advanced skills in programming, especially in the use of tools such as TensorFlow and Keras. Therefore, they will be prepared to tackle real-world problems using innovative Deep Learning techniques and CNNs.

This university program is designed for you to fulfill your most ambitious career aspirations. And in as little as 6 weeks!"

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 training, 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

- Explore and understand how convolutional and clustering layers work for Visual Cortex architecture
- Develop CNN architectures with Keras
- Use pre-trained Keras models for object classification, localization, detection, and tracking, as well as semantic segmentation
- Master the handling of Convolutional Neural Networks, including clustering layers and reuse of weights

Updating your knowledge about the implementation of a ResNet-34 CNN using Keras will be easier thanks to the multimedia resources provided by this program"

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Course Management

In line with its philosophy, TECH makes an effort to provide educational experiences of the highest level. For this Postgraduate Certificate, TECH has carried out a rigorous selection process to choose its teaching team. Among the criteria for choosing them, we highlight both their educational development and extensive professional experience in the field of Deep Learning Likewise, these experts are committed to Artificial Intelligence and keep up to date with the advances that arise in this discipline. This is a guarantee for the students, who will have access to a quality education from the hand of references who will guide them throughout the process.

The teachers of this university program will provide you with the most innovative rule-based segmentation methods, to keep you at the technological forefront"

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

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Structure and Content

From a theoretical-practical perspective, this Postgraduate Certificate will delve into the essential fundamentals of Convolutional Neural Networks, including both their usefulness and the mathematical principles behind their operation. Designed by experts in *Deep Computer Vision*, the syllabus will analyze the Cortex Visual Architecture by exploring its main theories and image processing models. Students will delve into the different types of *Pooling* to achieve a more efficient processing and effective feature extraction in Computer Vision applications. In addition, they will nurture their praxis with the most advanced techniques in object detection and tracking.

You will implement CNNs architectures efficiently and train them for a variety of tasks such as image classification, semantic segmentation or object detection"

Module 1. Deep Computer Vision with Convolutional Neural Networks

1.1. The Visual Cortex Architecture
- 1.1.1. Functions of the Visual Cortex
- 1.1.2. Theories of Computational Vision
- 1.1.3. Models of Image Processing

1.2. Convolutional Layers
- 1.2.1. Reuse of Weights in Convolution
- 1.2.2. 2D Convolution
- 1.2.3. Activation Functions

1.3. Grouping Layers and Implementation of Grouping Layers with Keras
- 1.3.1. Pooling and Striding
- 1.3.2. Flattening
- 1.3.3. Types of Pooling

1.4. CNN Architecture
- 1.4.1. VGG Architecture
- 1.4.2. AlexNet Architecture
- 1.4.3. ResNet Architecture

1.5. Implementation of a ResNet-34 CNN using Keras
- 1.5.1. Weight Initialization
- 1.5.2. Input Layer Definition
- 1.5.3. Output Definition

1.6. Use of Pre-trained Keras Models
- 1.6.1. Characteristics of Pre-trained Models
- 1.6.2. Uses of Pre-trained Models
- 1.6.3. Advantages of Pre-trained Models

1.7. Pre-trained Models for Transfer Learning
- 1.7.1. Transfer Learning
- 1.7.2. Transfer Learning Process
- 1.7.3. Advantages of Transfer Learning

1.8. Deep Computer Vision Classification and Localization
- 1.8.1. Image Classification
- 1.8.2. Localization of Objects in Images
- 1.8.3. Object Detection

1.9. Object Detection and Object Tracking
- 1.9.1. Object Detection Methods
- 1.9.2. Object Tracking Algorithms
- 1.9.3. Tracking and Localization Techniques

1.10. Semantic Segmentation
- 1.10.1. Deep Learning for Semantic Segmentation
- 1.10.2. Edge Detection
- 1.10.3. Rule-based Segmentation Methods

Reach your full potential in the Field of Computer Science thanks to the most complete pedagogical and practical materials on the educational market" Enroll now!"

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

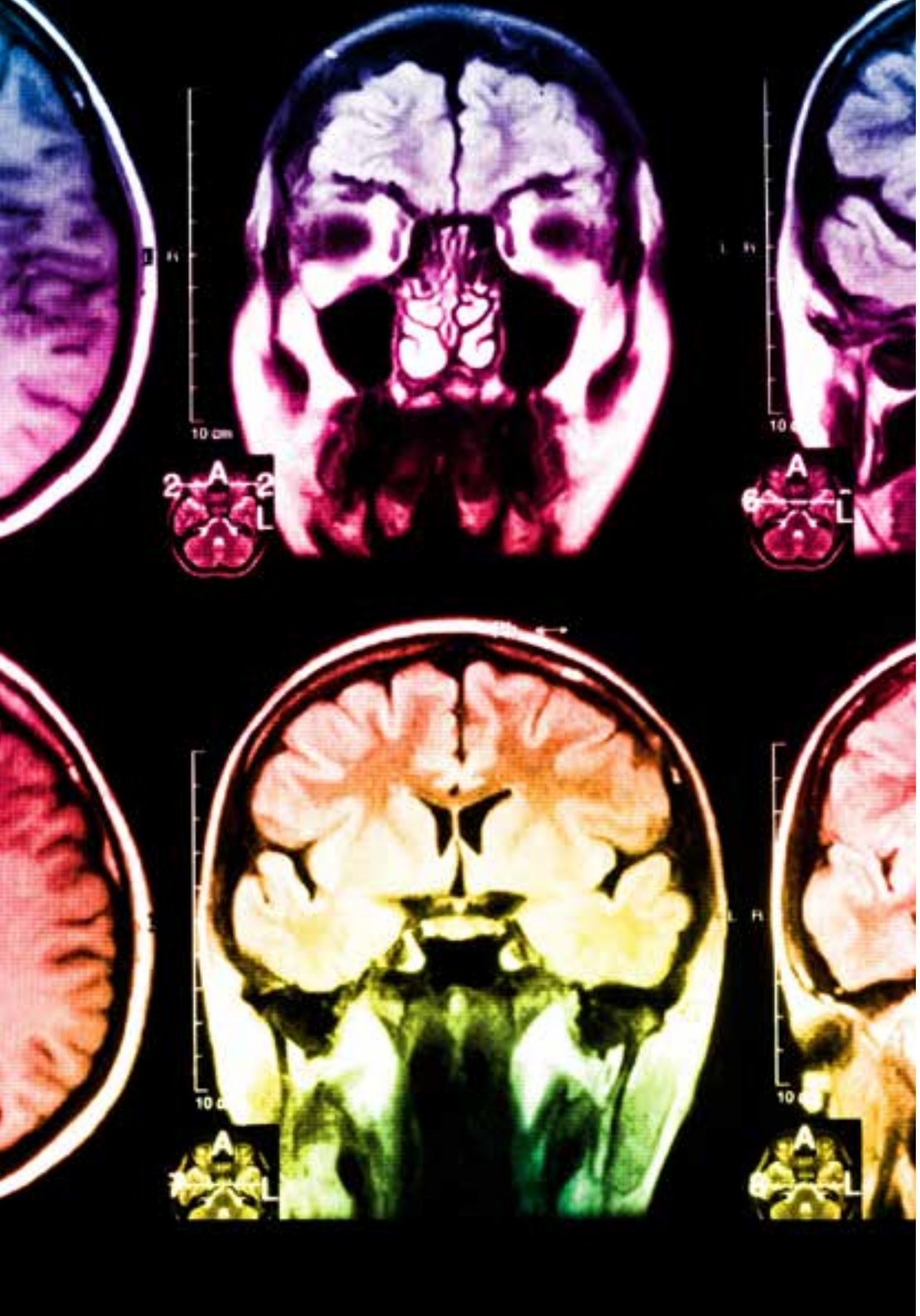
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

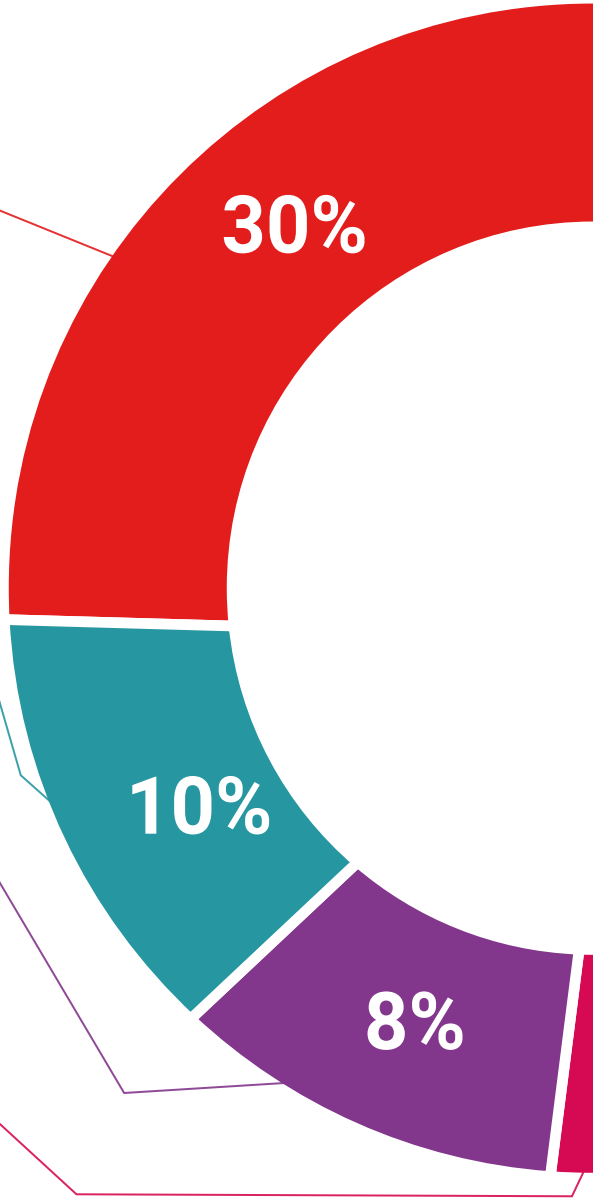
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

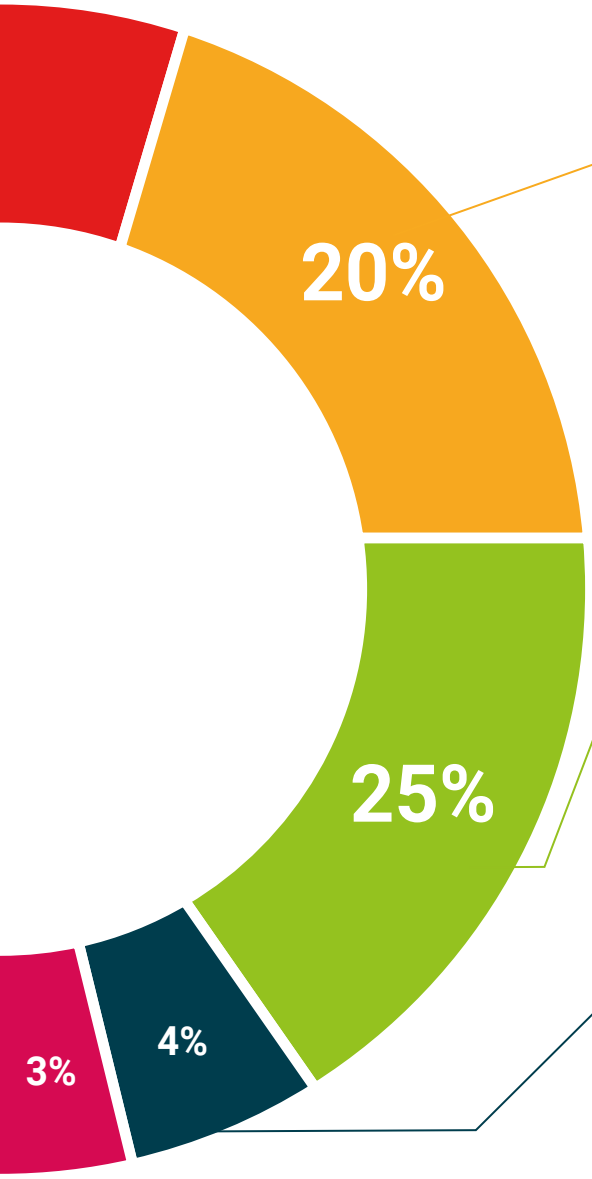
Practising Skills and Abilities

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 Certificate in Deep Computer Vision with Convolutional Neural Networks guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.

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

This program will allow you you to obtain a **Postgraduate Certificate in Deep Computer Vision with Convolutional Neural Networks** 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 title**, 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: **Postgraduate Certificate in Deep Computer Vision with Convolutional Neural Networks**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**


tech global university

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

Postgraduate Certificate in Deep Computer Vision with Convolutional Neural Networks

This is a private qualification of 150 hours of duration equivalent to 6 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

*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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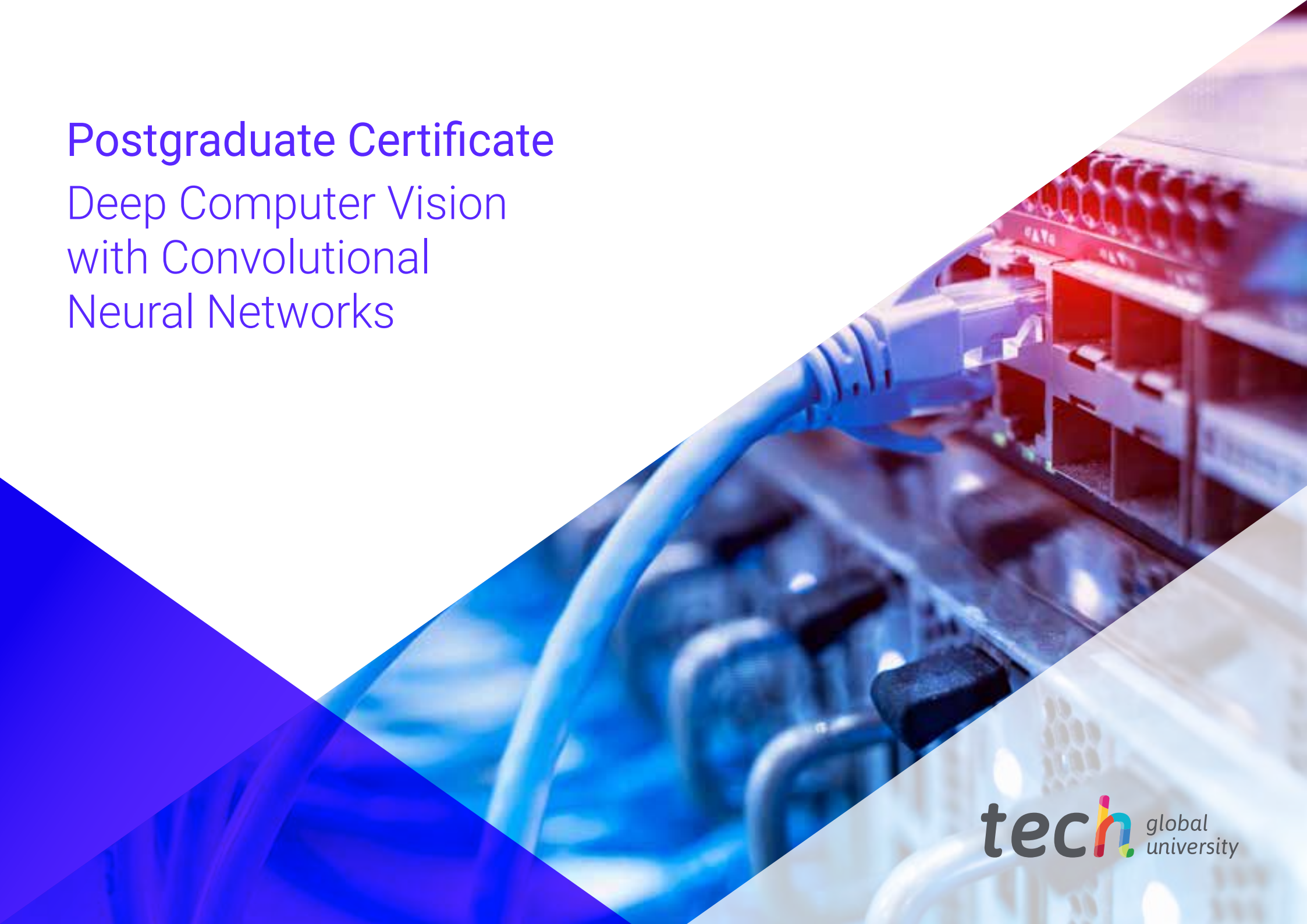

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