

# Postgraduate Certificate

## Deep Computer Vision with Convolutional Neural Networks



## Postgraduate Certificate Deep Computer Vision with Convolutional Neural Networks

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

Website: [www.techtute.com/us/technology/postgraduate-certificate/deep-computer-vision-convolutional-neural-networks-technology](http://www.techtute.com/us/technology/postgraduate-certificate/deep-computer-vision-convolutional-neural-networks-technology)

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# 01

# Introduction

Deep Computer Vision is a discipline of artificial intelligence that is responsible for providing computers with the ability to interpret and analyze images and videos. Its importance lies in the ability of these techniques to perform a wide variety of tasks in different fields, such as medicine, robotics, security, transportation and industry. For this reason, TECH has designed a degree that allows students to maximize their knowledge on aspects such as Object Detection and Tracking, Tracking and Localization Techniques or the Advantages of Transfer Learning, among others. All this, thanks to a 100% online modality and with the most dynamic and practical multimedia materials in the academic market.





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*Acquire new knowledge about Object Tracking Algorithms and Advantages of Pretrained Models, thanks to the best online university in the world according to Forbes"*

The importance of Deep Computer Vision with Convolutional Neural Networks lies in its ability to perform a wide variety of tasks in different fields. These techniques have revolutionized computer vision and have enabled significant advances in fields such as medicine, robotics, security, transportation and industry.

For this reason, TECH has designed a Postgraduate Certificate in Deep Computer Vision with Convolutional Neural Networks with which it seeks to provide students with the necessary skills and competencies to be able to perform their work as specialists, with the highest possible efficiency and quality. Thus, throughout this program, aspects such as the Definition of the Input Layer, the Initialization of Weights or the VGG Architecture will be addressed.

All this, through a convenient 100% online mode that allows students to organize their schedules and studies, combining them with their other work and interests of the day. In addition, this degree has the most complete theoretical and practical materials on the market, which facilitates the student's study process and allows them to achieve their goals quickly and efficiently.

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 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



*Become an expert in Deep Computer Vision in only 6 weeks and with total freedom of organization"*

“

*Enhance your professional profile in one of the most promising areas in the IT field, thanks to TECH and the most innovative multimedia materials"*

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

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

The design of this program focuses on Problem-Based Learning, by means of which the professional must try to solve the different professional practice situations that are presented throughout the academic course. For this purpose, the student will be assisted by an innovative interactive video system created by renowned experts.

*Learn how in use the 2D convolution Application from the comfort of your home at any time Moments the day.*

*Access all the content on Object Tracking Algorithms from your Tablet, mobile or computer and with total freedom to organize your studies.*



# 02 Objectives

The final objective of this Postgraduate Certificate in Deep Computer Vision with Convolutional Neural Networks is that the student acquires a precise update of his knowledge in this area. An update that will allow them to perform their work with the highest possible quality and efficiency. All this, thanks to TECH and a 100% online modality that gives total freedom of organization and schedules to the student. All this, thanks to TECH and a 100% online modality that gives total freedom of organization and schedules to the student.





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*Delve into all the essentials of Image Processing Models, from the comfort of your home or work office"*



## General Objectives

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- ◆ 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

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- ◆ 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

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*Enroll now and gain new knowledge about Pooling types and CNN Architectures”*



03

# Course Management

In order to provide a degree of the highest quality and usefulness, TECH has selected professionals specialized in Deep Computer Vision as part of this teaching staff, who have been in charge of designing the most advanced and updated contents. Thus, you will learn from the best the keys to your professional development in a field that adapts to new technologies and the latest advances in the academic market.





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*A prestigious teaching staff will teach you the latest advances in Deep Computer Vision, preparing you to face the current challenges in this area"*

## Management



### Mr. Gil Contreras, Armando

- ◆ Lead Big Data Scientist-Big Data at Jhonson Controls
- ◆ Data Scientist-Big Data at Opensistemas
- ◆ Fund Auditor at Creatividad y Tecnología and PricewaterhouseCoopers
- ◆ Lecturer at EAE Business School
- ◆ Degree in Economics from the Technological Institute of Santo Domingo INTEC
- ◆ Professional Master's Degree in Data Science at Centro Universitario de Tecnología y Arte
- ◆ Master MBA in International Relations and Business at CEF (Centro de Estudios Financieros)
- ◆ Postgraduate Certificate in Corporate Finance from the Santo Domingo Institute of Technology

## Professors

### Mr. Delgado Panadero, Ángel

- ◆ ML Engenieer at Paradigma Digital
- ◆ Computer Vision Engineer at NTT Disruption
- ◆ *Data Scientist* at Singular People
- ◆ *Data Analyst* at Parclick
- ◆ Tutor at Master in Big Data and Analytics at EAE Business School
- ◆ Degree in Physics at the University of Salamanca

### Mr. Matos, Dionis

- ◆ *Data Engineer* at Wide Agency Sodexo
- ◆ *Data Consultant* at Tokiota Site
- ◆ *Data Engineer* at Devoteam Testa Home
- ◆ *Business Intelligence Developer* at Ibermatica Daimler
- ◆ Master Big Data and Analytics /Project Management(Minor) at EAE Business



**Mr. Villar Valor, Javier**

- ◆ Director and founding partner Impulsa2
- ◆ Head of Operations at Summa Insurance Brokers
- ◆ Responsible for identifying opportunities for improvement at Liberty Seguros
- ◆ Director of Transformation and Professional Excellence at Johnson Controls Iberia
- ◆ Responsible for the organization of the company Groupama Seguros
- ◆ Responsible for Lean Six Sigma methodology at Honeywell
- ◆ Director of Quality and Purchasing at SP & PO
- ◆ Lecturer at the European Business School

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*A unique, key, and decisive educational experience to boost your professional development”*



# 04

# Structure and Content

The structure and all the didactic resources of this study plan have been designed by the renowned professionals that make up TECH's team of experts in the area of Computer Science. These specialists have used their extensive experience and their most advanced knowledge to create practical and completely updated contents. All this, based on the most efficient teaching methodology, TECH's Relearning.





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*Deep Computer Vision's more comprehensive and up-to-date vision will give you the skills you need to succeed in this area"*

## Module 1. Deep Computer Vision with Convolutional Neural Networks

- 1.1. The Cortex Visual 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. Classification and Localization in Deep Computer Vision
  - 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

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*Thanks to the most efficient pedagogical methodology, you will be able to acquire new knowledge in a precise way and in only 180 hours"*



# 04 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.





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*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.

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*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.



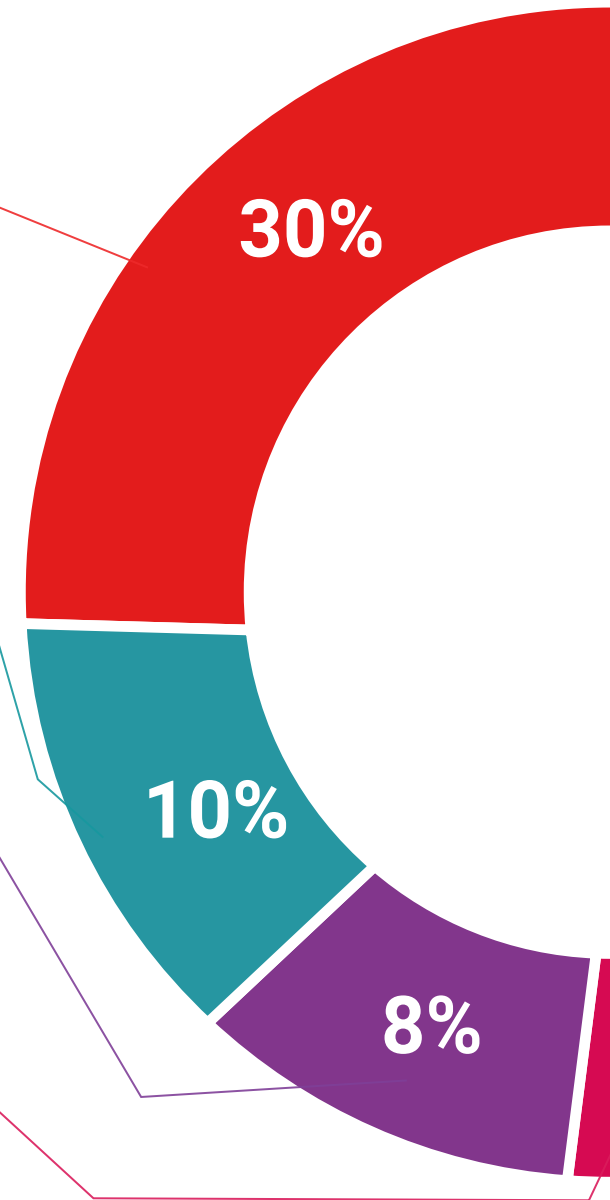
### Practising Skills and Abilities

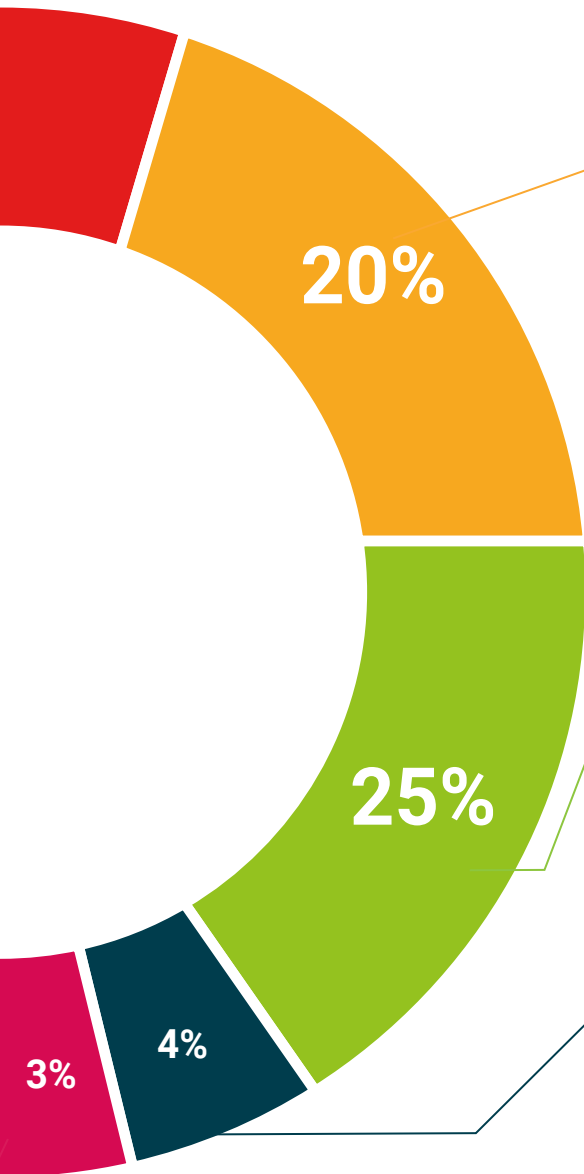
They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



### 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.



05

# Certificate

The Postgraduate Certificate in Deep Computer Vision with Convolutional Neural Networks guarantees, in addition to the most rigorous and updated training, access to a Postgraduate Certificate issued by TECH Global University.





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

This program will allow you to obtain your **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.

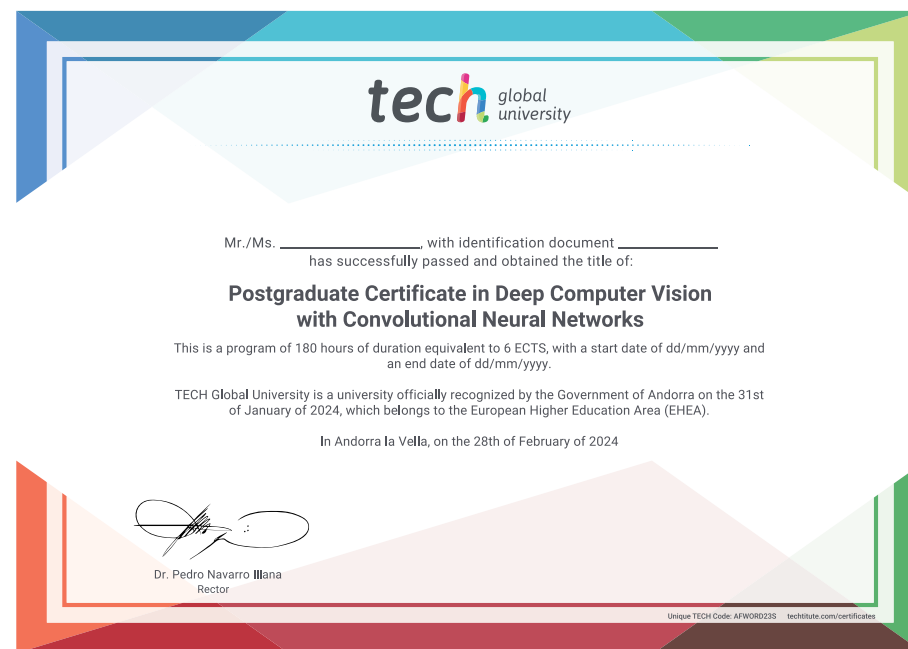
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Deep Computer Vision with Convolutional Neural Networks**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**



\*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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