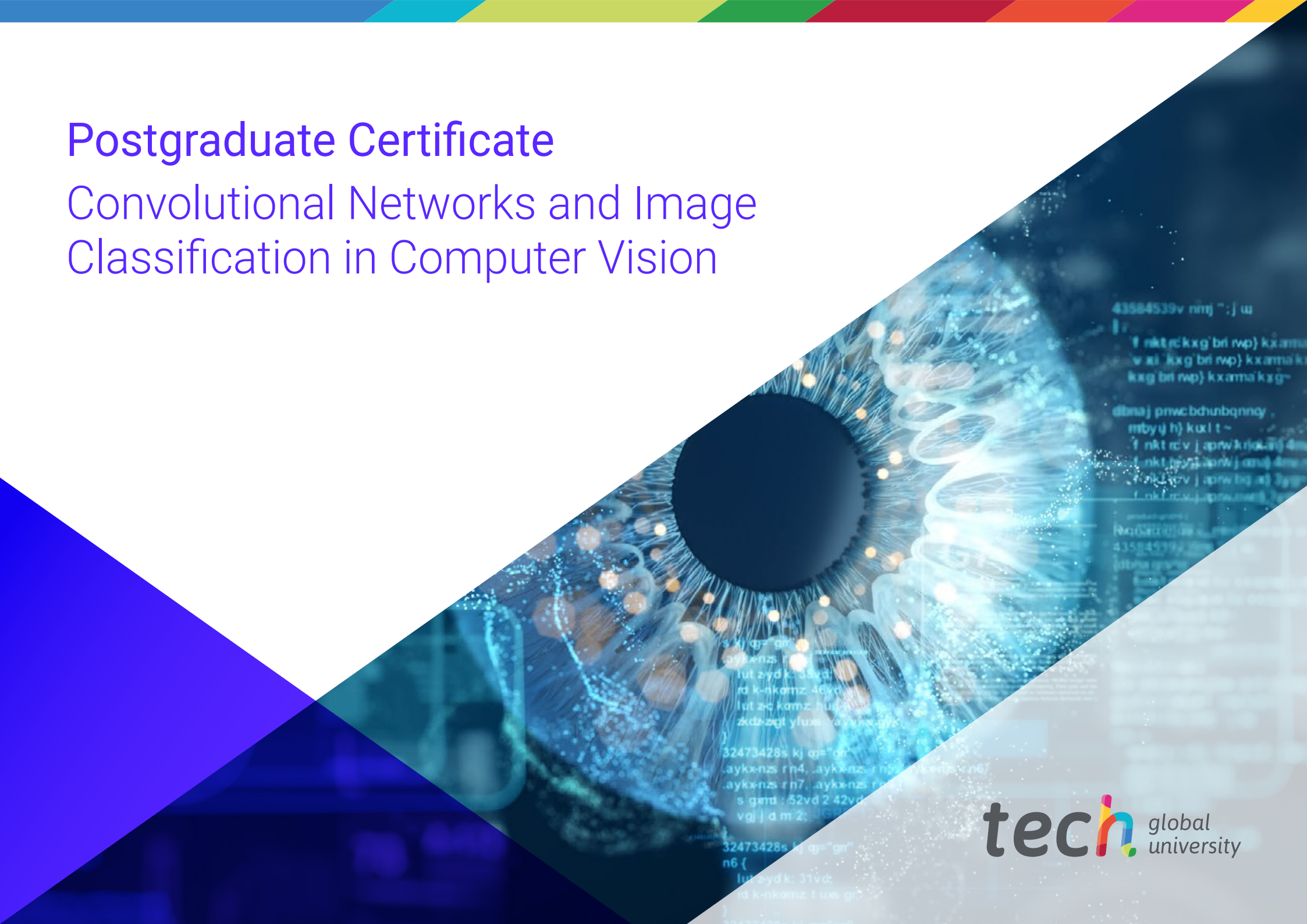
Postgraduate Certificate

Convolutional Networks and Image Classification in Computer Vision



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Postgraduate Certificate
Convolutional Networks and Image Classification in Computer Vision

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

Website: **www.techtitute.com/us/artificial-intelligence/postgarduate-certificate/convolutional-networks-image-classification-computer-vision**

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01

Introduction

Convolutional Networks are completely transforming the way image data is processed in the field of Computer Vision. These architectures are extremely efficient in a wide range of tasks, ranging from image segmentation to anomaly detection or facial recognition. However, as they are still an emerging technology, they present a number of challenges for practitioners. For example, they require a large amount of computational resources to run the models. Aware of this reality, TECH presents a university program that will delve into this subject and allow professionals to overcome the obstacles that arise during the development of their respective projects. Also, it the academic itinerary is taught in a 100% online convenient format.

You will master Transfer Learning and optimize the performance of models in new tasks, thanks to this program based on the Relearning system"

The field of Computer Vision Image Classification is constantly expanding, as new techniques or technological tools aimed at optimizing its processes are constantly emerging. At this juncture, specialists need more than ever to stay at the forefront of the advances that occur in this field. They also need to obtain advanced skills that will enable them to incorporate them properly into their daily practice. Only in this way will they be able to offer both their clients and companies innovative solutions that meet their needs.

For this reason, TECH implements a Postgraduate Certificate in Convolutional Networks and Image Classification in Computer Vision that will address the most recent advances in this discipline. The university program will delve into the practical considerations for CNN training, taking into account factors such as optimizer selection. In addition, the syllabus will thoroughly analyze the main practices of Deep Learning for students to improve the performance of models by allowing their layers to be tuned. The curriculum will also emphasize the importance of testing the training pipeline, as it serves both to identify failures and to validate the reproducibility of the results.

It should be noted that, as this is a 100% online training, students will be able to take the course whenever and wherever they want. In this sense, the only thing they will need is an electronic device with Internet access to enter the Virtual Campus (using their own cell phone or *Tablet*). In this way, students will enjoy an educational experience full of dynamic content, such as interactive summaries or case studies. Undoubtedly, a modality in line with the current times, with all the guarantees for graduates to take advantage of the opportunities offered by a highly demanded technological sector. And all this with the guidance of a teaching staff formed by experts in Computer Vision, which will resolve all the doubts that may arise during their study.

This **Postgraduate Certificate in Convolutional Networks and Image Classification in Computer Vision** 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, computer science and computer vision
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- Practical exercises where 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

A training designed to help you face both current and future challenges in Computer Vision"

The growing importance of Computer Vision makes this Postgraduate Certificate a safe bet that will allow you to raise your professional horizons"

A university program that incorporates case studies in Image Classification, which will immerse you in the reality of a profession full of opportunities.

A curriculum tailored to your needs and designed under the most effective teaching methodology: Relearning.

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

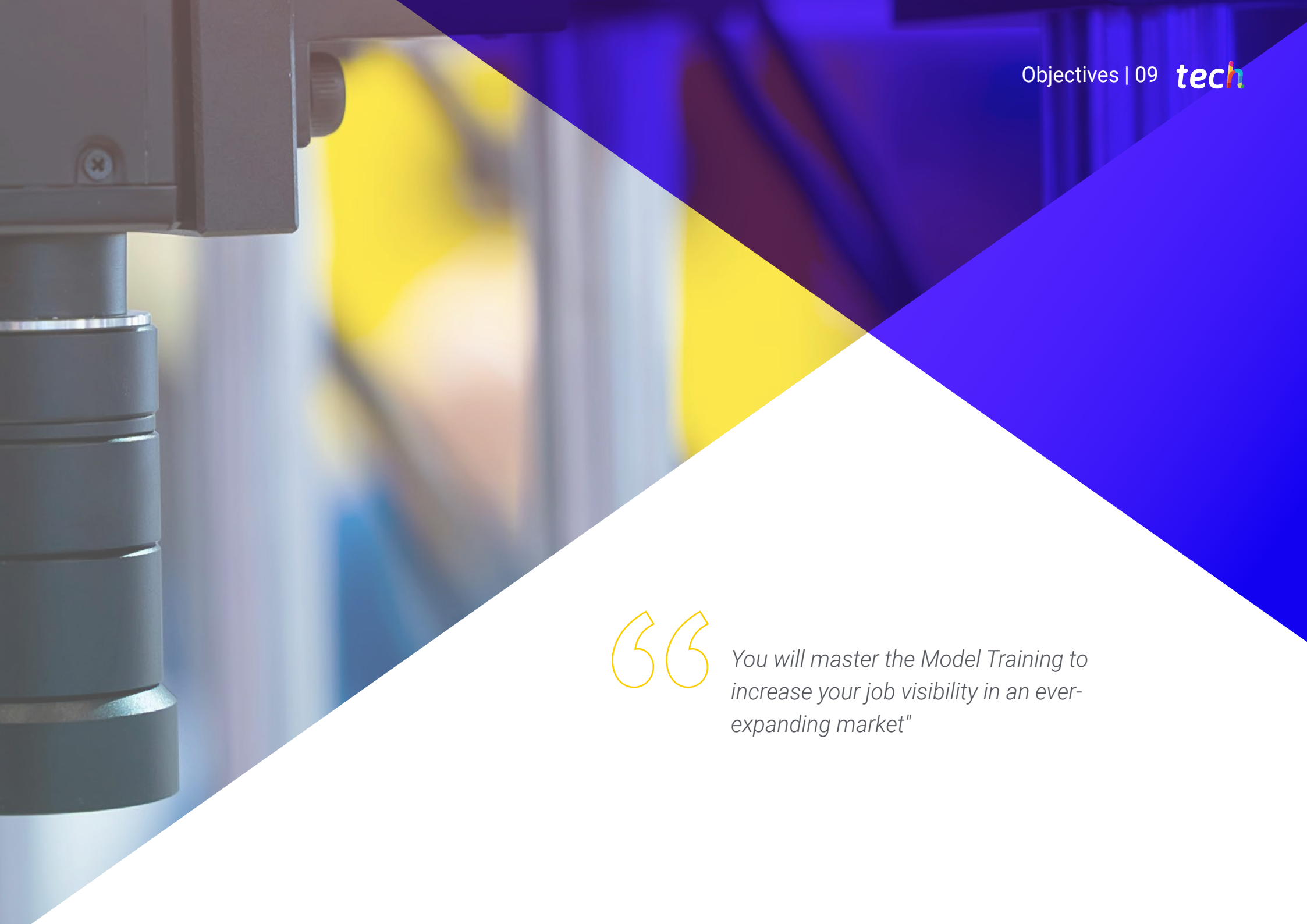
The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

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.

02

Objectives

With this Postgraduate Certificate, consisting of 180 teaching hours, graduates will achieve an effective update of their knowledge on Convolutional Networks and Image Classification in Computer Vision. They will also incorporate the latest developments in this technological area into their daily procedures. In this way, they will skillfully handle state-of-the-art technological tools aimed at CNN training and statistical data evaluation. In addition, professionals will be highly prepared to provide innovative and creative solutions to stand out in the digital industry.

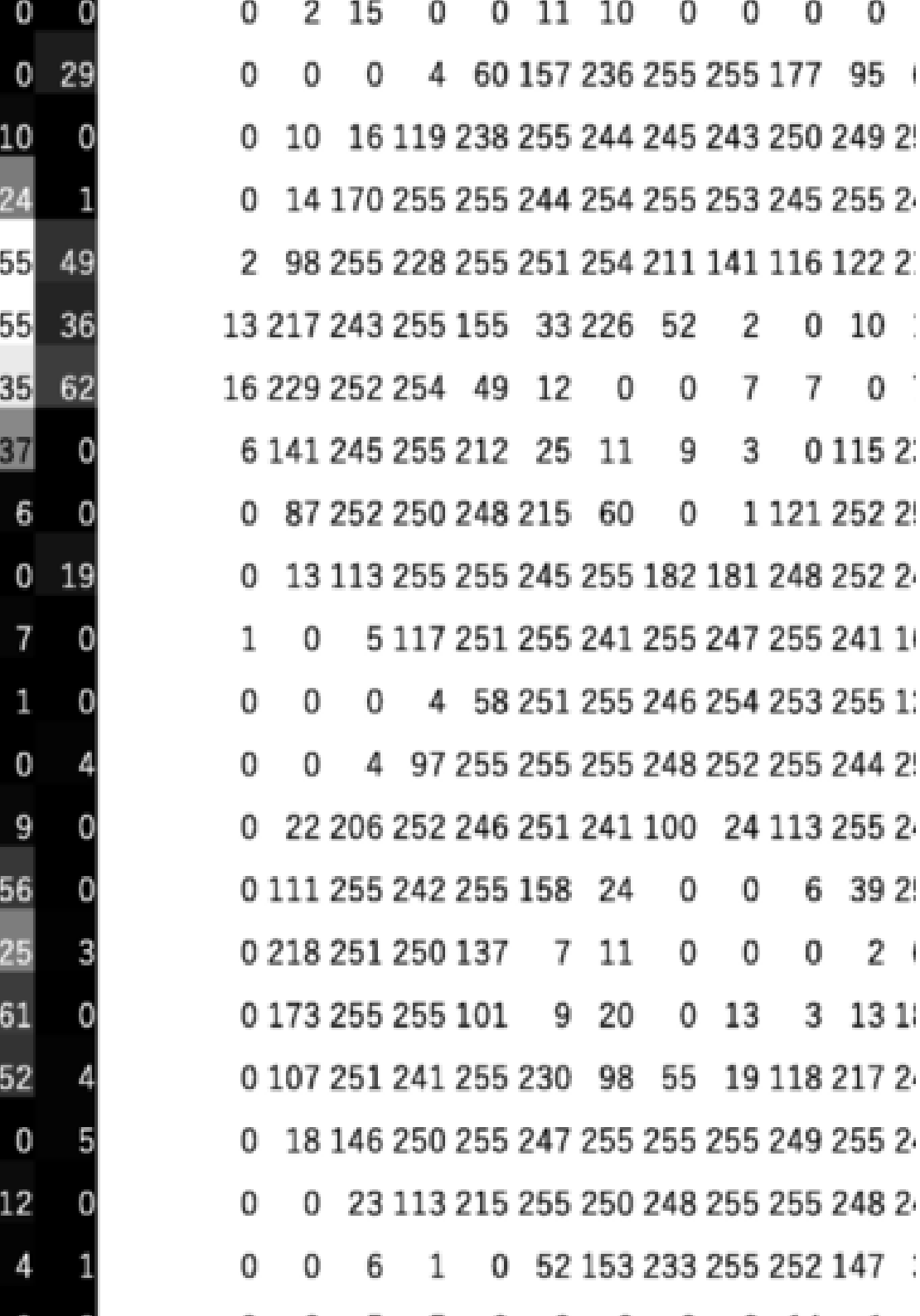


You will master the Model Training to increase your job visibility in an ever-expanding market"

General Objectives

- Develop convolutional neural networks
- Analyze existing metrics and tools
- Examine the pipeline of an image classification network
- Propose inference methods

The career advancement you are looking for is now within your reach. Don't let it go”



Specific Objectives

- Generate specialized knowledge on convolutional neural networks
- Establish evaluation metrics
- Analyze the performance of CNNs for image classification
- Assess Data Augmentation
- Propose techniques to avoid Overfitting
- Examine different architectures and compile inference methods

03

Course Management

TECH's main premise is to provide the most updated and complete university programs in the academic market. For this reason, TECH has selected the best experts in Convolutional Networks and Image Classification in Computer Vision for this course. These professionals have an extensive knowledge of all branches of Machine Learning, in addition to years of work experience behind them. This makes them authoritative voices to transmit to students the keys that will guarantee their update in this subject and thus ensure a quality leap in a profession that is advancing by leaps and bounds.

Take a step forward in your professional career with this high level program taught by experts in Convolutional Networks and Image Classification"

Management

Mr. Redondo Cabanillas, Sergio

- Machine Vision Research and Development Specialist at BCN Vision
- Development and *Backoffice* Team Leader at BCN Vision
- Project Manager and development of computer vision solutions
- Sound Technician at Media Arts Studio
- Specialization in Image and Sound by the Polytechnic University of Catalonia
- Graduate in Political Science and Industry from the Autonomous University of Barcelona
- Higher Level Training Cycle in Sound Villar CP

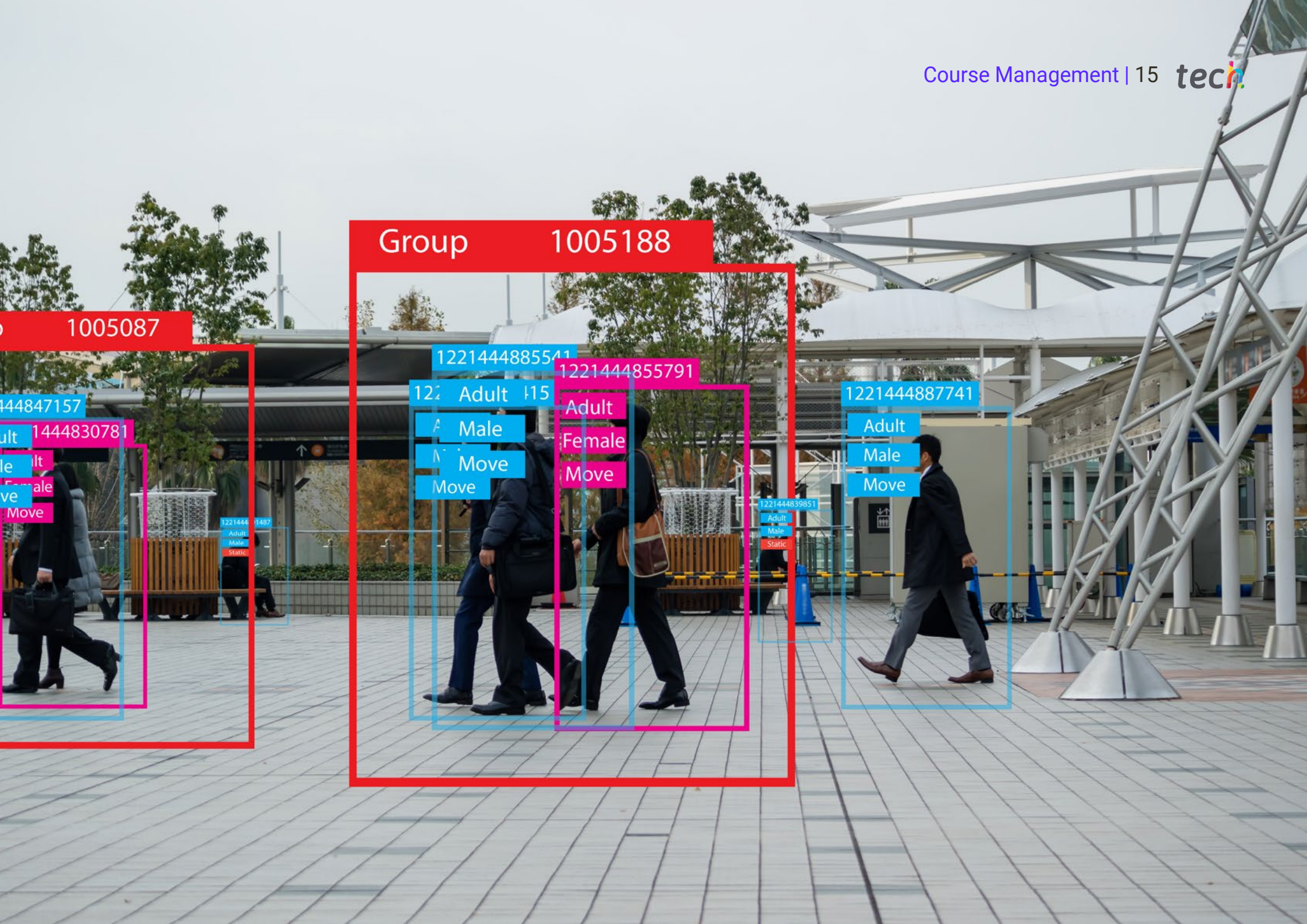
Professors

Mr. Higón Martínez, Felipe

- Electronics, telecommunications and computer engineer
- Validation and prototyping engineer
- Applications Engineer
- Support Engineer
- Master's Degree in Advanced and Applied Artificial Intelligence by IA3
- Technical Engineer in Telecommunications
- Degree in Electronic Engineering from the University of Valencia

Ms. García Moll, Clara

- Junior Visual Computer Engineer at LabLENI
- Computer Vision Engineer. Satellogic
- Full Stack Developer. Grupo Catfons
- Audiovisual Systems Engineering. Pompeu Fabra University (Barcelona)
- Master's Degree in Computer Vision. Autonomous University of Barcelona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04

Structure and Content

Designed by references in Computer Vision, this Postgraduate Certificate will provide students with a solid understanding of Convolutional Networks and Image Classification. To this end, the curriculum will delve into CNN Building Blocks, designed to efficiently capture and process hierarchical features in image data. The curriculum will also delve into the main architectures of deep learning networks, including GoogleLeNet, VGG and Resnet. In addition, the program will encourage experts to carry out good practices in Deep Learning through techniques ranging from Transfer Learning to Fine Tuning and Data Augmentation.

You will implement in your work procedures the latest advances in Image Classification through Convolutional Networks"

Module 1. Convolutional Neural Networks and Image Classification

1.1. Convolutional Neural Networks
- 1.1.1. Introduction
- 1.1.2. Convolution
- 1.1.3. CNN Building Blocks

1.2. Types of CNN Layers
- 1.2.1. Convolutional
- 1.2.2. Activation
- 1.2.3. Batch Normalization
- 1.2.4. Polling
- 1.2.5. Fully Connected

1.3. Metrics
- 1.3.1. Matrix Confusion
- 1.3.2. Accuracy
- 1.3.3. Precision
- 1.3.4. Recall
- 1.3.5. F1 Score
- 1.3.6. ROC Curve
- 1.3.7. AUC

1.4. Main Architectures
- 1.4.1. AlexNet
- 1.4.2. VGG
- 1.4.3. Resnet
- 1.4.4. GoogleLeNet

1.5. Image Classification
- 1.5.1. Introduction
- 1.5.2. Analysis of Data
- 1.5.3. Data Preparation
- 1.5.4. Model Training
- 1.5.5. Model Validation

1.6. Practical Considerations for CNN Training
- 1.6.1. Optimizer Selection
- 1.6.2. Learning Rate Scheduler
- 1.6.3. Check Training Pipeline
- 1.6.4. Training with Regularization

1.7. Best Practices in Deep Learning
- 1.7.1. Transfer Learning
- 1.7.2. Fine Tuning
- 1.7.3. Data Augmentation

1.8. Statistical Data Evaluation
- 1.8.1. Number of Datasets
- 1.8.2. Number of Labels
- 1.8.3. Number of Images
- 1.8.4. Data Balancing

1.9. Deployment
- 1.9.1. Saving and Loading Models
- 1.9.2. Onnx
- 1.9.3. Inference

1.10. Case Study: Image Classification
- 1.10.1. Data Analysis and Preparation
- 1.10.2. Testing the Training Pipeline
- 1.10.3. Model Training
- 1.10.4. Model Validation

You will study at your own pace, thanks to the facilities offered by TECH's online modality. 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

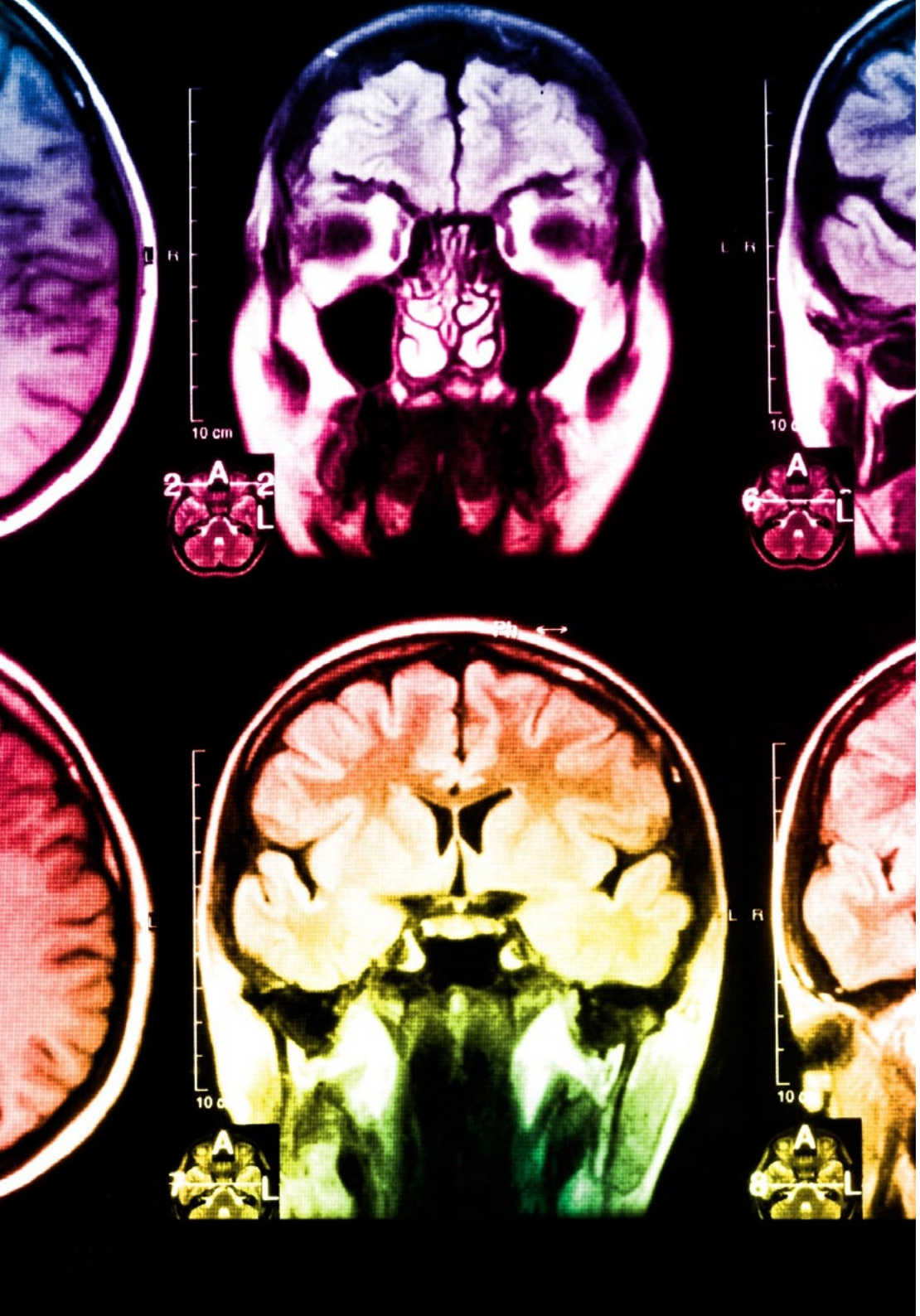
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

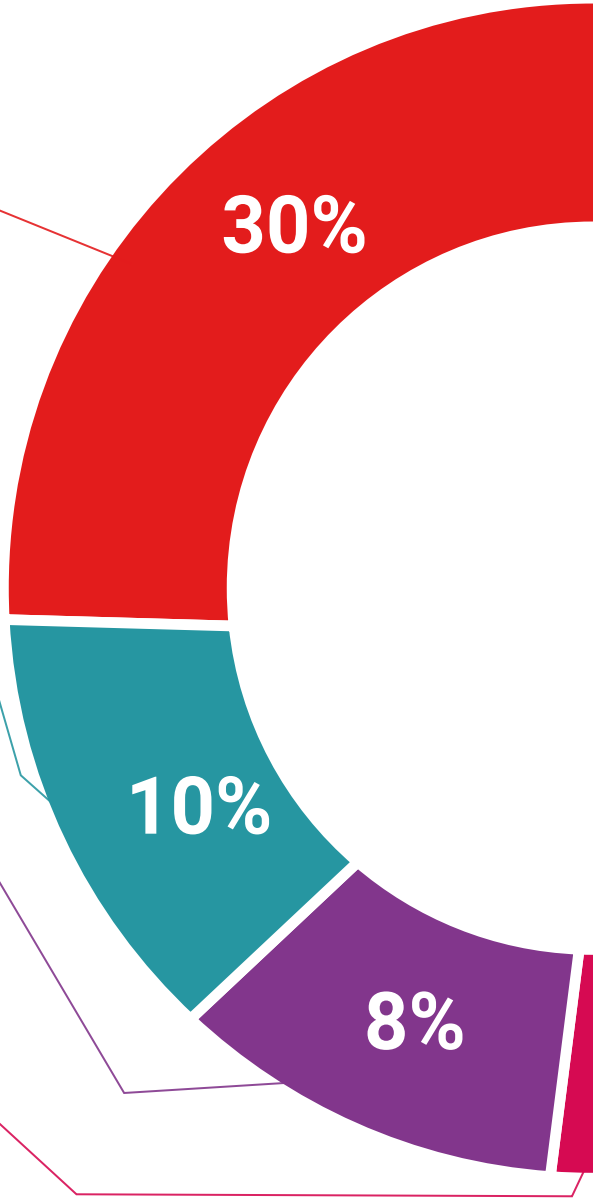
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

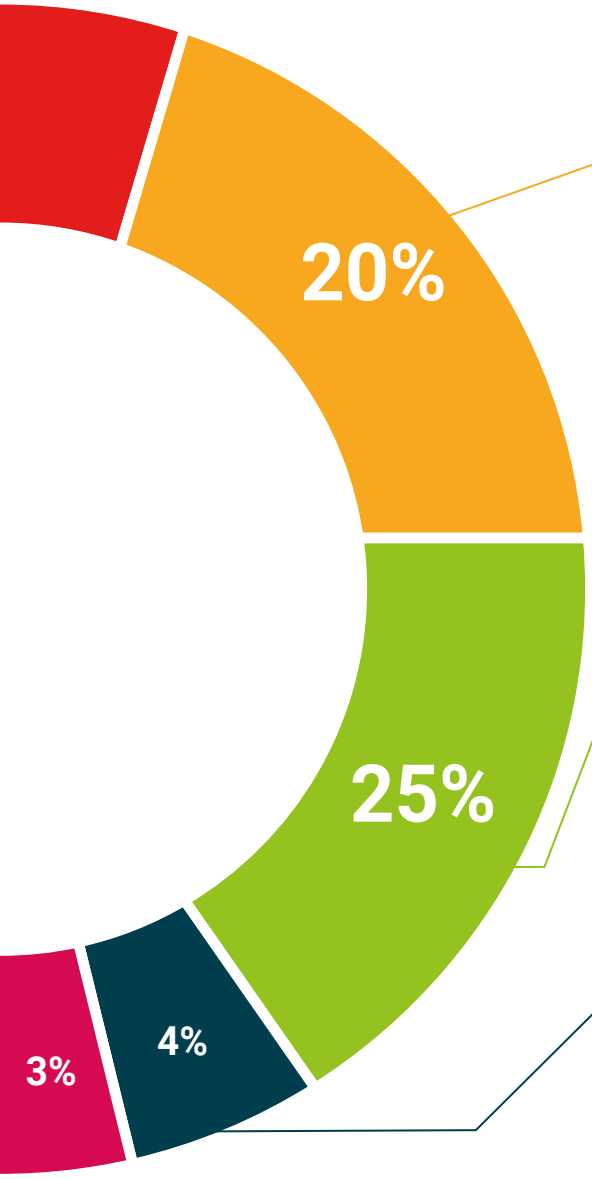
Practising Skills and Abilities

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 Convolutional Networks and Image Classification in Computer Vision 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 to obtain your **Postgraduate Certificate in Convolutional Networks and Image Classification in Computer Vision** 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 Convolutional Networks and Image Classification in Computer Vision**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**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Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Postgraduate Certificate in Convolutional Networks and Image Classification in Computer Vision

This is a program of 180 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
Rector

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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