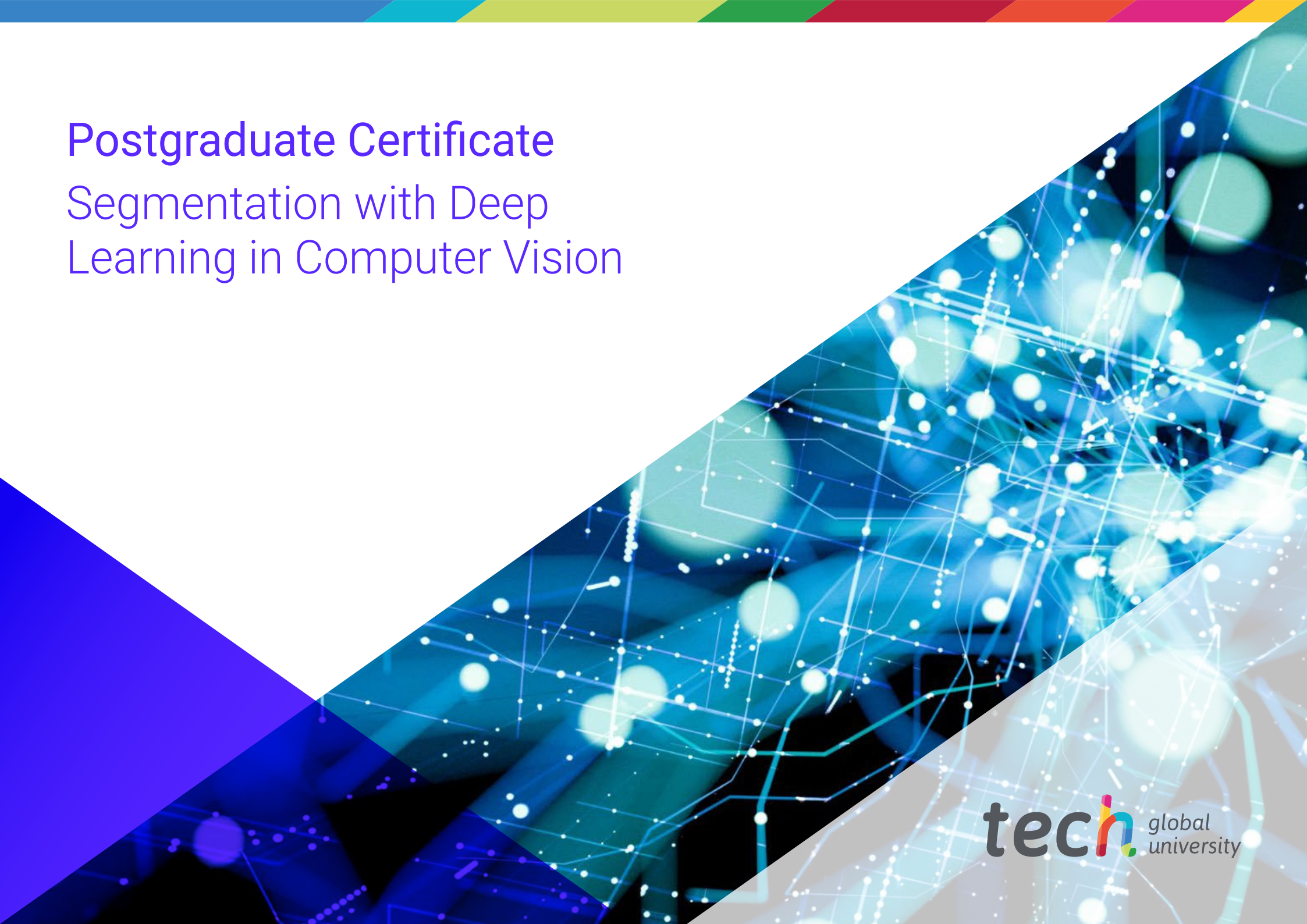
Postgraduate Certificate

Segmentation with Deep Learning in Computer Vision



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Postgraduate Certificate
Segmentation with Deep Learning 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/in/artificial-intelligence/postgraduate-certificate/segmentation-deep-learning-computer-vision**

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01

Introduction

Computer Vision is a technological field that has experienced a great growth in recent years. This is due to the exponential take-off ofDeep Learning systems, based on convolutional neural networks. This technique is used in multiple fields to understand, analyze and make decisions based on the content of images in an automated manner. It also has multiple applications ranging from satellite imagery to health diagnostics. This is why more and more professionals in this field are needed to contribute to social progress. In this context, TECH is launching a university program focused on object detection through Deep Learning. In addition, it is taught with a 100% online methodology aimed at the comfort of students.

The Relearning system of this program will lead you to make agile progress in the implementation of a Mas RCNN to detect objects in images"

In the field of Deep Learning, Evaluation Metrics are fundamental tools for measuring and quantifying the performance of Machine Learning models. In this way, professionals use them in order to evaluate both the efficiency and quality of the models in the task for which they are specialized. In turn, these systems enable companies to monitor progress, identify trends and make continuous adjustments aimed at improving the performance of their procedures. As a result, companies see opportunities to improve their business and differentiate themselves in the marketplace.

Given its rising relevance, TECH implements a pioneering Postgraduate Certificate in Segmentation with Deep Learning in Computer Vision. Its purpose is for professionals to acquire new skills and tools to carry out innovative projects. Therefore, the curriculum will provide various measurement methods such as Dice Coefficient and Pixel Accuracy Likewise, the syllabus will delve into Cost Functions so that graduates can learn the models effectively. Similarly, the program will delve into Point Cloud Segmentation for students to gain an accurate understanding of three-dimensional environments and facilitate informed decision making.

Since this university program is developed through a 100% online methodology, the specialists will have the opportunity to combine their update with the rest of their personal and professional obligations. This is an ideal opportunity for professionals to study a quality program, with the flexibility to plan their schedules and evaluation chronograms. The only thing students will need is an electronic device with Internet access to visualize the didactic content hosted on the virtual platform.

This **Postgraduate Certificate in Segmentation with Deep Learning 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 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

Mastering Segmentation with Deep Learning will open up numerous career opportunities in business sectors such as healthcare, technology and automotive"

You will effectively handle the STFCN architecture and leverage both spatial and temporal information to achieve robust results"

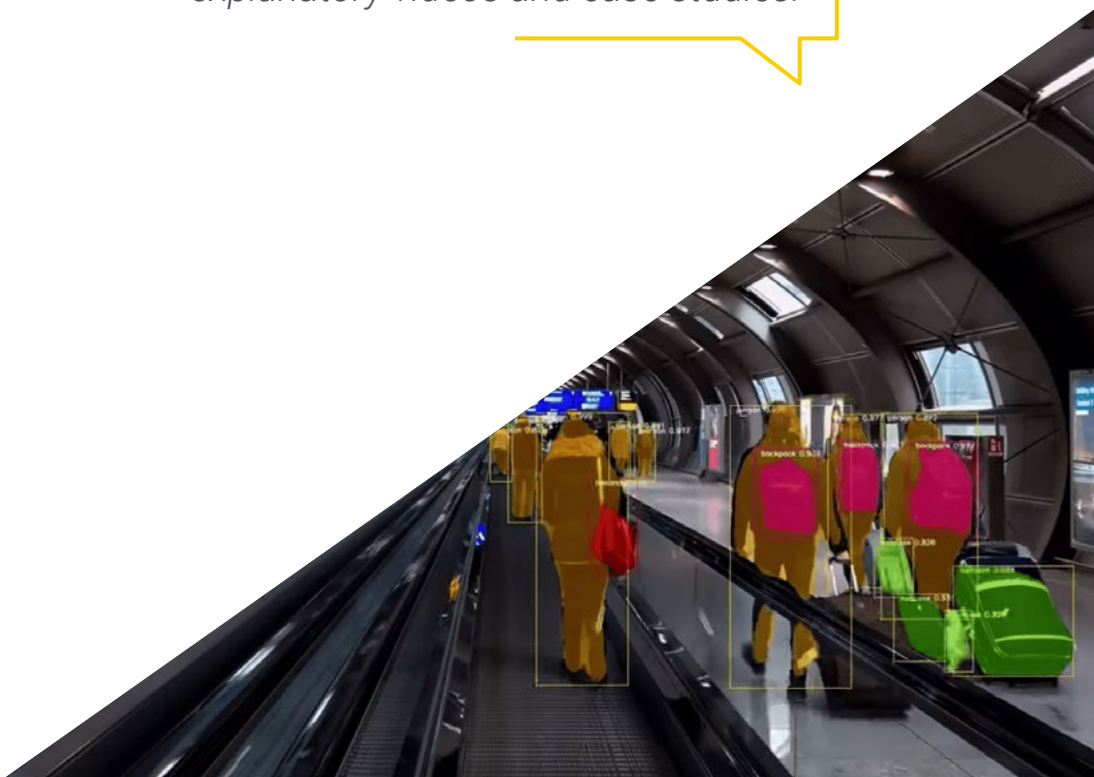
You will get a solid foundation to participate in the most important research projects and develop innovative algorithms.

You will enjoy dynamic learning thanks to TECH's didactic tools, including explanatory videos and case studies.

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.

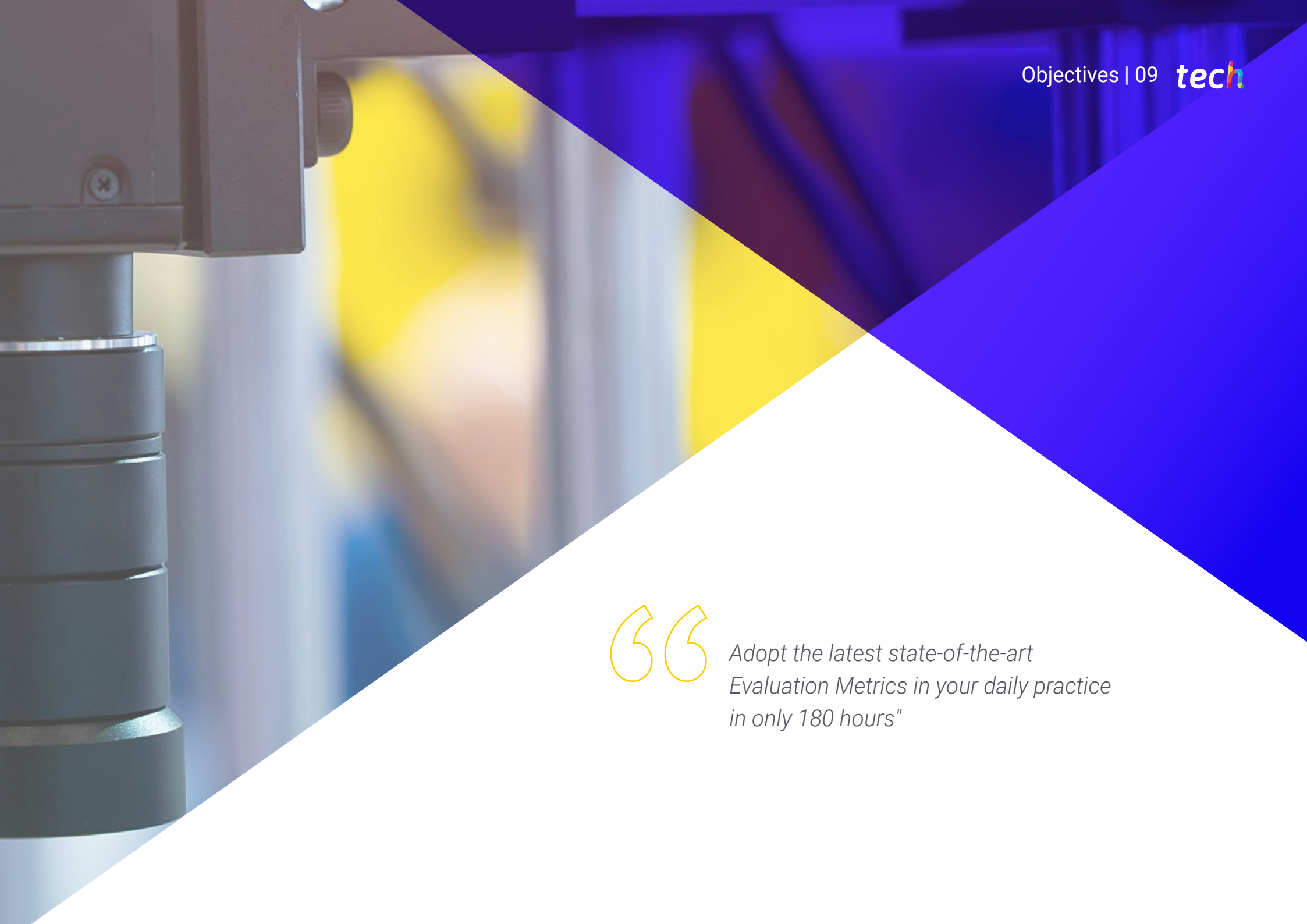
This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the academic year For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.



02

Objectives

This university program in Segmentation with Deep Leaning in Computer Vision will equip specialists with the latest tools in this branch of Machine Learning. In this way, they will be able to implement them in their work with immediacy to optimize their various tasks. In addition, professionals will be able to design and implement projects that include, among others, applications in object detection or computer vision.

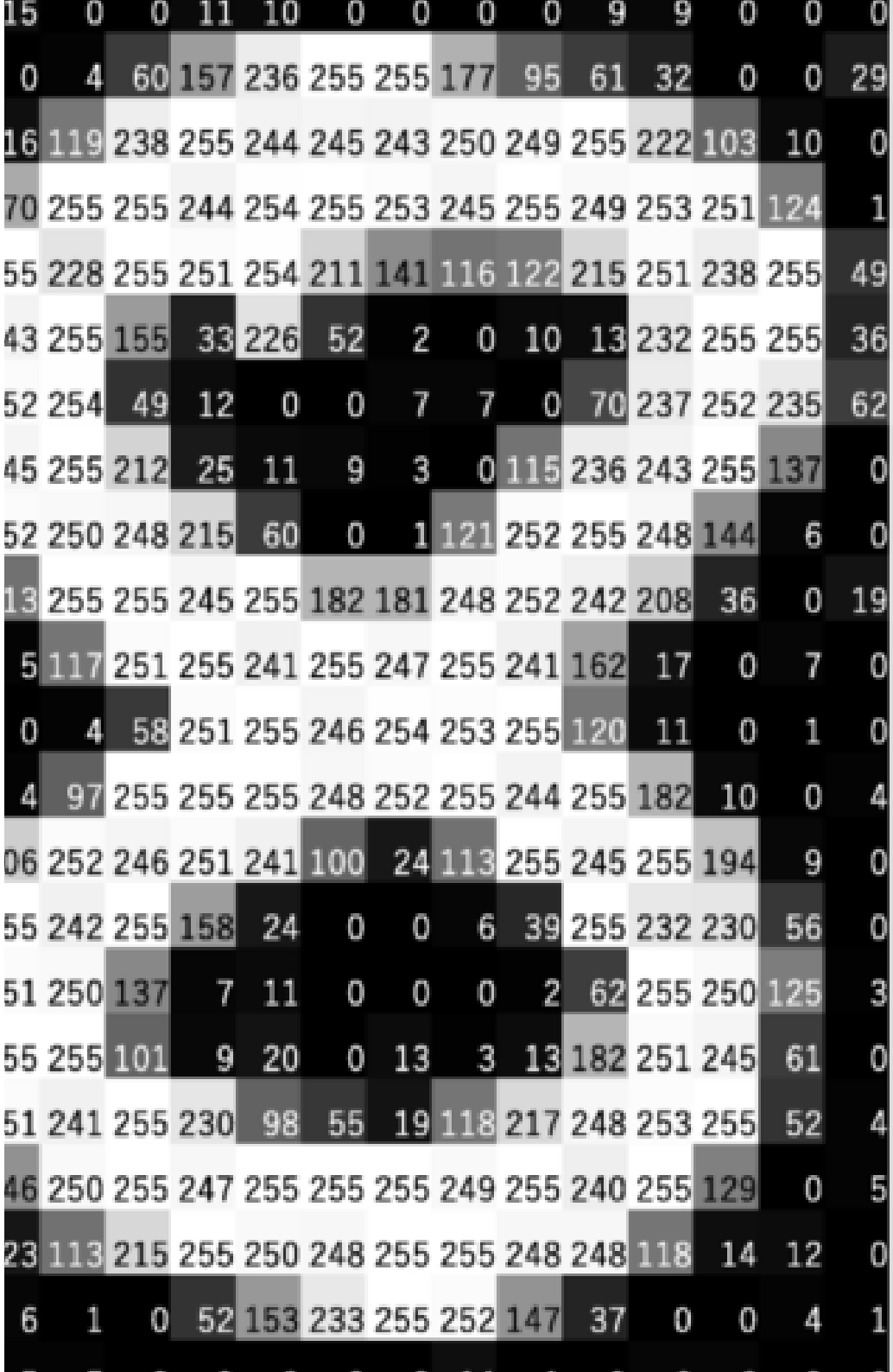


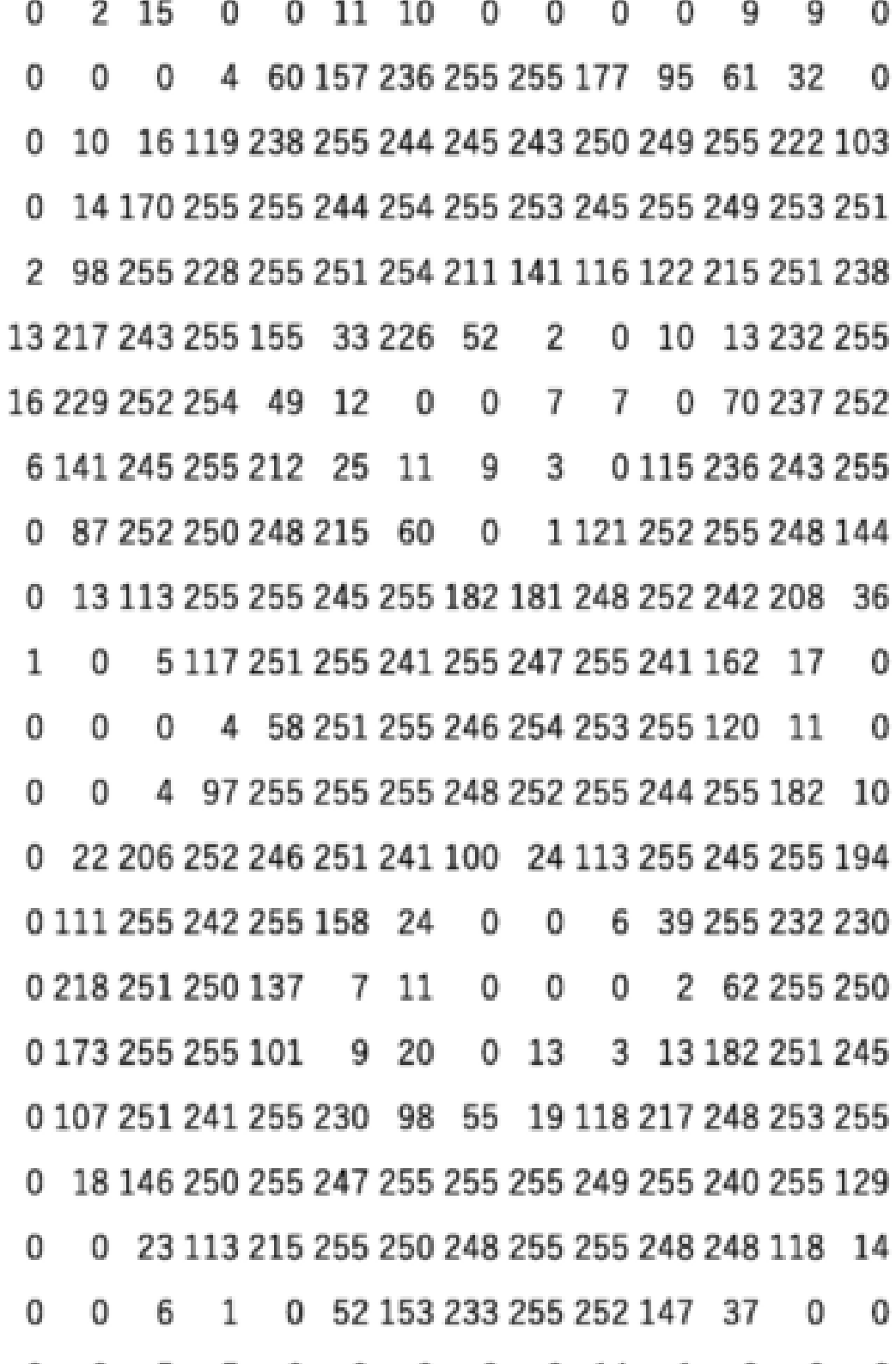
Adopt the latest state-of-the-art Evaluation Metrics in your daily practice in only 180 hours"

General Objectives

- Analyze semantic segmentation neural networks and their metrics
- Identify the most common architectures
- Establish Use Cases
- Apply correct cost function for learning

A comprehensive update on Image Segmentation with Deep Learning through a program designed by real specialists"





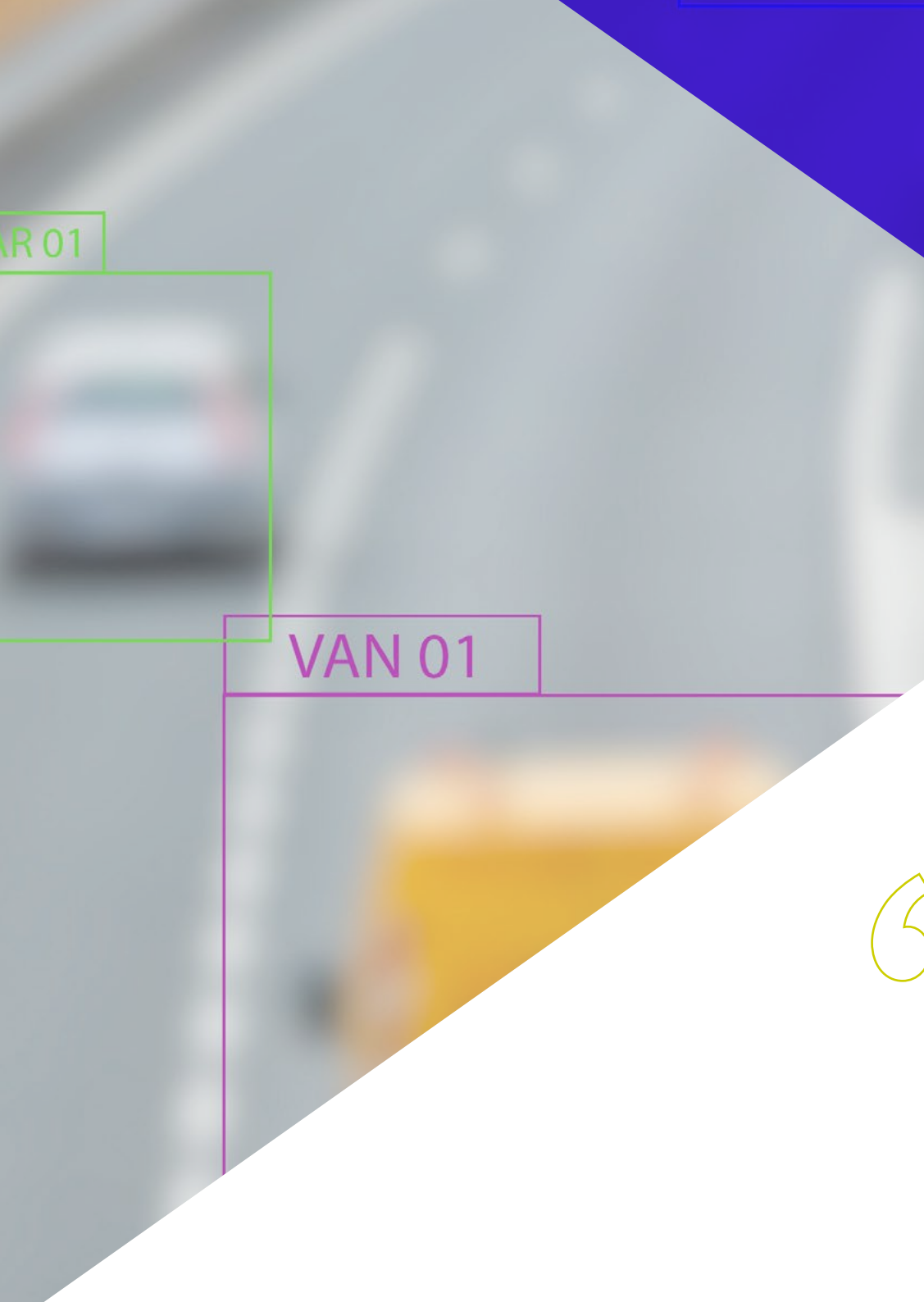
Specific Objectives

- Analyze how semantic segmentation networks work
- Examine evaluation metrics and different architectures
- Delve into video domains and cloud points
- Apply theoretical concepts through various examples

03

Course Management

TECH's priority is to provide high quality educational experiences to its students. Therefore, for this Postgraduate Certificate, TECH has brought together a group of experts specialized in Computer Vision. These professionals, who make up the teaching staff, are in charge of designing the academic itinerary and transmitting their knowledge to the students. Committed to their teaching work, they will provide students with the most advanced techniques to better understand the structure and content of visual resources. In this way, graduates will add state-of-the-art technological tools to their daily practice in order to experience a leap in quality in their careers.



A group of experts in Artificial Vision will propose the best solutions to problems in cost functions"

Management

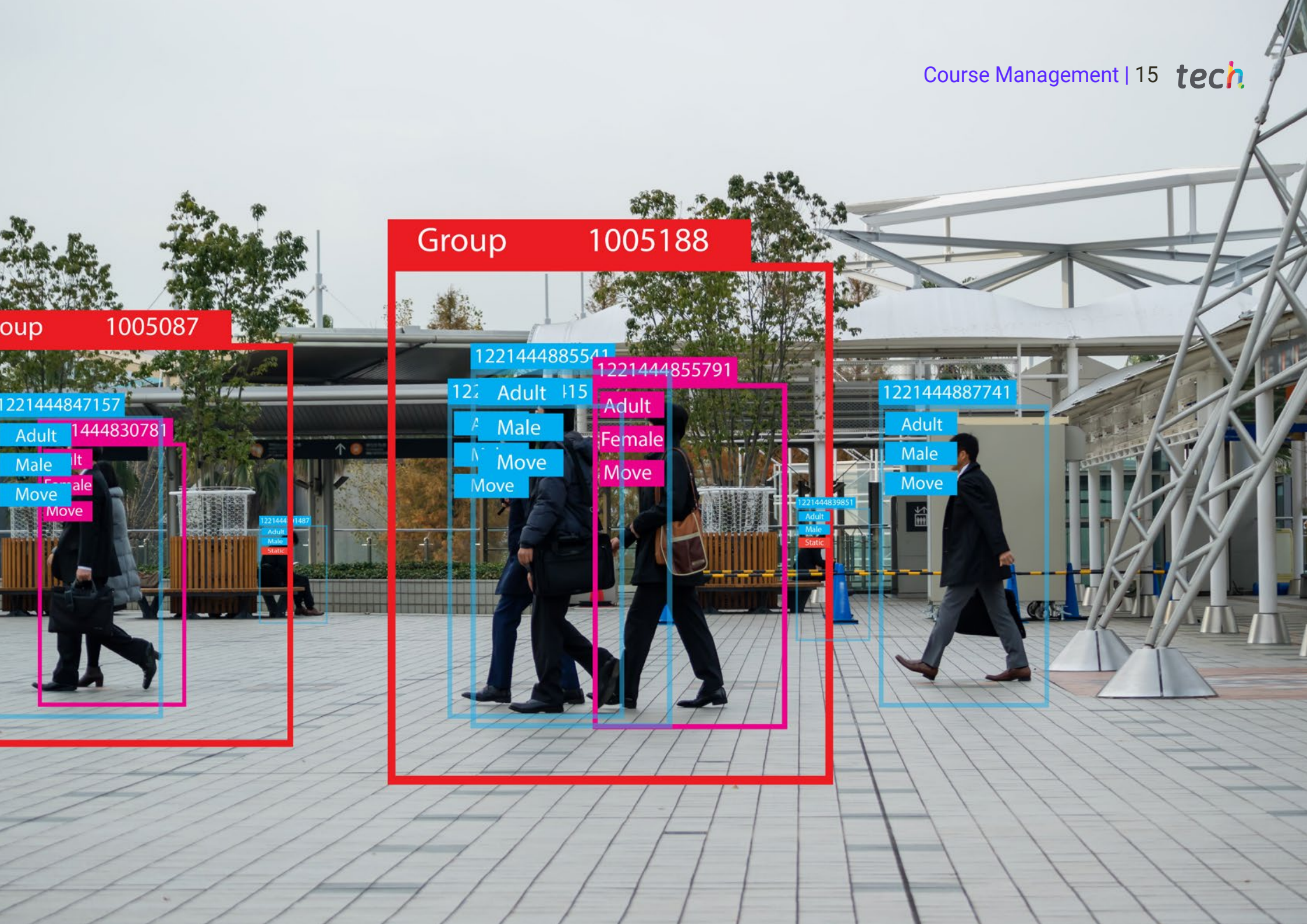
Mr. Redondo Cabanillas, Sergio

- Machine Vision Research and Development Specialist at BCN Vision
- Development and BackofficeTeam 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. González González, Diego Pedro

- Software Architect for Artificial Intelligence based systems
- Deep Learning and Machine Learning Application Developer
- Software architect for embedded systems for railway safety applications
- Linux driver developer
- Systems engineer for railway track equipment
- Embedded Systems Engineer
- Deep Learning Engineer
- Official Master's Degree in Artificial Intelligence from the International University of La Rioja (Spain)
- Industrial Engineer by Miguel Hernández University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04

Structure and Content

This Postgraduate Certificate will provide students with a comprehensive approach to Segmentation with Deep Learning in Computer Vision. To achieve this, the academic itinerary will delve into object detection using Deep Learning tools such as FCN architecture, Deep Lab or U-NET. Likewise, the syllabus will analyze in detail Evaluation Metrics so that the graduates can check the effectiveness of the models. Therefore, professionals will gain skills to handle systems such as Pixel Accuracy, Focal Loss or Dice Coefficient The program will also delve into Self-Organizing Maps to visualize the underlying structure of data and discover meaningful patterns.

You will master the application of thresholding, from methods such as Otsu and Riddlen, to segment regions of interest by binarizing the original image"

Module 1. Image Segmentation with Deep Learning

1.1. Object Detection and Segmentation
- 1.1.1. Semantic Segmentation
  - 1.1.1.1. Semantic Segmentation Use Cases
- 1.1.2. Instantiated Segmentation
  - 1.1.2.1. Instantiated Segmentation Use Cases

1.2. Evaluation Metrics
- 1.2.1. Similarities with Other Methods
- 1.2.2. Pixel Accuracy
- 1.2.3. Dice Coefficient (F1 Score)

1.3. Cost Functions
- 1.3.1. Dice Loss
- 1.3.2. Focal Loss
- 1.3.3. Tversky Loss
- 1.3.4. Other Functions

1.4. Traditional Segmentation Methods
- 1.4.1. Threshold Application with Otsu and Riddlen
- 1.4.2. Self-organizing maps
- 1.4.3. GMM-EM Algorithm

1.5. Semantic Segmentation Applying Deep Learning: FCN
- 1.5.1. FCN
- 1.5.2. Architecture
- 1.5.3. FCN Applications

1.6. Semantic Segmentation Applying Deep Learning: U-NET
- 1.6.1. U-NET
- 1.6.2. Architecture
- 1.6.3. U-NET Application

1.7. Semantic Segmentation Applying Deep Learning: Deep Lab
- 1.7.1. Deep Lab
- 1.7.2. Architecture
- 1.7.3. Deep Lab Application

1.8. Instantiated Segmentation Applying Deep Learning: RCNN Mask
  1.8.1. RCNN Mask
  1.8.2. Architecture
  1.8.3. Application of a Mask RCNN
1.9. Video Segmentation
  1.9.1. STFCN
  1.9.2. Semantic Video CNNs
  1.9.3. Clockwork Convnets
  1.9.4. Low-Latency
1.10. Point Cloud Segmentation
  1.10.1. The Point Cloud
  1.10.2. PointNet
  1.10.3. A-CNN

TECH adapts to your schedule, that's why it has designed a flexible and 100% online university program"

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

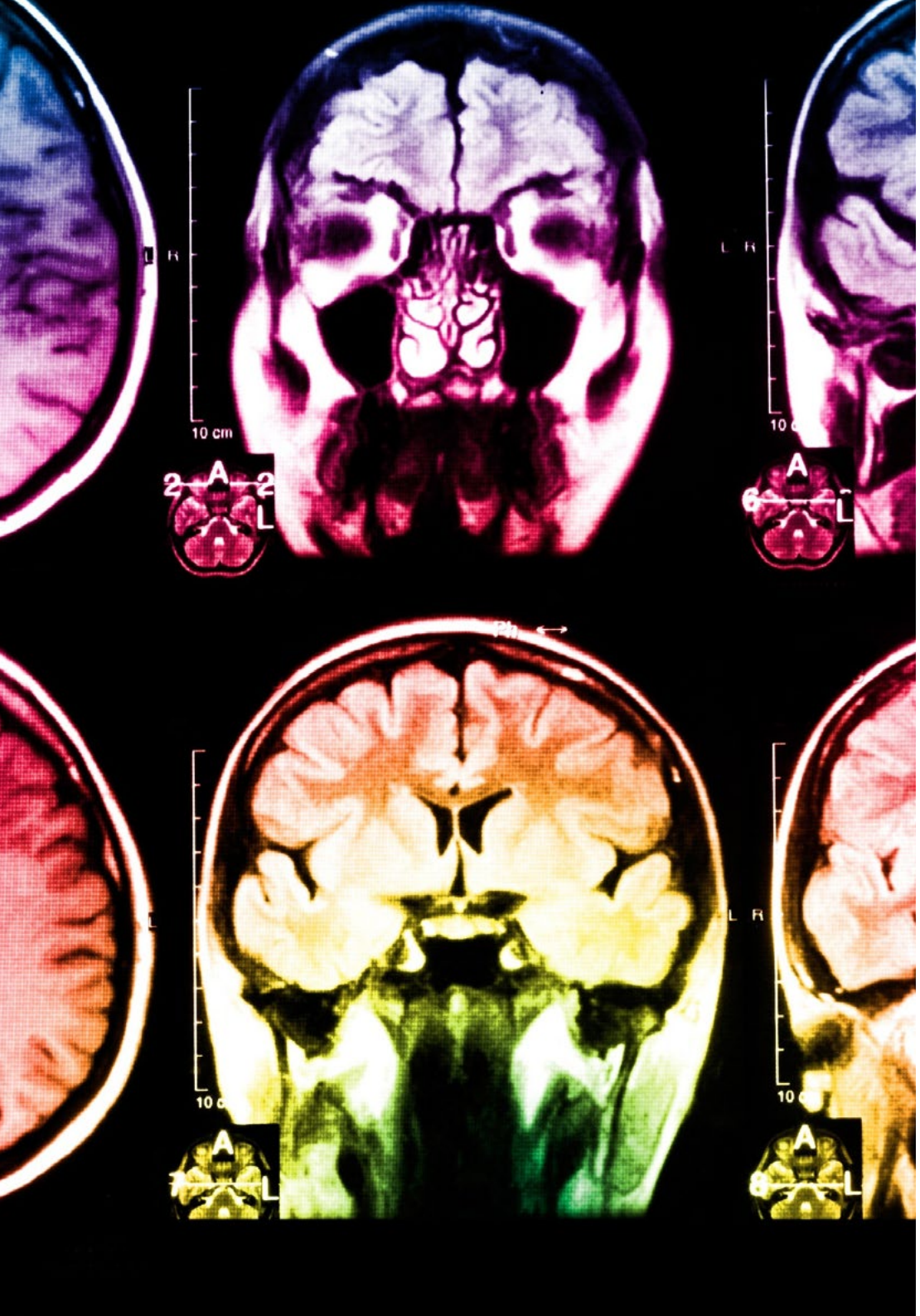
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

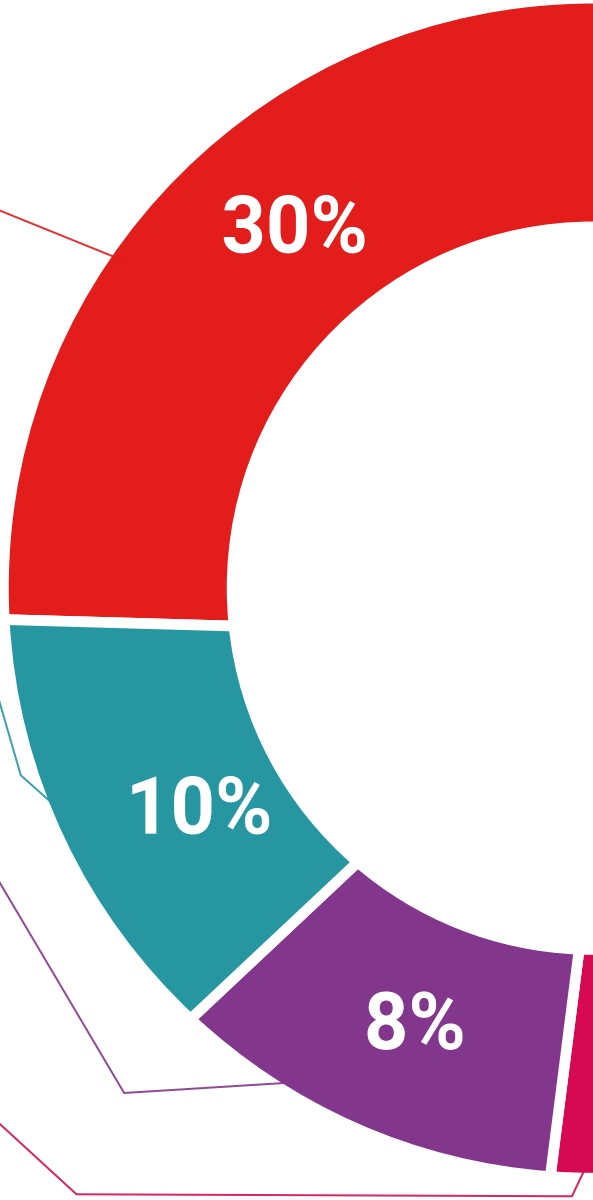
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

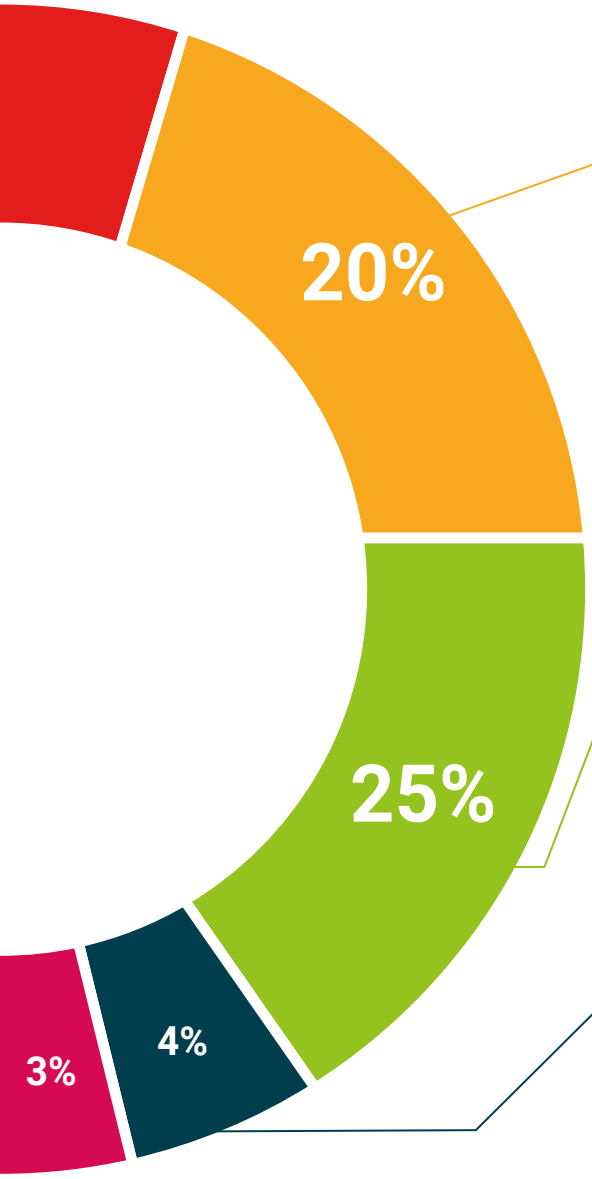
Practising Skills and Abilities

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 Segmentation with Deep Learning 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 Segmentation with Deep Learning 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.

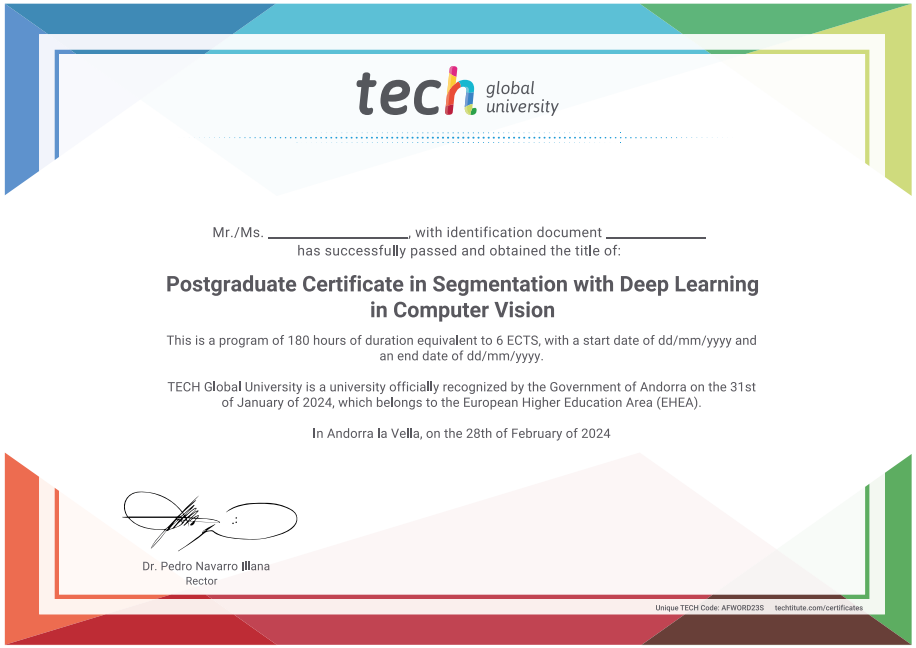
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Segmentation with Deep Learning 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 Segmentation with Deep Learning 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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Postgraduate Certificate

Segmentation with Deep Learning in Computer Vision

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Postgraduate Certificate

Segmentation with Deep Learning in Computer Vision

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