Postgraduate Certificate
Autoencoders, GANs, and Diffusion Models in Deep Learning

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Postgraduate Certificate
Autoencoders, GANs,
and Diffusion Models
in Deep Learning

- » 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/autoencoders-gans-diffusion-models-deep-learning**

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01

Introduction

A recent report by the European Central Bank confirms the explosive growth of Artificial Intelligence tools. In this sense, the sub-area that is gaining more and more prominence within companies globally is Deep Learning. This focuses on the training of Artificial Neural Network algorithms for devices to learn and perform tasks automatically emulating the human brain. Given its multiple benefits, institutions are actively seeking to integrate Deep Learning specialists into their organizational charts. For experts to gain a competitive advantage, it is essential that they have a thorough knowledge of Autoencoders, GANs and Diffusion Models. That is why TECH presents an online university program that will delve into these techniques.

You will master Convolutional Model Training to make accurate image predictions, thanks to this 100% online Postgraduate Certificate"

In the context of *Deep Learning*, numerous advances have been made to improve data quality and open up new possibilities in research. Among these include the techniques of *Autoencoders*, GANs and Diffusion Models. These 3 models have the ability to generate synthetic data that resemble real data, which is especially useful in cases where real information is difficult to obtain. For example, these tools produce images, text or sounds synthetically to train Machine Learning models. Notably, they have applications in a multitude of areas such as computer vision, natural language processing and even music generation.

As a result of this, TECH launches a Postgraduate Certificate focused on Autoencoders, GANs and Diffusion Models. Throughout the study plan, the following aspects will be examined Construction of Coding Architectures, Pattern Recognition or the use of Generative Adversarial Networks. This will equip graduates with the most innovative procedures to develop synthetic data and improve data quality. The syllabus will also delve into the particularities of Deep Neural Networks, in order for professionals to process large volumes of data in various fields and optimize the efficiency of intelligent solutions.

This Postgraduate Certificate is taught in a fully online mode, so students will not have to make uncomfortable daily commutes to an academic center. At the same time, it has the revolutionary *Relearning* methodology, which favors the acquisition of knowledge by students at their own pace of study, without external teaching limitations. Likewise, it has a wide variety of didactic contents that combine textual and multimedia content, so that students can choose the one that best suits their pedagogical preferences.

This **Postgraduate Certificate in Autoencoders, GANs, and Diffusion Models 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 Autoencoders, GANs, and Deep Learning Diffusion Models
- 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

Do you aspire to specialize in Data Distribution Modeling? Thanks to this program you will achieve it in only 180 hours"

You will delve into the construction of Coding Architectures and feed Machine Learning models for multiple tasks.

"You will implement state-of-the-art techniques in your models to improve both their performance and generalization capacity"

This program will make you learn in a theoretical and practical way with virtual learning systems, so that you can develop your work with a guarantee of successful results.

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.

02
Objectives

Thanks to this immersive educational experience, graduates will become true professionals in the area of *Deep Learning*. After 180 teaching hours, students will acquire a solid and practical understanding of the most advanced techniques in the field of Deep Learning: *Autoencoders*, GANs and Diffusion Models. In this way, they will effectively apply them in their projects to perform synthetic content generalization tasks, feature extraction and modeling of high dimensional data. In addition, students will master the Python programming language to build web applications quickly and efficiently.

At the end of this 6-week program, you will have gained the tools necessary to launch your career as an Artificial Intelligence Software Engineer"

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

- Implement PCA techniques with an incomplete linear autoencoder
- Use convolutional and variational autoencoders to improve the performance of autoencoders
- Analyze how GANs and diffusion models can generate new and realistic images new and realistic images
- Encourage students to explore new ideas, experiment with different approaches and develop creative solutions using advanced Deep Learning techniques

A totally flexible university program with educational excellence, that you can study comfortably from your cell phone, computer or tablet"

03

Course Management

To keep intact the eminent quality of its academic itineraries, TECH has acquired the services of a group of experts in Deep Learning.These professionals are in charge of both designing the syllabus and delivering this training, so they will pour all their years of work experience in the field of Artificial Intelligence. They also excel in keeping abreast of the latest developments in this technological field. In this way, students have the guarantees they demand to specialize in a discipline that offers job opportunities in a wide range of industrial sectors.

"
A well-versed group of experts in Machine Learning will support you at all times, also solving any doubts you may have"

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

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

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

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)

04
Structure and Content

The didactic materials that make up this Postgraduate Certificate will provide students with solid knowledge in Autoencoders, GANs and Diffusion Models in Deep Learning. To this end, the syllabus will analyze the keys to represent efficient data by addressing issues such as dimensionality reduction or Deep Learning. Likewise, the syllabus will delve into the performance of Principal Component Analysis with an incomplete linear automatic encoder. Graduates will identify patterns in the data and express these data in terms of new variables. Generative Adversarial Networks will also be addressed, to generate new information using other input data.

TECH's 100% online methodology will allow you to enjoy effective learning without leaving your home"

Module 1. Autoencoders, GANs, and Diffusion Models

1.1. Representation of Efficient Data

    1.1.1. Dimensionality Reduction

    1.1.2. Deep Learning

    1.1.3. Compact Representations

1.2. PCA Realization with an Incomplete Linear Automatic Encoder

    1.2.1. Training Process

    1.2.2. Implementation in Python

    1.2.3. Use of Test Data

1.3. Stacked Automatic Encoders

    1.3.1. Deep Neural Networks

    1.3.2. Construction of Coding Architectures

    1.3.3. Use of Regularization

1.4. Convolutional Autoencoders

    1.4.1. Design of Convolutional Models

    1.4.2. Convolutional Model Training

    1.4.3. Results Evaluation

1.5. Automatic Encoder Denoising

    1.5.1. Application of Filters

    1.5.2. Design of Coding Models

    1.5.3. Use of Regularization Techniques

1.6. Sparse Automatic Encoders

    1.6.1. Increasing Coding Efficiency

    1.6.2. Minimizing the Number of Parameters

    1.6.3. Using Regularization Techniques

1.7. Variational Automatic Encoders

    1.7.1. Use of Variational Optimization

    1.7.2. Unsupervised Deep Learning

    1.7.3. Deep Latent Representations

You will update your knowledge from the experience of the best professionals in Deep Learning, which will make you a more skilled developer. Enroll now!"

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.

30%

10%

8%

20%

25%

4%

3%

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.
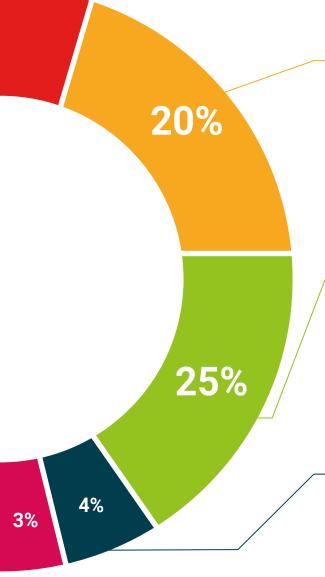
This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

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.

Certificate

The Postgraduate Certificate in Autoencoders, GANs, and Diffusion Models in Deep Learning 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 Autoencoders, GANs, and Diffusion Models in Deep Learning** 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 Autoencoders, GANs, and Diffusion Models in Deep Learning**

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 Autoencoders, GANs, and Diffusion Models in Deep Learning

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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