Electronics & ICT Academy
Indian Institute of Technology Guwahati
An Initiative of Ministry of Electronics & Information Technology(Meity)

इलेक्ट्रॉनिकी एवं सूचना प्रौद्योगिकी मंत्रालय
MINISTRY OF ELECTRONICS AND INFORMATION TECHNOLOGY

Professional Certificate Program in

Generative AI and Machine Learning

Powered By

simplilearn

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About the Program

Generative AI is a powerful tool that's changing how we live, work, and interact globally. It is transforming industries by streamlining content creation, enhancing product designs, and improving customer service. Companies use AI to create personalized marketing, speed up innovation, and offer smart virtual assistance. It also helps in making informed decisions through advanced data analysis and improves user experiences with tailored recommendations. Additionally, Generative AI boosts cybersecurity, aids in language translation, and makes employee training more engaging.

Our Professional Certificate Program in Generative AI and Machine Learning offers a comprehensive learning experience in this rapidly growing field. Taught by industry experts through live virtual classes and featuring hands-on projects, self-paced videos, and group learning, this program equips you with essential skills and insights. Our curriculum covers the latest advancements and critical topics like Generative AI, machine learning, and deep learning, as well as specialized areas such as computer vision, natural language processing, and speech recognition.

Upon successful program completion, you'll unlock access to Simplilearn's Career Assistance Services, featuring expert resume crafting and personalized interview preparation, empowering you to propel your career to new heights.

About Electronics & ICT Academy at IIT Guwahati

As an initiative of the Ministry of Electronics & Information Technology (MeitY), the Electronics & ICT Academy was set up at the Indian Institute of Technology Guwahati (IIT Guwahati) under the scheme of "Financial Assistance for setting up Electronics and ICT Academies." On 26 March 2015, the project started at IIT Guwahati and the academy was inaugurated by Prime Minister Shri. Narendra Modi on 19 January 2016. The objective of the academy is to provide skill training to the Faculty Members (engineering & non-engineering) in the area of recent trends in engineering & ICT applications. The academy is designing specialized modules for imparting quality training for enhancing employability and capacity building in the field of Electronics & ICT. In the past 7 years, the academy has successfully conducted 400+ programs through conventional classroom teaching and virtual classroom mode in different institutes/universities of north eastern states, particularly in other states of India. To date, the academy has successfully trained 20,000+ participants. The academy has also signed an MoU with institutes/universities to host the programs and conduct hands-on sessions. The academy collaborated with industries as training/industry partners. The academy also offers online advanced certification courses in data science, artificial intelligence & machine learning, big data, cloud computing, full stack development, UI/UX, and VLSI design, and trained 2,000+ graduates and working professionals. The academy has also trained 140+ Assam Police and Indian Navy officials on cybercrime concepts and data science.

About Simplilearn

Simplilearn is the world's #1 online certificate program provider, enabling learners around the globe with rigorous and highly specialized training offered in partnership with world-renowned universities and leading corporations. We focus on emerging technologies and skills, such as data science, cloud computing, programming, and more, that are transforming the global economy. Our hands-on and immersive training includes live virtual classes, integrated labs and projects, 24x7 support, and a collaborative learning environment. Over two million professionals and 2000 corporate training organizations across 150 countries have harnessed our award-winning programs to achieve their career and business goals.

Key Features of the Program

- Program completion certificate from E&ICT Academy, IIT Guwahati
- Curriculum delivered in live virtual classes by seasoned industry experts
- Exposure to the latest AI advancements, such as generative AI, LLMs, and prompt engineering
- Interactive live-virtual masterclasses delivered by esteemed IIT Guwahati faculty
- Opportunity to earn an 'Executive Alumni Status' from E&ICT Academy, IIT Guwahati
- Eligibility for a campus immersion program organized at IIT Guwahati
- Exclusive hackathons and "ask-me-anything" sessions by IBM
- Certificates for IBM courses and industry masterclasses by IBM experts
- Practical learning through 25+ hands-on projects and 3 industry-oriented capstone projects
- Access to a wide array of AI tools such as ChatGPT, Hugging Face, DALL-E 2, Midjourney and more
- Simplilearn's JobAssist to help you get noticed by top hiring companies

Eligibility Criteria

For admission to this program, candidates should have:

- A bachelor's degree with an overall average of at least 50% marks
- Fundamental understanding of mathematics and programming concepts
- Over 2 years of formal work experience

Application Process

The application process consists of three simple steps:

1

Submit an Application

Complete the application, including a brief statement of purpose explaining your interest and qualifications for the program.

2

Application Review

A panel of admissions counselors will review your application and statement of purpose to determine whether you qualify for acceptance.

3

Admission

An offer of admission will be made to qualified candidates. You can accept this offer by paying the program fee.

Talk to an Admissions Counselor

Our dedicated admissions counselors are ready to assist with any questions or concerns you may have about the Generative AI and Machine Learning program.

Our team is available to:

- Guide you through the application process
- Discuss financing options
- Offer detailed insights into the curriculum, program outcomes, and more

Inquire Now

Contact Us | 1-800-212-7688

Generative AI Industry Trends

The demand for cloud computing experts is soaring, with a 23.1% YoY surge in the last 12 months. Cloud professionals enjoy a positive career outlook, as indicated by a turnover rate of 42% for employees with these valuable skills. (230)

$667.9 billion

Estimated Generative AI market size by 2030

Source: Fortune Business Insights

$4.4 trillion

Expected value added by Generative AI to the global economy annually.

Source: Mckinsey

₹10,12,500

Average annual salary of an AI/ML engineer in India

Source: Glassdoor

Who is this Program Ideal for?

This program is designed for professionals from various backgrounds and industries who are eager to enhance their skills in generative AI and machine learning.
By bringing together individuals from different fields, the program fosters a dynamic learning environment enriched by diverse perspectives. It is ideally suited for, but not limited to, individuals pursuing or currently employed in the following roles:

- IT
- Software Engineering
- Consulting
- Analysis
- Development
- Product Management
- AI and ML

Program Outcomes

Understand cutting-edge trends in AI, including Generative AI, prompt engineering, and ChatGPT.

Differentiate among various generative models, such as VAEs, GANs, transformers, and autoencoders.

Comprehend the architecture and key components of large language models, including the role of Transformers and attention mechanisms.

Analyze the design principles, performance, and limitations of advanced models like GPT and BERT.

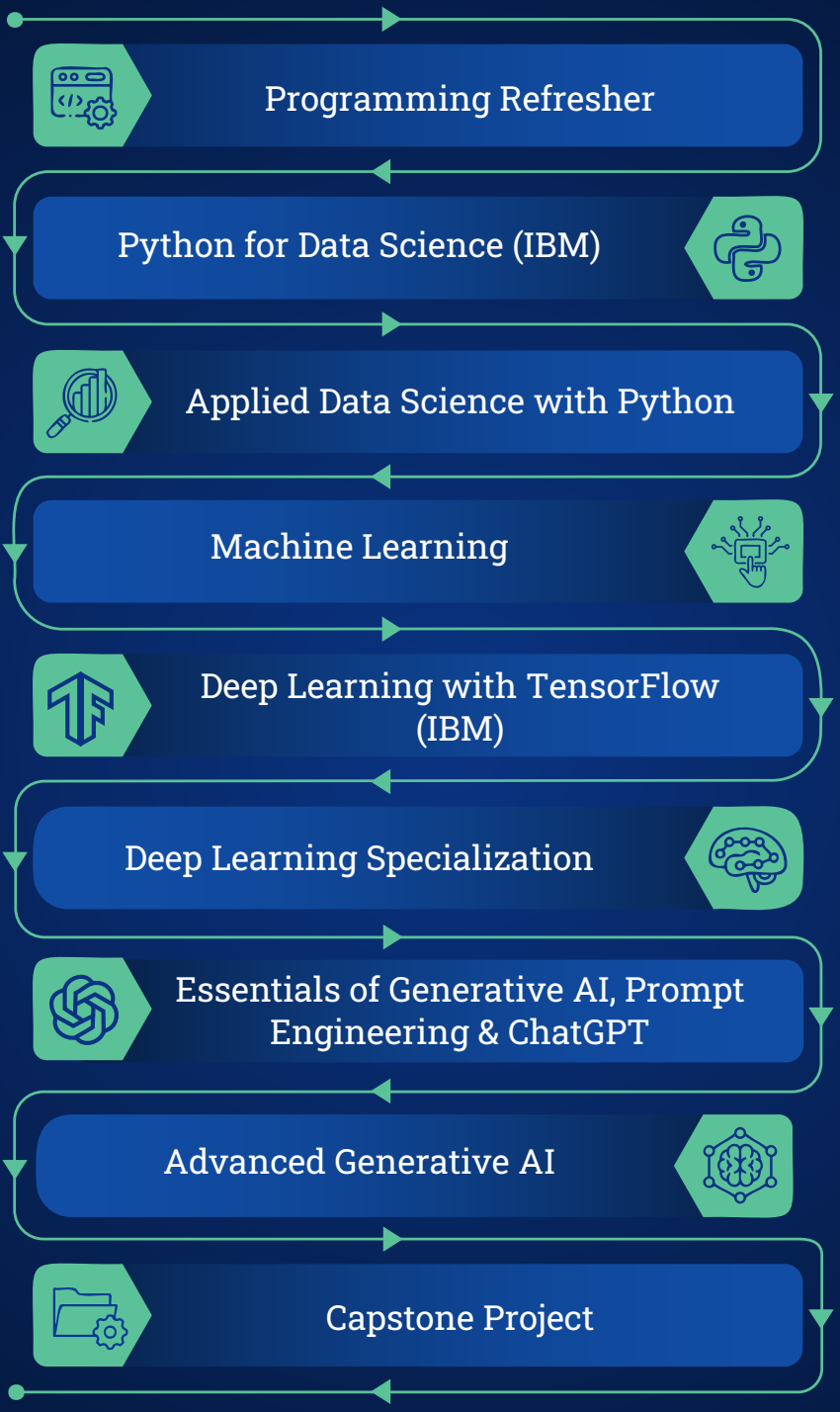
Master supervised and unsupervised learning, recommendation systems, time series modeling, and validate models with accuracy metrics.

Apply machine learning and deep learning techniques to NLP, including text-to-speech conversion and automated speech recognition.

Execute scientific computations with SciPy, NumPy, and scikit-learn, and solve reinforcement learning problems using Python and TensorFlow.

Learning Path Visualization

Core Topics



Elective

- Advanced Deep Learning and Computer Vision
- NLP and Speech Recognition
- Reinforcement Learning
- Academic Masterclass
- Industry Masterclass

Core Courses

Module 1

Programming Refresher

This course equips you with essential Python programming skills that will serve as the building blocks for your entire program journey. You will learn to implement artificial intelligence (AI) and machine learning (ML) algorithms, analyze data, and effectively build intelligent systems using Python.

Learning Outcomes

- Gain proficiency in Python programming, covering installation, syntax, and basic constructs.
- Master Python data types, operators, conditional statements, and loops.
- Develop skills in creating and using Python functions.
- Understand and apply Object-Oriented Programming (OOP) concepts in Python.
- Learn threading and multithreading concepts and their implementation in Python.

Topics covered

- Introduction to Python Programming
- Python Data Types and Operators
- Conditional Statements and Loops
- Python Programming Features
- Python Functions
- Object-Oriented Programming with Python
- Threading and Multithreading
- Functional Programming Implementation

Module 2

Python for Data Science (IBM)

Developed by IBM, this course teaches how to utilize Python for data science. By the end of this course, you'll be proficient in writing Python scripts and conducting essential hands-on data analysis in a Jupyter-based lab environment.

Learning Outcomes

- Utilize variables, strings, functions, loops, and conditional statements to develop Python programs.
- Understand and implement lists, sets, dictionaries, conditional branching, objects, and classes in Python.
- Leverage pandas for loading, manipulating, and saving data, as well as reading and writing files in Python.

Topics covered

- Python Basics
- Python Programming Fundamentals
- Python Data Structures
- Working with Data in Python
- Working with NumPy Arrays

Module 3

Applied Data Science with Python

This course covers essential data science principles, including data preparation, model development, and evaluation. You'll learn key Python concepts like strings, Lambda functions, and lists, and dive into NumPy, linear algebra, and statistical concepts such as central tendency, dispersion, skewness, covariance, and correlation. Explore hypothesis testing methods like Z-tests, T-tests, and ANOVA. Additionally, master data manipulation with pandas and enhance your data visualization skills using Matplotlib, Seaborn, Plotly, and Bokeh.

Learning Outcomes

- Develop a comprehensive understanding of the data science process and its components.
- Gain proficiency in using Python and its libraries for data science applications.
- Master the use of NumPy and Pandas for data manipulation and analysis.
- Construct visually appealing and informative graphs using Matplotlib, Seaborn, Plotly, and Bokeh.
- Acquire skills in data wrangling and preprocessing techniques.

Topics covered

- Introduction to Data Science
- Essentials of Python Programming
- Linear Algebra
- Statistics Fundamentals
- Probability Distributions
- Advanced Statistics
- Fundamentals of NumPy
- Working with Pandas
- Data Analysis
- Data Wrangling
- Data Visualization
- End-to-End Statistics Application in Python

Module 4

Machine Learning

Explore different types of machine learning and their applications, study the entire pipeline, and focus on supervised learning with regression models and classification algorithms. Learn unsupervised learning, clustering techniques, and ensemble modeling. Evaluate frameworks like TensorFlow and Keras, and gain hands-on experience with PyTorch to build a recommendation engine.

Learning Outcomes

- Examine various machine learning types and their characteristics.
- Analyze the machine learning pipeline and understand MLOps (Machine Learning Operations).
- Explore supervised learning and its applications in real-world scenarios.
- Understand overfitting and underfitting concepts, and learn detection and prevention methods.
- Analyze different regression models and their practical applications.
- Examine various ensemble modeling techniques such as bagging, boosting, and stacking.

Topics covered

- Machine Learning Fundamentals
- Regression Models and Applications
- Classification Models and Applications
- Supervised Learning
- Unsupervised Learning
- Ensemble Learning
- Recommendation Systems

Module 5

Deep Learning with TensorFlow (IBM)

Designed by IBM, this course will elevate your machine learning skills by offering a thorough understanding of deep learning with TensorFlow and Keras. You'll master deep learning concepts, allowing you to build artificial neural networks and navigate layers of data abstraction. By harnessing the full potential of big data, this course will prepare you to explore new frontiers in artificial intelligence.

Learning Outcomes

- Develop a profound understanding of neural networks and their application in deep learning.
- Achieve expertise in TensorFlow and Keras, critical tools in deep learning.
- Delve into Convolutional Neural Networks (CNNs) and understand their real-world applications.
- Acquire familiarity with Recurrent Neural Networks (RNNs) and Autoencoders.
- Enhance your neural networks performance using methods like L2 Regularization and Dropout Layers.
- Develop Autoencoder models for anomaly detection.

Topics covered

- Introduction to AI and Deep Learning
- Deep Neural Network and Tools
- Optimization, Tuning, and Interpretability of Deep Neural Networks
- Artificial Neural Network
- Convolutional Neural Networks (CNN)
- Recurrent Neural Networks Autoencoders

Module 6

Deep Learning Specialization

This course delves into the fundamentals and applications of deep learning, highlighting its distinctions from machine learning. Key topics include neural networks, forward and backward propagation, TensorFlow 2, Keras, performance optimization, model interpretability, CNNs, transfer learning, object detection, RNNs, autoencoders, and PyTorch.

Learning Outcomes

- Understand the distinctions between deep learning and machine learning.
- Learn about the practical applications of deep learning.
- Master forward propagation and backward propagation in deep neural networks (DNN).
- Comprehend hyperparameter tuning and model interpretability in deep learning.
- Implement dropout and early stopping techniques to improve model performance.
- Gain expertise in convolutional neural networks (CNNs) for tasks like object detection.

Topics covered

- Introduction to Deep Learning
- Artificial Neural Networks
- Deep Neural Networks
- TensorFlow
- Model Optimization and Performance Improvement
- Convolutional Neural Networks (CNNs)
- Transfer Learning
- Object Detection
- Recurrent Neural Networks (RNNs)
- Transformer Models for Natural Language Processing (NLP)
- Getting Started with Autoencoders
- PyTorch

Module 7

Essentials of Generative AI, Prompt Engineering & ChatGPT

This course offers an extensive exploration of cutting-edge AI concepts, including generative AI, prompt engineering, LLMs, and ChatGPT, among others. Participants will attain a deep practical understanding of these topics, learning how to effectively apply them across various business contexts. Additionally, the course delves into the intricate workings of prompt engineering and its pivotal role in crafting customized outputs to meet specific needs.

Learning Outcomes

- Gain a comprehensive understanding of generative AI models, including their types and operational principles.
- Recognize the importance of explainable AI and explore various approaches to achieve transparency in AI systems.
- Apply effective prompt engineering techniques to optimize the performance and control the behavior of generative AI models.
- Develop a deep understanding of ChatGPT, including its mechanisms, features, and limitations.
- Explore diverse applications and use cases where ChatGPT can be applied.
- Learn fine-tuning techniques to customize and optimize ChatGPT models for specific tasks and domains.

Topics covered

- Introduction to Generative AI Models
- Explainable AI
- Prompt Engineering
- Fine-tuning ChatGPT
- Ethical Considerations in Generative AI Models & ChatGPT
- The Future of Generative AI
- Security and Privacy Considerations

Module 8

Advanced Generative AI

Explore the creative potential of artificial intelligence with this Generative AI course. Dive into generative models like Variational Autoencoders (VAEs) and Generative Adversarial Networks (GANs), as well as Large Language Models (LLMs) and Transformer architectures. Learn about attention mechanisms, LangChain Workflow Design, and advanced prompt engineering. Gain expertise in developing applications with cutting-edge LLMs and refine them for specific tasks and domains.

Learning Outcomes

- Understand the pivotal role of Transformers in modern AI applications.
- Analyze the suitability of neural network architectures for generative tasks.
- Explain the foundational concepts driving generative models clearly.
- Comprehend the complex architecture and essential components of large language models.
- Evaluate the design principles of advanced models such as GPT, BERT, and their counterparts.
- Recognize how model architecture influences language processing capabilities.

Topics covered

- Introduction to Generative Models
- Large Language Models Architecture
- Attention Mechanisms and Transformers
- Types of Generative AI Models
- Popular Generative AI Models
- Benchmarking & Evaluating Models
- Advanced Prompt Engineering Techniques

Module 9

Capstone Project

Upon completing the GenAI and ML courses, participants embark on a capstone project to apply their newly acquired skills. Guided by mentors, they address real industry challenges directly. This project not only marks the culmination of their learning journey but also provides an opportunity to showcase their abilities to potential employers in a real-world context.

Learning Outcomes

- Gain hands-on experience in the Artificial Intelligence decision cycle.
- Perform exploratory data analysis to understand the dataset.
- Build and fine-tune models using cutting-edge AI algorithms.
- Present and interpret results obtained from the models.

Electives:

1 Advanced Deep Learning & Computer Vision

In this advanced course, you will acquire extensive knowledge and practical skills in computer vision and deep learning techniques. The curriculum encompasses a wide range of subjects, such as image formation and processing, convolutional neural networks (CNNs), object detection, image segmentation, generative models, optical character recognition, distributed and parallel computing, explainable AI (XAI), and the deployment of deep learning models. By the conclusion of the course, you will possess the expertise needed to address intricate computer vision challenges and effectively implement deep learning models.

2 NLP and Speech Recognition

This advanced course comprehensively explores the application of machine learning algorithms to handle extensive volumes of natural language data. It focuses primarily on natural language understanding, feature engineering, natural language generation, automated speech recognition, speech-to-text conversion, text-to-speech conversion, voice assistance devices, and the creation of Alexa skills. By the end of the course, you will possess a profound understanding of the principles underlying natural language processing and speech recognition, empowering you to create sophisticated applications in these domains.

3 Reinforcement Learning

This course delves deeply into the fundamental concepts of reinforcement learning (RL), equipping you with the knowledge and skills to tackle RL problems using various strategies in Python and TensorFlow. You will explore the theoretical underpinnings of RL and gain hands-on experience in applying RL algorithms as effective problem-solving tools. By the conclusion of the course, you will be proficient in using reinforcement learning across a wide range of applications and scenarios.

4 Academic Masterclass

These sessions led by distinguished IIT Guwahati faculty members will offer invaluable insights into the latest advancements in technology and techniques across expansive domains such as Data Science, Artificial Intelligence (AI), Generative AI (GenAI), and Machine Learning (ML). Through in-depth discussions and presentations, you will enhance your understanding of the cutting-edge developments that are shaping these fields. This will equip you with the knowledge and expertise needed to stay at the forefront of innovation in the constantly evolving landscape of technology.

5 Industry Masterclass

Attend online interactive masterclasses delivered by industry leaders from IBM. These masterclasses will equip you with the skills to give your organization a competitive advantage in any industry by leveraging data for decision-making, extracting business insights, and predicting future trends.

Skills Covered

- Generative AI
- Prompt Engineering
- ChatGPT
- Explainable AI
- Machine Learning Algorithms
- Supervised and Unsupervised Learning
- Model Training and Optimization
- Model Evaluation and Validation
- Ensemble Methods
- Deep Learning
- Natural Language Processing (NLP)
- Computer Vision
- Reinforcement Learning
- Speech Recognition
- Statistics

Tools Covered

ChatGPT | OpenAI | DALL·E 2 | Hugging Face

python | gradio | LangChain | TensorFlow

Keras | NLTK | NumPy | OpenCV

scikit-learn | matplotlib | django

Projects

Create a Virtual Assistant with Generative AI

Develop a conversational chatbot that can engage in meaningful dialogues, answer questions, provide recommendations, and assist with tasks based on the documents provided.

Predicting Employee Iteration with Machine Learning

Build a machine learning model that predicts employee attrition rate at a company by identifying patterns in their work habits and desire to stay with the company.

Explore the Road Safety of Autopilot Feature with Data Analysis

Examine accident data involving Tesla's auto-pilot feature to assess the correlation between road safety and the use of auto-pilot technology.

Create An AI Recommendation Engine to Improve Marketing

Use AI to categorize images of historical structures and conduct exploratory data analysis (EDA) to build a recommendation engine that improves marketing initiatives.

Utilize Deep Learning to Automate Ship Detection

Use deep learning concepts, such as CNN, to automate a system that detects and prevents faulty situations resulting from human error and identifies the type of ships.

Explore Feature Analysis with EDA and Statistics

Perform feature analysis to understand the features of water bottles using EDA and statistical techniques to understand their overall quality and sustainability.

Understand the Real Estate Parameters with Feature Engineering

Use feature engineering to identify the top factors that influence price negotiations in the homebuying process.

Use Cluster Analysis for Song Classification

Perform cluster analysis to create a recommended playlist of songs for users based on their user behavior.

Customer Acquisition with EDA and Statistics

Use exploratory data analysis and statistical techniques to understand the factors that contribute to customer acquisition for a retail firm.

Utilize Time Forecasting to Forecast for the Food Industry

Use data science techniques, such as time series forecasting, to help a data analytics company forecast demand for different items across restaurants.

Detecting Diabetics with CNN and Deploying with TensorFlow

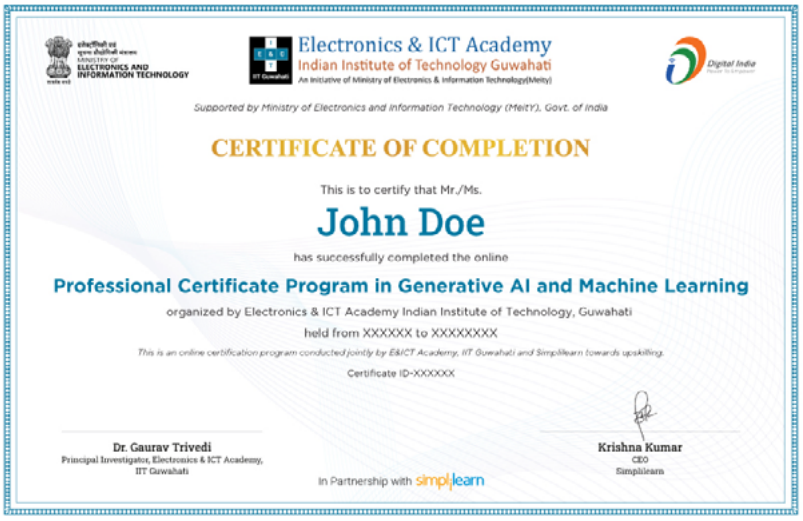
Use distributed training to construct a CNN model capable of detecting diabetic retinopathy and deploy it using TensorFlow Serving for an accurate diagnosis.

Build Facial Recognition for Healthcare System with Deep Learning

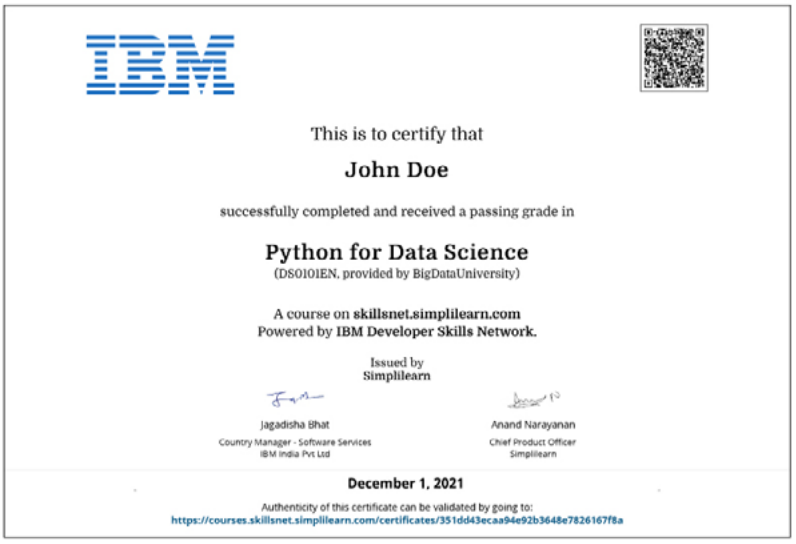
Leverage deep learning algorithms to develop a facial recognition feature that helps diagnose patients for genetic disorders and their variations.

Certificates

Simplilearn has partnered with the E&ICT Academy, IIT Guwahati, to offer online professional programs. Simplilearn's award-winning immersive learning model delivered via live virtual classes focuses on applied learning methods to create an immediate career impact.



Upon completing the program, you will receive a program completion certificate from the E&ICT Academy, IIT Guwahati.



Aditionally, you have an opportunity to earn industry certification from IBM for the IBM courses you complete.

Furthermore, you will receive certificates from Simplilearn for each individual course completed within the learning path. These certificates will validate your expertise in the field of AI and ML.

Program Advisor

Dr. Gaurav Trivedi

Associate Professor, Electronics and Electrical Engineering Principal Investigator, E&ICT Academy, IIT Guwahati

Dr. Gaurav Trivedi is an Associate Professor of Electronics and Electrical Engineering at IIT Guwahati. He is also a Principal Investigator at the E&ICT Academy. With an M.Tech. in Microelectronics and a Ph.D. in Electrical Engineering from IIT Bombay, his research spans circuit simulation, VLSI CAD, electronics system design, computer architecture, semiconductor devices, hardware security, embedded systems, IoT, high-performance computing, large-scale optimization, and machine learning.

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