



Executive PG Programme in

# MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE

Detect Your Next Step



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# About upGrad and IIITB

*upGrad has delivered over 20 million hours of learning, delivering programs by collaborating with universities across the world including Duke CE, IIT Madras, IIT Bangalore and Deakin Business School among others.*

Online education is a fundamental disruption that will have a far-reaching impact. **upGrad** was founded taking this into consideration. upGrad is an online education platform to help individuals develop their professional potential in the most engaging learning environment.

Since inception, upGrad has delivered over 20 million hours of learning, delivering programs by collaborating with universities across the world including Duke CE, IIT Madras, IIT Bangalore and Deakin Business School among others.

upGrad is focused on helping working professionals in their bid to learn, grow and move up in their career through a wide-range of programs designed to improve their expertise.

**IIITB** is a renowned university offering programs specialising in data science, machine learning and artificial intelligence. The IIITB faculty includes an average of 15+ years of experience.

The faculty covers the conceptual depths of topics such as Data Science, Machine Learning and Artificial Intelligence, and Big Data Analytics. These will be complemented by industry relevant case studies from major industry verticals by industry leaders with 8+ years of experience from upGrad's industry network.

The Executive PG Programme in ML & AI has been developed with the experienced faculty of IIITB in collaboration with industry experts and upGrad to bring you cutting-edge curriculum with industry relevance. The strong placement network, industry mentorship and the credibility of this Executive PG Programme from IIITB will provide you with just the right push to accelerate your career in Machine Learning and AI!



**400% Highest Raise**

# Why upGrad?

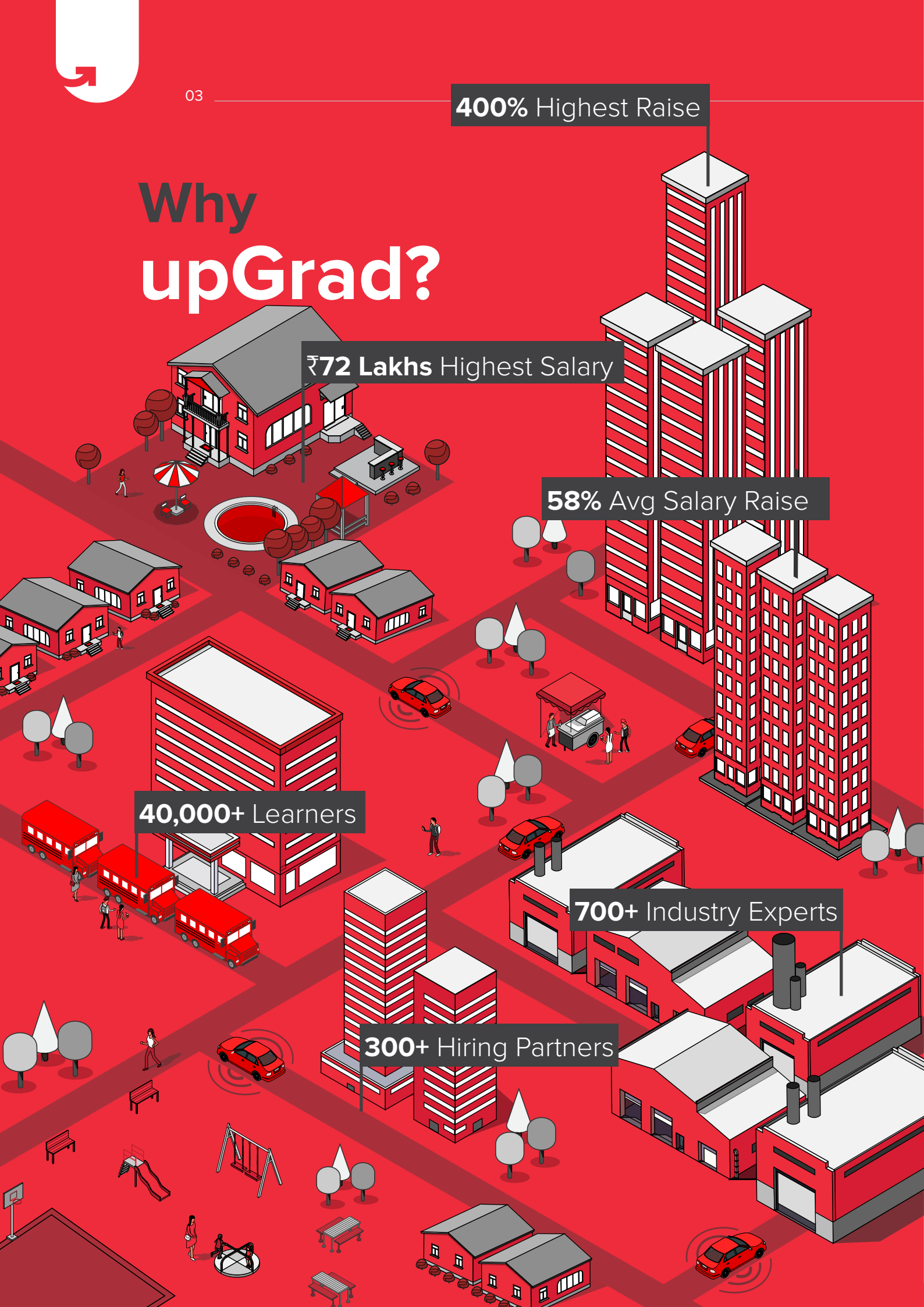
**₹72 Lakhs Highest Salary**

**58% Avg Salary Raise**

**40,000+ Learners**

**700+ Industry Experts**

**300+ Hiring Partners**





# Faculty and Industry Experts



**Hindol Basu**  
CEO, Actify Data Labs

An alumnus of IIT and IIM with over 13 years of experience in analytics with industry leaders such as Citigroup and Tata Industries.



**Chandrashekar Ramanathan**  
Dean Academics, IIITB

Prof. Chandrashekar has a PhD from Mississippi State University and experience of over 10 years in several multinational organisations.



**S. Anand**  
CEO, Gramener

A gold medallist from IIM Bangalore, an alumnus of IIT Madras and London Business School, Anand is among the top 10 data scientists in India with 20 years of experience.



**Tricha Anjali**  
Former Associate Dean, IIITB

Prof. Anjali has a PhD from Georgia Institute of Technology as well as an integrated MTech (EE) from IIT Bombay.



**Ujjaini Mitra**  
Head of Analytics, Zee5

An alumna of McKinsey and Co., Flipkart, and Bharti Airtel with over 11 years of experience.



**Prof. Debabrata Das**  
Director, IIITB

Dr. Debabrata Das is serving as Director of IIIT Bangalore (IIITB). He has completed his Ph.D. degree from the Indian Institute of Technology Kharagpur. His main areas of research interest are IoT and Wireless Access Network's MAC, QoS, Power saving.



**Anshuman Gupta**

Director - Data Science, Pitney Bowes

He has a PhD (Dual) from Penn State University as well as a BTech Degree from IIT Bombay.



**Prof. G. Srinivasaraghavan**

Professor, IIITB

Prof. Srinivasaraghavan has a PhD in Computer Science from IIT-K and 18 years of experience with Infosys Technologies and several other companies.



**Ankit Jain**

Sr. Research Scientist, Uber

An alumnus of IIT Bombay, UCB and Harvard Business School with over 9 years of experience.



**Dinesh Babu Jayagopi**

Associate Professor, IIITB

Prof. Dinesh has a PhD from EPFL Switzerland, MSc from IISc Bangalore in System Science and Signal Processing and BTech.



**Kalpana Subbaramappa**

Ex-AVP, Genpact

Kalpana is the ex-AVP of Decision Sciences at Genpact with over 20 years of experience.



**Srinath Srinivasa**

Professor and Dean (R&D), IIITB

He holds a PhD in Information Systems from the Berlin Brandenburg Graduate School, Germany, and is a recipient of various international grants for his research activities.



**Mirza Rahim Baig**

Lead Business Analytics, Flipkart

Advanced Analytics professional with 8+ years of experience as a consultant in the e-commerce and healthcare domains.



**Prof. V. Sridhar**

Faculty In Charge, CPE, IIITB

Dr. Sridhar has a Ph.D. from the University of Iowa, U.S.A. He has been a member of Government of India committees on Telecom and IT and has published many peer reviewed articles in telecom and information systems journals.

# upGrad Learning Experience

## Coaching

- Student Support Team & upGrad Buddy
- Weekly real-time doubt clearing sessions
- Live Discussion forum for peer-to-peer doubt resolution monitored by technical experts
- Peer-to-peer networking opportunities with an alumni pool of 10,000+ keen professionals
- Reverse knowledge transfer sessions (FLIP classrooms) with learners assuming the role of an expert and tutoring fellow batchmates.
- 100+ commonly asked interview questions added across modules
- Lab walk-throughs of 15+ industry-driven assignments/case studies/projects
- 6 Employability Tests for industry readiness
- Access to the program for up to 3 years

## Format

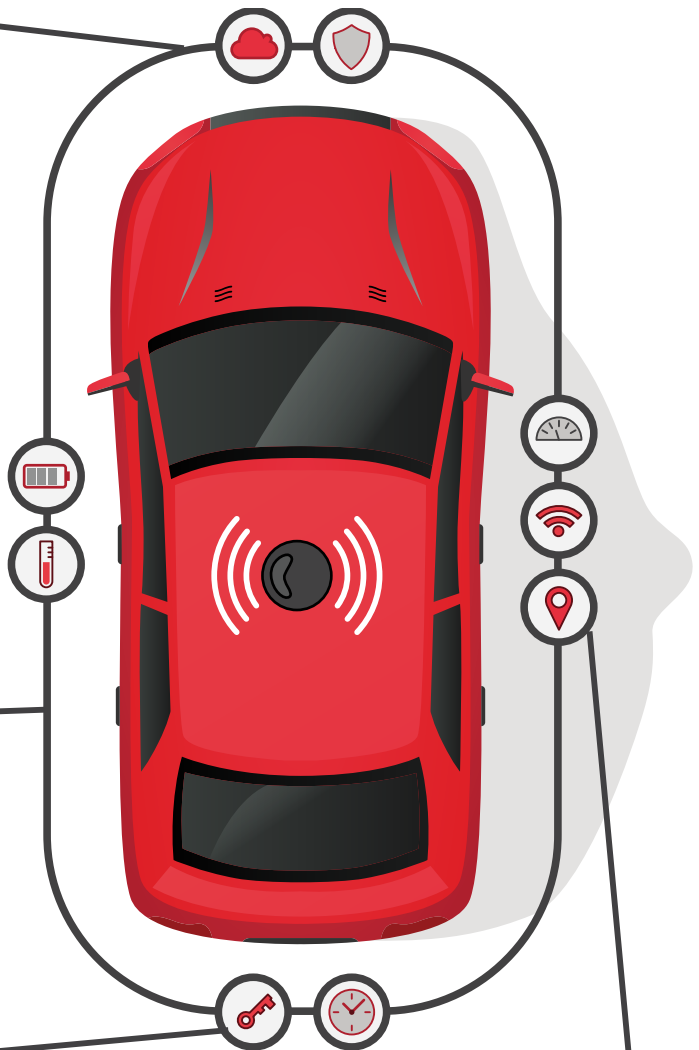
- Online format with weekly live sessions from industry experts to help with topic walk-throughs, doubt resolution and personalised project feedback
- Offline sessions such as upGrad basecamps and Hackathons

## Hands-On Projects and Hackathons

- 12+ Industry projects and a Capstone Project to choose from 5+ options.
- 1 Hackathon every quarter to apply learnings & opportunity to interview with companies
- Live coding classes on Kaggle platform
- Hands-on sessions on Git and Github to boost the learners' career persona
- Live coding session on openCV

## Mentorship

- Live interactive sessions (every weekend) with leading industry experts covering curriculum + advanced topics.
- Fortnightly personalised group (1:8) mentorship sessions with industry experts for pro-active mentoring.
- Dedicated Student Success Mentor for proactive mentoring.



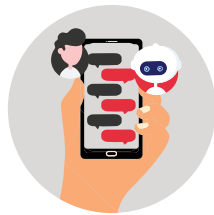




# Industry Projects



**Train an Agent to Play Tic Tac Toe**



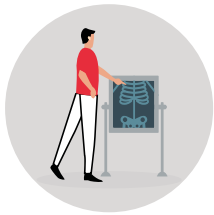
**Build a Chatbot**



**Object Detection in Images**



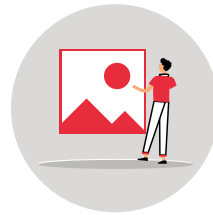
**Fraud Detection**



**Detect Skin Cancer from Images**



**Speech Recognition**



**Image Captioning**



**Gesture Recognition**



**Social Media Listening**



**Telecom Churn Analysis**



**Recommendation System**



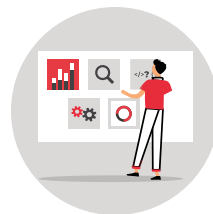
**Sentiment Analysis on Twitter**



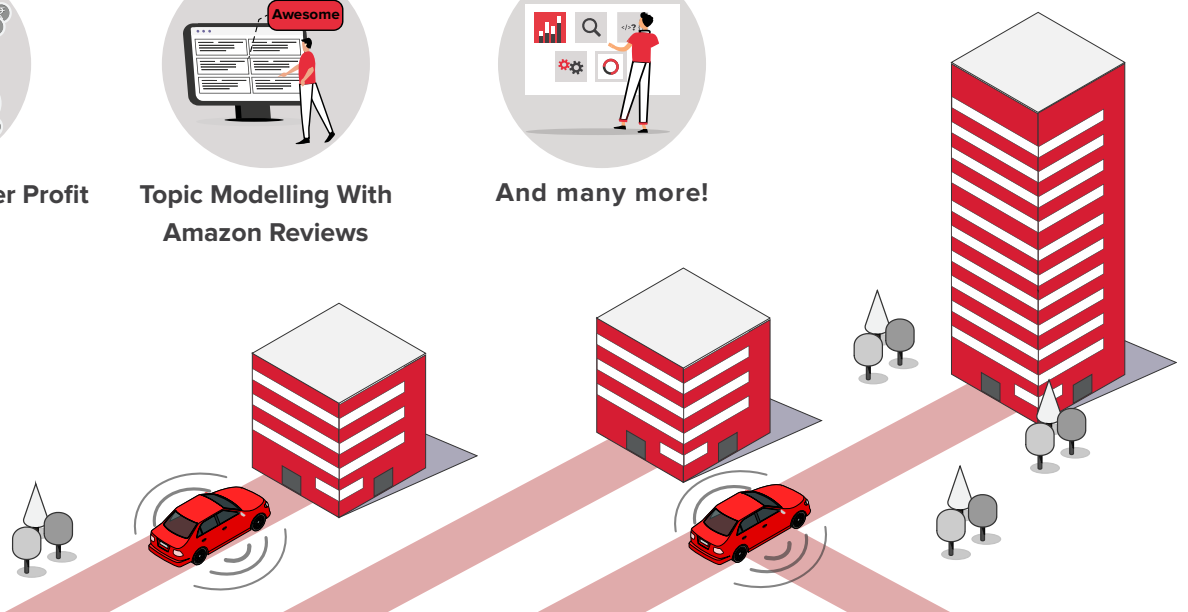
**Maximize Cab Driver Profit Using RL**



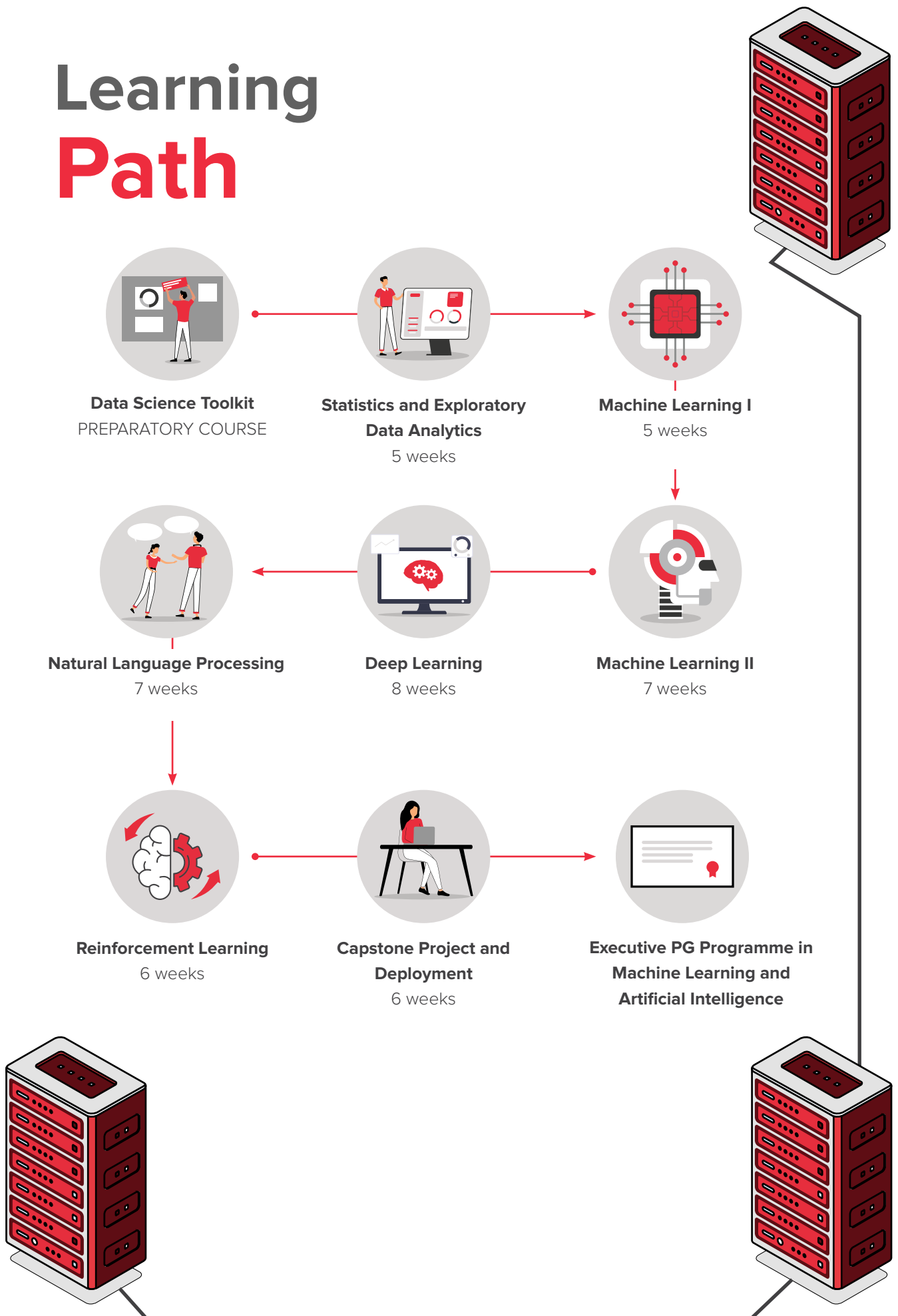
**Topic Modelling With Amazon Reviews**



**And many more!**



# Learning Path





# Programming Tools, Languages and Libraries

- Pandas
- Matplotlib
- Numpy
- NLTK
- Seaborn
- Scikit-learn
- Statsmodels
- OpenCV
- Kubernetes
- Rest API
- Docker
- Spacy
- Flask
- AWS
- Heroku
- Excel
- Tensorflow
- Keras
- MySQL
- Python



# Program Curriculum

## DATA SCIENCE TOOLKIT

- 1 INTRODUCTION TO PYTHON**  
Build a foundation for the most in-demand programming language of the 21st century.
- 2 PYTHON FOR DATA SCIENCE**  
Learn how to manipulate datasets in Python using Pandas, which is the most powerful library for data preparation and analysis.
- 3 DATA VISUALISATION IN PYTHON**  
Humans are visual learners and hence no task related to data is complete without visualisation. Learn to plot and interpret various graphs in Python and observe how they make data analysis and drawing insights easier.
- 4 DATA ANALYSIS USING SQL (OPTIONAL)**  
Data in companies is definitely not stored in excel sheets! Learn the fundamentals of database and extract information from RDBMS using the structured query language.
- 5 ADVANCED SQL AND BEST PRACTICES (OPTIONAL)**  
Apply advanced SQL concepts like windowing and procedures to derive insights from data and answer pertinent business questions.
- 6 DATA ANALYSIS IN EXCEL (OPTIONAL)**  
Taught by one of the most renowned data scientists in the country (S.Anand, CEO, Gramener), this module takes you from a beginner level Excel user to an almost professional user.
- 7 ANALYTICS PROBLEM SOLVING (OPTIONAL)**  
This module covers concepts of the CRISP-DM framework for business problem-solving.
- 8 MATH FOR MACHINE LEARNING**  
Learn the prerequisite mathematical tools and techniques for ML - Linear Algebra and Multi-variable Calculus.

## STATISTICS AND EXPLORATORY DATA ANALYTICS

- 1 EXPLORATORY DATA ANALYSIS**  
Learn how to find and analyse the patterns in the data to draw actionable insights.
- 2 INVESTMENT ASSIGNMENT**  
The students will fill in the shoes of an analyst at an investment bank and determine where the firm

### **3 INFERENTIAL STATISTICS**

Build a strong statistical foundation and learn how to 'infer' insights from a huge population using a small sample.

### **4 HYPOTHESIS TESTING**

Understand how to formulate and validate hypothesis for a population to solve real-life business problems.

### **5 LENDING CLUB CASE STUDY**

Determine which customers are at risk of default and what are their characteristics so as to avoid providing loans to similar people in the future.

## **MACHINE LEARNING I**

### **1 LINEAR REGRESSION**

Venture into the machine learning community by learning how one variable can be predicted using several other variables through a housing dataset where you will predict the prices of houses based on various factors.

### **2 ASSIGNMENT: LINEAR REGRESSION**

Build a model to understand the factors car prices vary on and help a Chinese company enter the US car market.

### **3 LOGISTIC REGRESSION**

Learn your first binary classification technique by determining whether customers of a telecom operator are likely to churn to help the business retain customers.

### **4 NAIVE BAYES**

Understand the basic building blocks of Naive Bayes and learn how to build an SMS Spam Ham Classifier using Naive Bayes technique.

### **5 MODEL SELECTION**

Learn the pros and cons of simple and complex models and the different methods for quantifying model complexity, along with regularisation and cross validation.



## **MACHINE LEARNING II**

**1**

### **ADVANCED REGRESSION**

Understand generalised regression and different feature selection techniques, along with the perils of overfitting and how it can be countered using regularisation.

**2**

### **ADVANCED REGRESSION ASSIGNMENT**

Build a model to understand the factors house prices vary on and help an American company enter the Australian housing market.

**3**

### **SUPPORT VECTOR MACHINE (OPTIONAL)**

Learn how to find a maximal marginal classifier using SVM, and use them to detect spam emails, recognise alphabets and more!

**4**

### **TREE MODELS**

Learn how the human decision making process can be replicated using a decision tree and other powerful ensemble algorithms.

**5**

### **MODEL SELECTION: PRACTICAL CONSIDERATIONS**

Given a business problem, how do you choose the best algorithm? Learn a few practical tips for doing this here.

**6**

### **BOOSTING**

Learn how weak learners can be 'boosted' with the help of each other and become strong learners using different boosting algorithms such as Adaboost, GBM, and XGBoost.

**7**

### **UNSUPERVISED LEARNING: CLUSTERING**

Learn how to group elements into different clusters when you don't have any pre-defined labels to segregate them through K-means clustering, hierarchical clustering, and more.

**8**

### **UNSUPERVISED LEARNING: PRINCIPAL COMPONENT ANALYSIS**

Understand important concepts related to dimensionality reduction, the basic idea and the learning algorithm of PCA, and its practical applications on supervised and unsupervised problems.

**9**

### **TELECOM CHURN CASE STUDY**

Solve the most crucial business problem for a leading telecom operator in India and southeast Asia - predicting customer churn.

## DEEP LEARNING

# 1

### INTRODUCTION TO NEURAL NETWORKS

Learn the most sophisticated and cutting-edge technique in machine learning - Artificial Neural Networks or ANNs.

# 2

### CONVOLUTIONAL NEURAL NETWORKS - INDUSTRY APPLICATIONS

Learn the basics of CNN and OpenCV and apply it to Computer Vision tasks like detecting anomalies in chest X-Ray scans, vehicle detection to count and categorise them to help the government ascertain the width and strength of the road.

# 3

### NEURAL NETWORKS - ASSIGNMENT

Build a neural network from scratch in Tensorflow to identify handwritten digits.

# 4

### RECURRENT NEURAL NETWORKS

Ever wondered what goes behind machine translation, sentiment analysis, speech recognition etc. ? Learn how RNN helps in these areas having sequential data like text, speech, and videos, etc.

# 5

### NEURAL NETWORKS PROJECT: GESTURE RECOGNITION

Make a Smart TV system which can control the TV with user's hand gestures as the remote control.





## NATURAL LANGUAGE PROCESSING

1

### LEXICAL PROCESSING

Do you get annoyed by the constant spams in your mail box? Wouldn't it be nice if we had a program to check your spellings?

In this module learn how to build a spell checker & spam detector using techniques like phonetic hashing, bag-of-words, TF-IDF, etc.

2

### SYNTACTICAL PROCESSING

Learn how to analyse the syntax or the grammatical structure of sentences using POS tagging and Dependency parsing.

3

### SYNTACTIC PROCESSING - ASSIGNMENT

Use the techniques such as POS tagging and Dependency parsing to extract information from unstructured text data.

4

### SEMANTIC PROCESSING

Learn the most interesting area in the field of NLP and understand different techniques like word-embeddings, topic modelling to build an application that extracts opinions about socially relevant issues.

5

### CASE STUDY: CLASSIFYING CUSTOMER COMPLAINT TICKETS

In this case study you will create a solution that will help in identifying the type of complaint ticket raised by the customers of a multinational bank.

## REINFORCEMENT LEARNING

1

### CLASSICAL REINFORCEMENT LEARNING

Ever wondered how Alpha Go beat the best GO player or how Boston Dynamics made robots that can run. Start your journey with the classical RL algorithms like dynamic programming, Monte Carlo methods, Q Learning, to train the state value and action value functions of the policy.

2

### TIC TAC TOE ASSIGNMENT - CLASSICAL REINFORCEMENT LEARNING ASSIGNMENT

Train an agent that will beat you in the game of numerical tic tac toe every time you play.

3

### DEEP REINFORCEMENT LEARNING

Want to build your own Atari Game? Learn the Q-function or policy using the various Deep Reinforcement Learning algorithms: Deep Q Learning, Policy Gradient Methods and Actor-Critic method.

4

### REINFORCEMENT LEARNING PROJECT

Improve the recommendation of the rides for the cab drivers by creating an RL-based algorithm using vanilla Deep Q-Learning (DQN) to maximize the driver's profits and in turn help in retention of the driver on the cab aggregator service.



## DEPLOYMENT AND CAPSTONE PROJECTS

# 1

### DEPLOYMENT

Learn how to productionize your model and deploy it on the server.

# 2

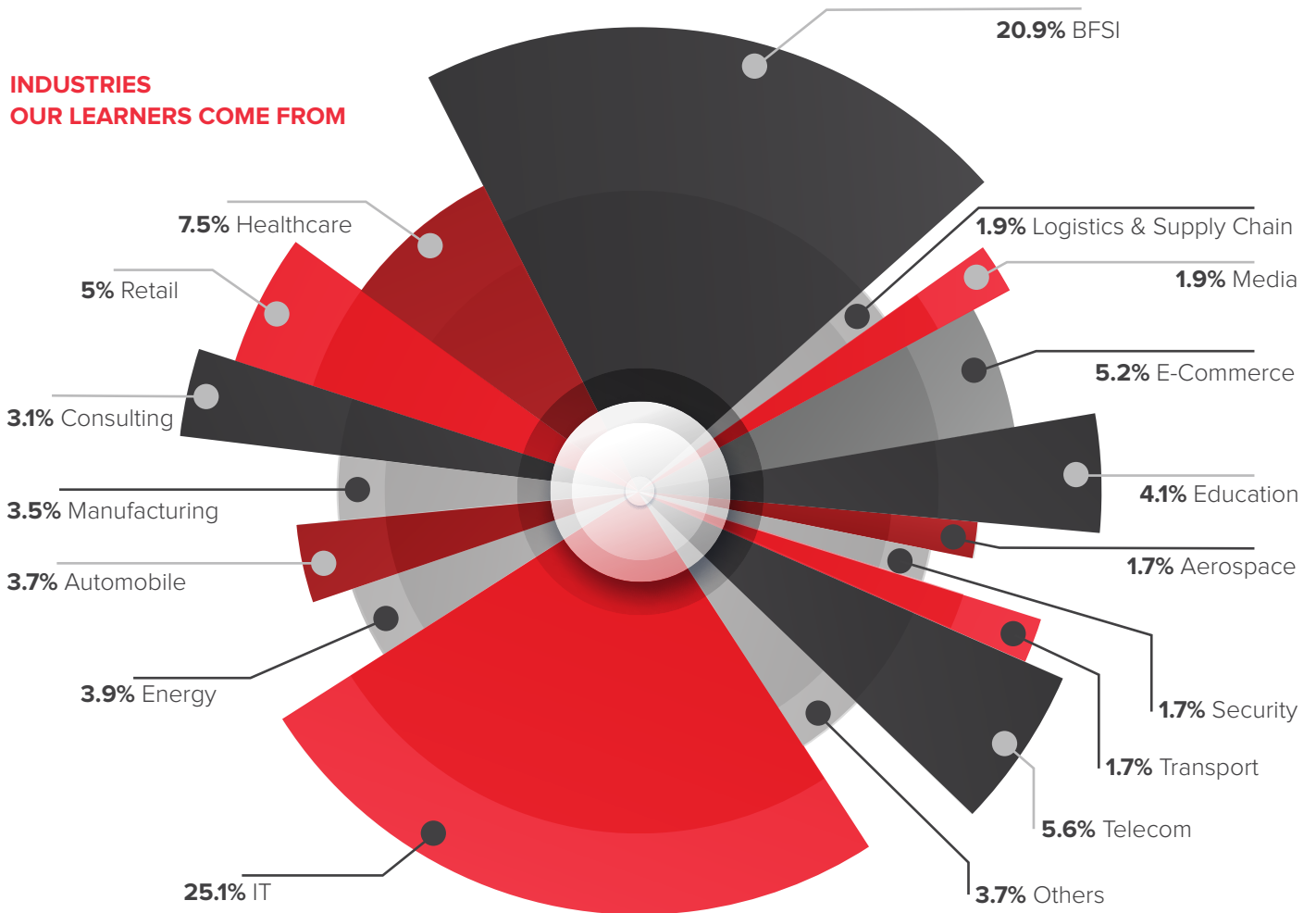
### CAPSTONE

Choose from a range of real-world industry woven projects on advanced topics like Recommendation Systems, Fraud Detection, Emotion Detection from faces, Social Media Listening, Speech Recognition among many others.

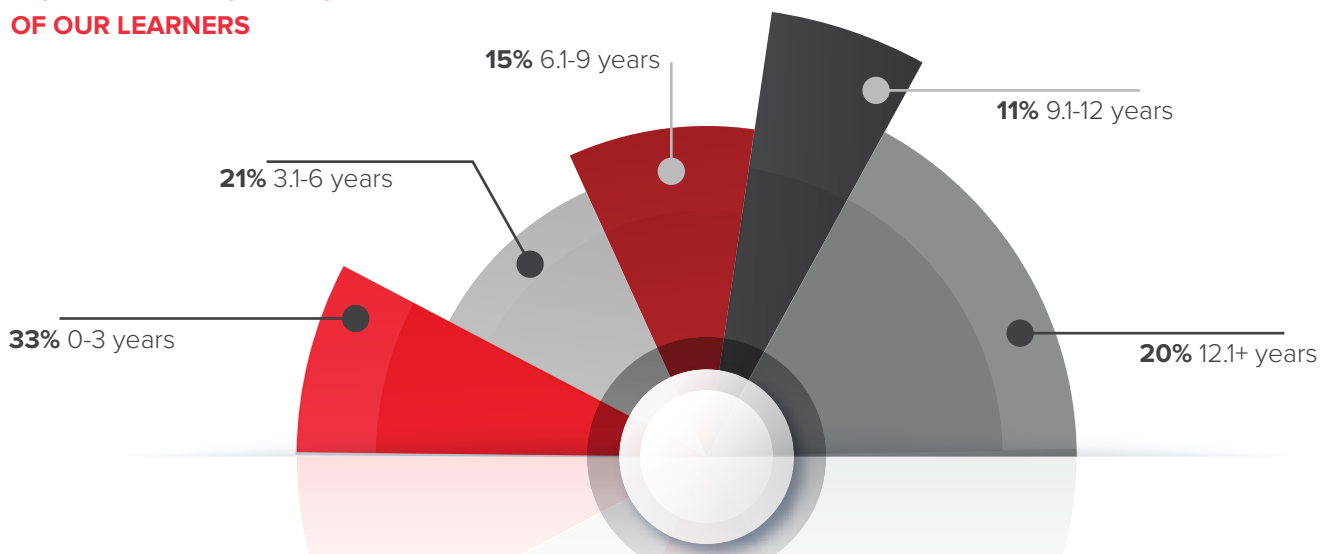


# Meet the Class

## INDUSTRIES OUR LEARNERS COME FROM



## WORK EXPERIENCE RANGE OF OUR LEARNERS





# Career Support

## Job Opportunities Portal

Gain exclusive access to upGrad's Job Opportunities portal which has 100+ openings from upGrad's hiring partners at any given time.

## upGrad elevate

Virtual hiring drive giving you the opportunity to interview with upGrad's 300+ hiring partners ensuring you get every opportunity you deserve.

## Just-In-Time Interviews

Get company and role-specific preparation with mock interviews right before your actual interviews.

## Resume Review

Obtain specific, personalised inputs on your resume structure and content.

## Personalised Mentorship

Get mentored by an experienced data science industry expert and receive personalised feedback with 4 calls spread over a period of 3 months.

## Career Mentor

Get a dedicated career mentor to help track your weekly company application targets, coach you on your profile, and support you during your career transition journey.

## Post Graduation Career Support

Career sessions are continued post graduation because we want you to have all the help you need. These include: live sessions with industry mentors to guide you, dedicated mentorship, and access to upGrad's career assistance resources.

## Company-Specific Preparation Support

Get company-specific guidance with access to a carefully curated pool of interview resources per company to ensure you are interview-ready for the company of your choice.

## Interviews through Hackathons

Gain every opportunity to get ahead. Top performers in Hackathons with individual companies will have the opportunity to interview with the company.

## Live Profile Building Workshops

Have live sessions of how to build your profile - be it your resume or GitHub - with hands-on sessions on Git and Github you can boost your profile. And also include your work from Kaggle & OpenCV.

## Internship Opportunities

Relevant Internship opportunities for learners open to gaining hands-on experience

# Experience upGrad Offline



## UPGRAD BASECAMPS

Held across all major cities in India, upGrad basecamps bring together learners, faculty and industry experts for a power-packed day of activities, career building sessions and live group projects. Get to know your peers and faculty, and hone your networking skills in an exciting environment.

## UPGRAD ELEVATE

upGrad's Hiring Drive where you can interview with upGrad's 300+ hiring partners ensuring you get every opportunity you deserve.



## HACKATHONS & JOB OPPORTUNITIES

Team up and put your learning to use with our offline Hackathons - designed to help you apply concepts and meet, network and grow! Being a top performer at Hackathons also provides the opportunity to interview at top firms.





# Hear from Our Learners

**Saurav Kant Kumar, Experience: 3.6 Years**

*"After just 6 months of starting my AI and ML journey, I have been rewarded with a Data Scientist position in Tech Mahindra with a very hefty package and this is just after going halfway through the program. I can put my money on this program on any given day and assure everyone that this is one program that stands apart from every other in the market. The program pedagogy is impeccable but what I liked the most is the constant motivation from my student mentor which kept me going in the program."*

**Shashank Sane, Experience: 11 Years**

*"Overall it is a very well rounded program (and only one of the few) and while the topics are being covered in sufficient depth, it would not be useful to compare this with MOOC's or any other specialised programs covering only one of the topics. The primary importance of this program lies in the structured approach and well-rounded coverage (with the industry insights that it offers)."*

**Amarpal Singh, Experience: 17 Years**

*"According to me this particular program is pretty useful and adds value because of its structured approach, strict schedule, deadlines and the discipline in learning that the overall process brings along. The whole idea that you will spend almost a year learning about ML/AI in a structured and organized manner is the biggest USP of this program and what makes it different from other short term courses."*

**Gaurav Singh, Experience: 2 Years**

*"This program sets very high standards in the field of ML and AI. Before joining this program I searched about many other programs but none of them is at par to this program. Yes it's true that nothing is perfect in this world, but whenever they commit mistakes they are very fast to respond and do not hesitate to accept and rectify that. I am completely satisfied with what they have given me, your money will not get wasted and you will get opportunity to expose yourself to the field of ML and AI."*

**AKNR Chandra Shekhar, Experience: 10+ Years**

*"My favourite part about the learning experience is the approach followed in breaking a huge content into interesting entities which can be understood and appreciated independently. In today's context of Digital Transformation, it is important to stay on top of latest technologies and grow in the same direction of the industry. A special thanks to upGrad's program which helped me in switching my career nurtured with 24 years of IT experience to be part of Digital Transformation."*



#### **Anurag Narula, Experience: 1 Year**

*“My favourite part about the learning experience was the relentless support from upGrad and the lectures by industry experts which helped me learn the practical applications of various Machine Learning techniques. With what I learned from the Machine Learning and AI program at upGrad, I made a career switch to Innovaccer as a Decision Scientist after 1 year of experience.”*

#### **Atul Kumar, Experience: 15 Years**

*“Learning AI and ML with upGrad is an awesome experience in terms of accelerated learning. I had my worries about schedule and teaching methods. It’s a fair bit of stretch for sure but worth every rupee and second spent. The best part about the learning experience is the great community of peers and strict deadlines. Kudos to the upGrad team.”*



#### **Snehit Vemulapati, Experience: 6 Years**

*“The program’s intent is to first give you some basic theoretical knowledge and follow that up with substantial practical experience so that you are ready to work on industry projects. If this is what you are looking for, then the program is good on these aspects. Additionally, something that upGrad does which most others don’t is they take your feedback seriously and make improvements within no time for your cohort itself while the program is still happening.”*

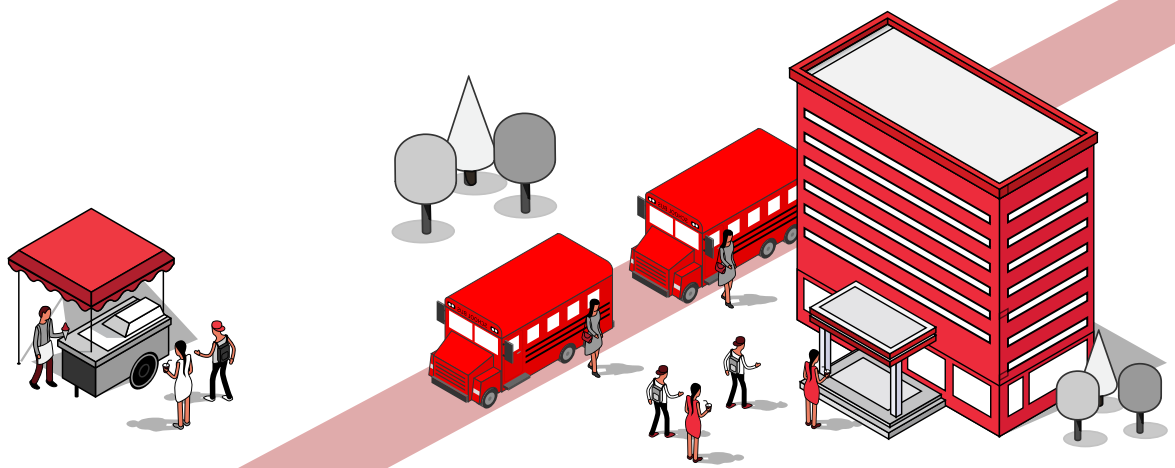
#### **Aakash Verma, Experience: 7 Years**

*“Very early in the program, it has already started helping me in my organization, I have proactively asked for use cases related to ML to work on and things are going well. A lot is still to be done to be industry-ready if I want to switch jobs with the same experience but the program certainly has given me a strong base on which I can build on.”*



#### **Rajendra Talluri, Experience: 15+ Years**

*“The upGrad team really brings world class technology programs, specifically tailored for working professionals that fit into their lifestyle for career growth. We can see equal commitment from three sides upGrad, IITB and the learner. It is an awesome course and well designed for the current cutting edge technology trends, and applicable for those who are really interested and seriously committed to learn and upgrade themselves to new upcoming technology transformations.”*





# Program Details and Admission Process

## PROGRAM DURATION AND FORMAT

12 Months | Online

## PROGRAM FEE

INR 2,99,000 (Incl. of all taxes)

## PROGRAM START DATES

Please refer to the website for program start dates.

[www.upgrad.com/machine-learning-ai-pgd-iiitb/](http://www.upgrad.com/machine-learning-ai-pgd-iiitb/)

## ELIGIBILITY

Bachelor's Degree with 50% or equivalent passing marks. Minimum 1 year of work experience or a degree in Mathematics or Statistics.

## WEEKLY COMMITMENT (15 hours/week)



**7-8 HOURS**

Asynchronous learning time.



**7-8 HOURS**

Assignments and projects.



**1 LIVE SESSION**

Every week.

## SELECTION PROCESS



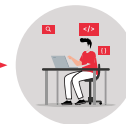
### STEP 1: Online Eligibility Test

Fill out an application and take a quick 40-minute online test with 18 questions to assess your aptitude.



### STEP 2: Review and Shortlisting of Suitable Candidates

Our faculty will review all applications, considering the educational and professional background of an applicant and review the test scores where applicable. Following this, Offer Letters will be rolled out so you are assured a great peer group to learn and network with.



### STEP 3: Enrollment for Access to Prep Content

Make a quick block payment with assistance from our loan partners where required, receive immediate access to the prep content and begin your upGrad journey.

**FOR FURTHER  
INFORMATION,  
CONTACT**

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## COMPANY INFORMATION

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