

# Advanced Certificate Programme in **MACHINE LEARNING & NATURAL LANGUAGE PROCESSING**



# Table of Contents

- 2** About upGrad and IIITB
- 3** Why upGrad?
- 4** Program Highlights
- 5** Faculty and Industry Experts
- 7** upGrad Learning Experience
- 8** Learning Path
- 9** Industry Projects
- 10** Program Curriculum
- 16** Meet the Class
- 17** Career Support
- 18** Hear from Our Learners
- 19** Program Details and Admission Process

# 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, IIT-Madras, IIT Bangalore and Deakin Business School among others.

upGrad is focussed 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+ yrs of experience and will be covering the conceptual depths of Machine

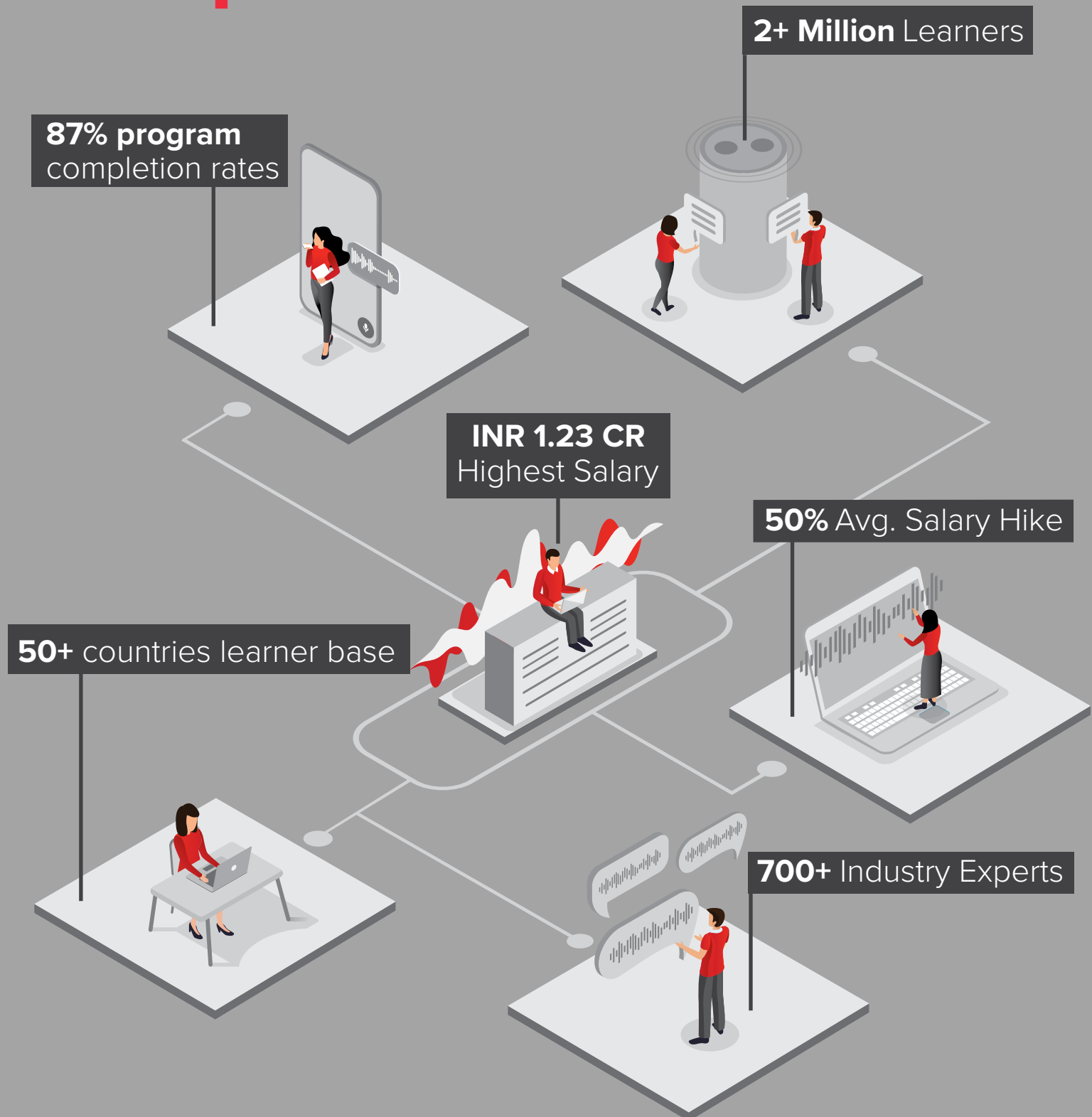
Learning & Natural Language Processing in this program. This will be further complemented by industry relevant case studies from major industry verticals by industry leaders with 8+ yrs of experience from upGrad's industry network.

Thus, the Advanced Certificate Programme in Machine Learning & Natural Language Processing has been developed by IIITB faculty in collaboration with industry experts and upGrad to bring you the most cutting-edge and industry-relevant curriculum.

## **Who is this program for?**

This program is for anyone looking to gain a foothold in the Machine Learning Industry. No previous experience is necessary for you to take up this program. As long as you have the passion to learn, this cutting-edge program will ensure you're equipped to kick-start your Machine Learning career. In order to enrol, an application form must be filled out for the admissions committee's review, post which you may begin your journey in Machine Learning & NLP!

# Why upGrad?



# Program Highlights



## **Advanced Certification Programme from IIITB**

Differentiate yourself from your peers by earning the industry recognized Advanced Certification from IIIT Bangalore.



## **For the Industry, by the Industry**

Learn and apply concepts on industry projects and work on a mini-capstone project along with personalised industry mentorship.



## **360° Career Assistance**

360° Career Support with Career Mentorship Sessions(1:1), Exclusive job opportunities Portal, High Performance Coaching(1:1), AI Powered Profile Builder, etc.



## **Unparalleled Learning Experience**

Learn concepts from experienced IIITB faculty & understand the applications from Industry experts to get a blend of theoretical knowledge and practical hands-on experience.

# Faculty and Industry Experts



**Chandrashekar Ramanathan**

Dean | Academics, IIIT-B

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



**S. Anand**

CEO, Gramener

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



**Ujjayini Mitra**

Head of Analytics, Zee5

An alumnus of Mckinsey and Co., Flipkart, and Bharti Airtel with over 11 years of experience.



**Anshuman Gupta**

Director | Data Science, Pitney Bowes

He has a PhD (Dual) from Penn State University as well as a B.Tech. degree from IIT Bombay.



**Ankit Jain**

Sr. Research Scientist, Uber

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



**Kalpana Subbaramappa**

ex-AVP | Decision Science, Genpact

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



**Chandramouleeswaran  
(Mouli Sankaran)**

Adjunct Faculty, IIIT-B

Professor Chandramouleeswaran has 33+ years of experience in networking, embedded SW, ML. He is an Adjunct faculty at IIIT Bangalore and a visiting faculty at IIIT Lucknow, handling courses on AI for IoT and Python.



**Prof. S. Sadagopan**

Director, IIIT-B

Prof. Sadagopan is currently the Director (President) of IIIT Bangalore.

He has an M.S. and a PhD from Purdue University as well as a B.E. (Hons) degree from Madras University.



**Prof. G. Srinivasaraghavan**

Professor, IIIT-B

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



**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.



**Dinesh Babu Jayagopi**

Assistant Professor, IIIT-B

Prof. Dinesh has a PhD from Ecole Polytechnic Federate Switzerland, M.Sc. from IISc Bangalore in System Science and Signal Processing, and B.Tech.



**Srinath Srinivasa**

Professor & Dean | R&D, IIIT-B

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

# upGrad Learning Experience

## Job Opportunities

### upGrad Opportunities

- upGrad Elevate: Virtual hiring drive giving you the opportunity to interview with upGrad's 300+ hiring partners
- 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
- Be the first to know about the vacancies to gain an edge in the application process
- Connect with companies that are the best match for you

## Career Assistance

### Career Mentorship Sessions (1:1)

- Get mentored by an experienced industry expert and receive personalised feedback to achieve your desired outcome

### High Performance Coaching (1:1)

- Get a dedicated career coach after the program to help track your career goals, coach you on your profile, and support you during your career transition journey

### AI Powered Profile Builder

- Obtain specific, AI powered inputs on your resume and LinkedIn structure along with content on real time basis

### Interview Preparation

- Get access to Industry Experts and discuss

## Learning Support

### Industry Expert Guidance

- Interactive Live Sessions with leading industry experts covering curriculum + advanced topics
- Personalised Industry Session in small groups (of 10-12) with industry experts to augment program curriculum with customized industry based learning

### Student Support

- Student support is available 7 days a week, 24\*7. You can write to us via [studentsupport@upgrad.com](mailto:studentsupport@upgrad.com)

## Practical Learning and Networking

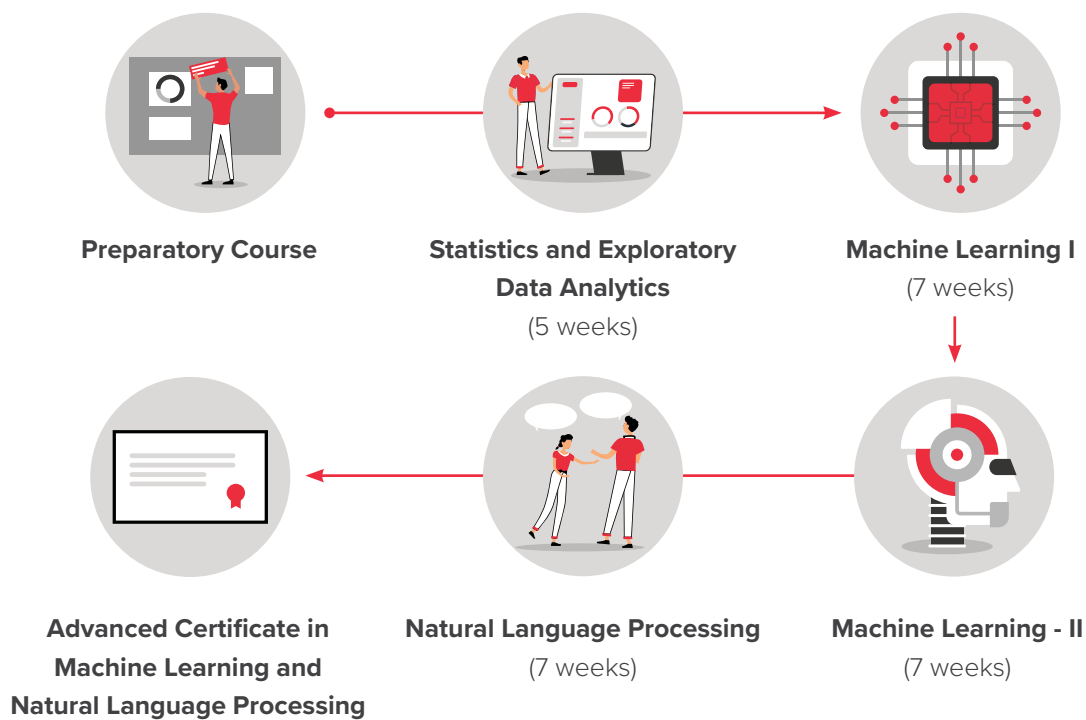
### Hands-on Projects & Hackathons

- 6 projects & assignments and a Mini-Capstone Project to apply your learnings
- 1 Hackathon every quarter to network & build on core concepts. Live coding classes on Kaggle & OpenCV

### Networking & Learning Experience

- Live Discussion forum for peer to peer doubt resolution monitored by technical experts
- Peer to peer networking opportunities with a alumni pool of 10000+
- Lab walkthroughs of industry-driven projects
- Weekly real-time doubt clearing sessions

# Learning Path



## Programming Tools, Languages & Libraries

Pandas, Matplotlib, Numpy, Seaborn, Scikit-learn, Statsmodels, NLTK, Python, MySQL, Excel



# Program Curriculum



## PRE-PROGRAM PREPARATORY CONTENT

# 1

### INTRODUCTION TO PYTHON

Build a foundation for the most in-demand programming language of the 21<sup>st</sup> 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

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

Apply advanced SQL concepts like windowing and procedures to derive insights from data and answer pertinent business questions.

# 6

### DATA ANALYSIS IN EXCEL

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

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.

# Program Curriculum



## 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

### CLOUD ESSENTIALS: INTRO TO GIT AND GITHUB

Learn version control, collaborating, portfolio making using git. Understand the process of creating repository. Learn the process of creating github portfolio using github pages with jekyll.

3

### INFERENCE 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 hypotheses for a population to solve real-life business problems.

5

### LENDING CLUB CASE STUDY

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



# Program Curriculum



## 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 LINEAR REGRESSION ASSIGNMENT

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

### 3 LOGISTIC REGRESSION

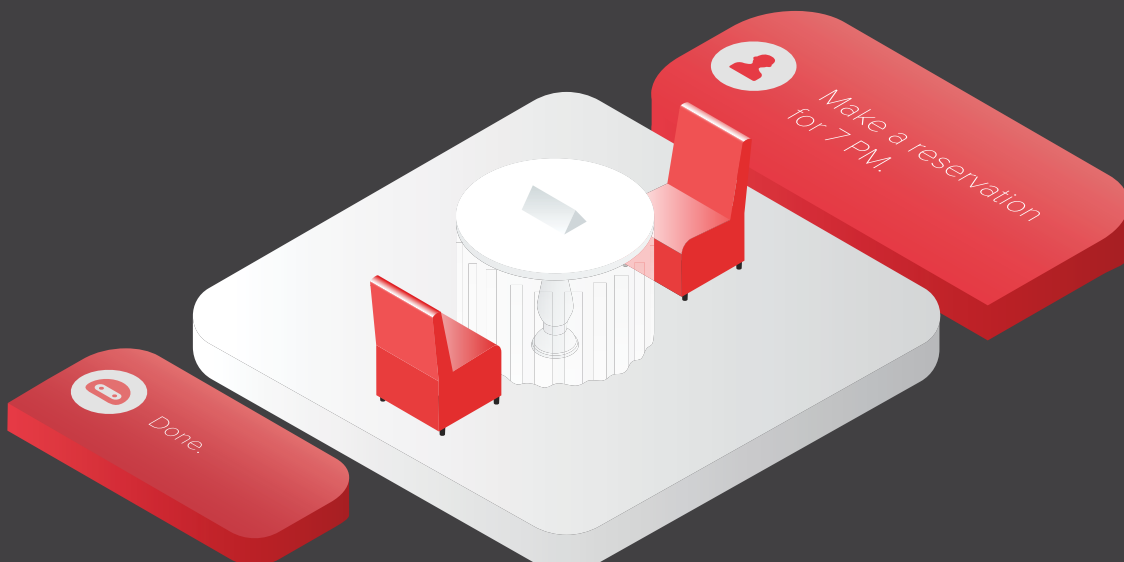
Learn your first binary classification technique by determining which customers of a telecom operator are likely to churn to help versus who are not to help business retain customers.

### 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.



# Program Curriculum



## 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.

# Program Curriculum



## 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 and spam detector using techniques like phonetic hashing, bag-of-words, TF-IDF, etc.

2

### SYNTACTIC 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.



# Industry Projects



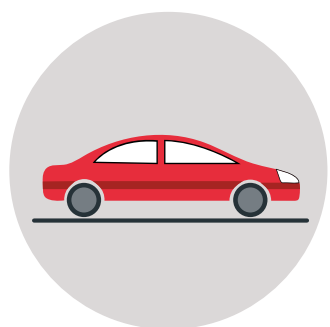
## Investment Analysis

Learners will fill in the shoes of an analyst at an investment bank and determine where the firm should invest. They will then have to explain their recommendations in lieu of the analysis conducted.



## Lending Club Case Study

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



## Car Price Prediction

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



## House Price Prediction

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

# Industry Projects



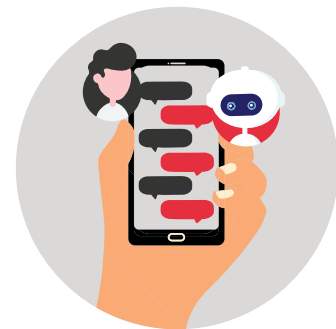
## Part-of-Speech Tagger Project

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



## Telecom Churn Case

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



## MINI CAPSTONE PROJECT:

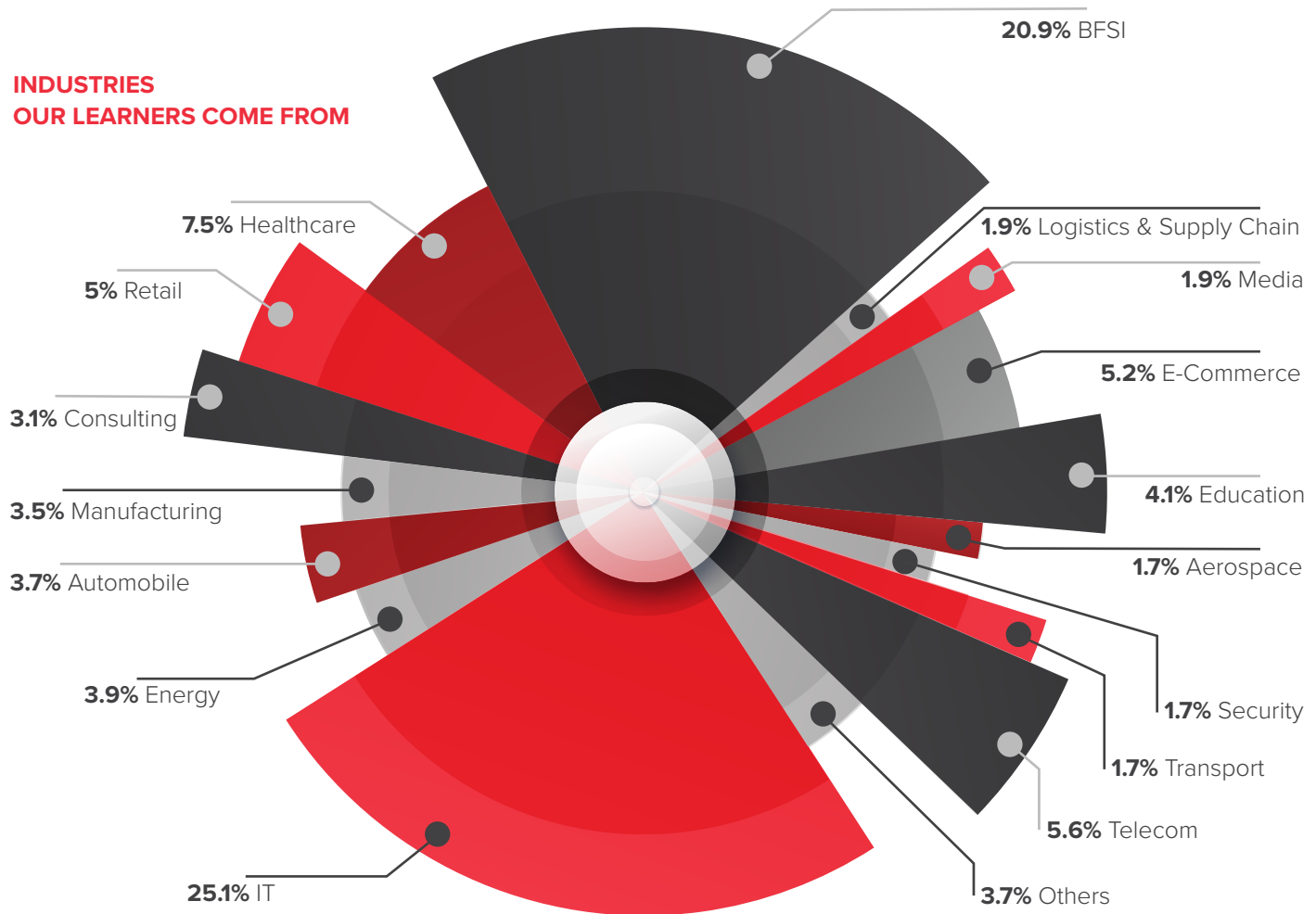
### Classification of Customer Complaint Tickets

Create a solution that will help in identifying the type of complaint ticket raised by the customers of a multinational bank.

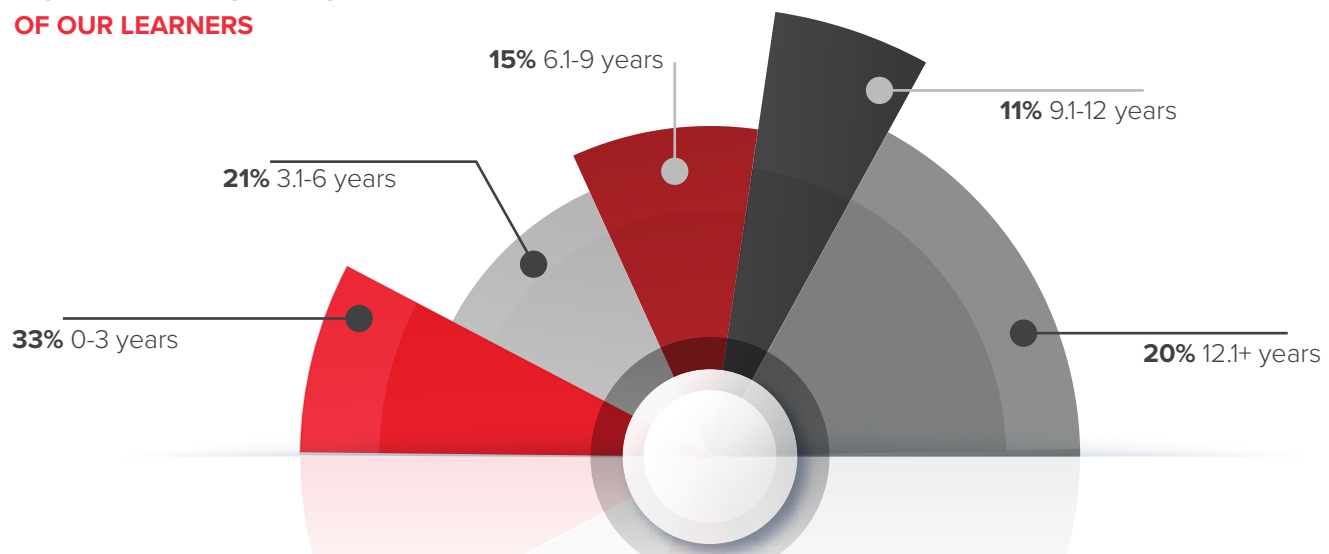


# Meet the Class

## INDUSTRIES OUR LEARNERS COME FROM



## WORK EXPERIENCE RANGE OF OUR LEARNERS



# Elements of Career Services

## Jobs on Career Centre

Career Centre offering upGrad jobs across experience levels and CTC ranges.

- Easy apply feature for upGrad hiring partner vacancies
- Create resume at profile builder and with one click to apply for various jobs

## upGrad Elevate

- Recruitment Drive to connect you with the best talent admirers in the industry
- Get access to a wide range of opportunities and find the perfect job
- Apply your learnings to real industry problems

## Interview Preparation

Pre-recorded content on topics such as:

- Profile building, communications, etc
- Problem solving approach
- Approaching guesstimates
- Domain specific interview question bank and much more

## Profile Builder (AI Powered)

An easy to use Resume, LinkedIn and Cover Letter preparation tool.

- Resume Score: AI-Driven Resume Score
- Real time recommendations to improve
- Match your resume to the JD and check fitment
- LinkedIn Profile Review
- Cover Letter creation

## Just In Time Interview Prep (JIT)

For upcoming job interviews, JITs are conducted within 48 hours for eligible programs.

- Tailored to job role and target domain
- Real time feedback and tips for improvement

## High Performance Coaching

Dedicated coaches working with you to identify best suited career opportunities.

- Help you define your value proposition
- Lay out a Career Path and help you adhere to your timelines and goals
- Help you with interview preparations, finding jobs in the market, salary negotiations and other preparation as required

## Personalised Industry Session

90-minute sessions over the weekend by leading industry experts.

- Session categories: Career, Technical and Communications
- Doubt resolution
- Develop proof of concepts and apply theoretical concepts in the real world
- Assess skill levels
- Peer Networking
- Classroom element
- Business communication sessions and much more

## Career Mentorship Sessions

Get personalised career advice through 1-1 sessions with industry experts.

- Goal setting for better employment results

# Hear from Our Learners

**Suchet Raghavan, 3.5 Years**

*"I would recommend this program to anyone interested in stepping into this domain, or to expand their current knowledge. The group case studies and assignments played a vital role throughout the course for me as I was able to truly implement the theoretical concepts learnt during the course which were in line with industry expectations."*

**Loveneet Kumar, Experience: 13 Years**

*"At present, this is the most comprehensive and effective ML and Data science course available online. They emphasize on implementation of techniques and approaches rather than theory. With lots of hands on it gives you confidence to start with any real world problem if you have data."*

**Sachinraj CS, Experience: 6 Years**

*"Satisfied with the modules, mentor support and all the services offered. Content would cover every concept of machine learning including the math behind it that gives full confidence while building any model."*

**Avinash Rai, Experience: Fresher**

*"The best part about the program is the faculty and the website experience. I didn't feel like I was missing out something irrespective of whether it was in a class. In many ways it is better than a class room experience. The program assumes you are from a non-science or non-mathematical background. There are people to help you along the way, you'll get to reach out with many successful Software Engineers, Product Managers and even CEOs. You will have the opportunity to build relationships and understand the industry, it will give you a good perspective of what you need to do to reach what you're aiming for."*



# Program Details and Admission Process

## PROGRAM DURATION AND FORMAT

8 Months | Online

## PROGRAM FEE

Please refer to the website for the program fees.

## PROGRAM START DATES

Please refer to the website for the program start dates.

## ELIGIBILITY

Bachelor's degree with 50% or equivalent passing marks.

## TIME COMMITMENT (12 hours/week)



### 6 HOURS

Asynchronous learning time.



### 6 HOURS

Assignments and projects.



### LIVE SESSION

Every weekend.

## SELECTION PROCESS



### STEP 1: Fill out the Application Form

Fill out an application with details on your professional & educational background.



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

Our Admissions Committee will review all applications - and will consider the the educational and professional background of an applicant. Following this, offer letters will be rolled out so you're 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 any queries:

+44 7830 344510, [info.emea@upgrad.com](mailto:info.emea@upgrad.com) - Europe, Middle East and Africa

+1 240-719-6120, [admissions@upgrad.com](mailto:admissions@upgrad.com) - North and South America

+65 3105 1199, [query@upgrad.com](mailto:query@upgrad.com) - Asia Pacific except India

+84-28-7300-8884, [connect@upgrad.com](mailto:connect@upgrad.com) - Vietnam

Disclaimer: Program fee and payment options are subject to change. Please refer to the website for updated details or speak to our admission counsellor.