Advanced Certificate Programme in

MACHINE LEARNING & DEEP LEARNING

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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, IIIT 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, IIIT 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 & will be covering the conceptual depths of Neural Networks & Deep Learning 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. The strong career support, industry mentorship and the credibility of this Advanced Certification Programme from IIITB will provide you with just the right push to accelerate your career in Machine Learning and Deep Learning!

Who is this program for?
This program is for anyone looking to gain a foothold in the Machine Learning Industry and there is no previous background necessary in this field to undertake 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, you must fill out an application form which may begin your journey in ML & Deep Learning!

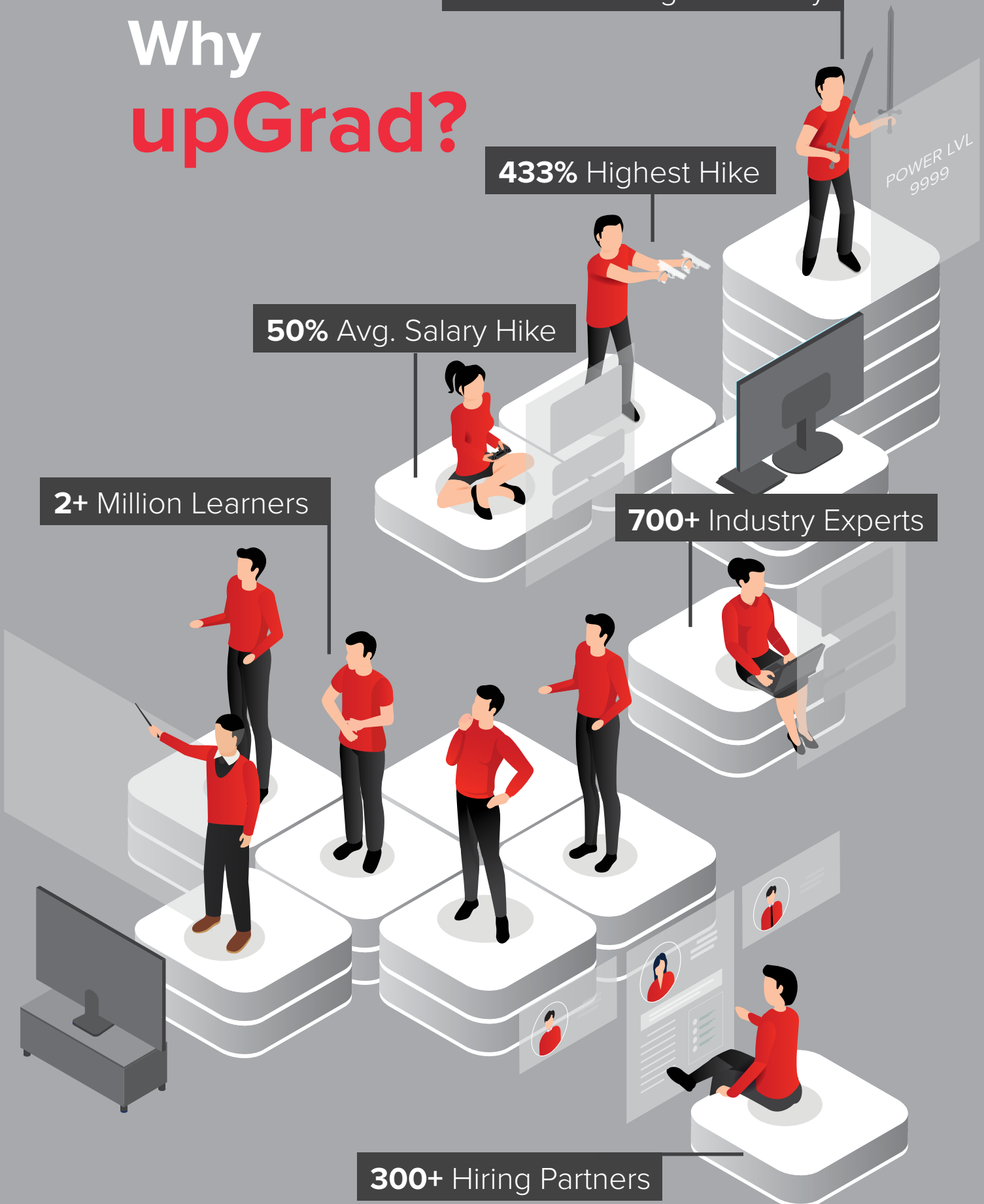# Why upGrad?

INR 1.23 CR Highest Salary

POWER LVL 9999

433% Highest Hike

50% Avg. Salary Hike

2+ Million Learners

700+ Industry Experts

300+ Hiring Partners

Program
Highlights

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.

Student Support Team
To help resolve your non-academic queries.

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

Unparalleled Learning Experience
Learn the concepts from experienced IIITB faculty and 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
International Institute of Information
Technology Bangalore

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

Prof. S. Sadagopan
Director
International Institute of Information
Technology Bangalore

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.

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. G. Srinivasaraghavan
Professor
International Institute of Information
Technology Bangalore

He has a PhD in Computer Science from
IIT Kanpur and 18 years of experience
with Infosys Technologies as well as
several other fortune 500 companies.

Dinesh Babu Jayagopi
Assistant Professor
International Institute of Information
Technology Bangalore

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
International Institute of Information
Technology Bangalore

He holds a PhD in information Systems
from the Berlin-Brandenburg Graduate
School,for distributed information
systems (GkVI), Germany and an M.Sc.

**Chandramouleeswaran
(Mouli Sankaran)**
Adjunct Faculty, IIIT Bangalore

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.

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 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 any queries before your interview
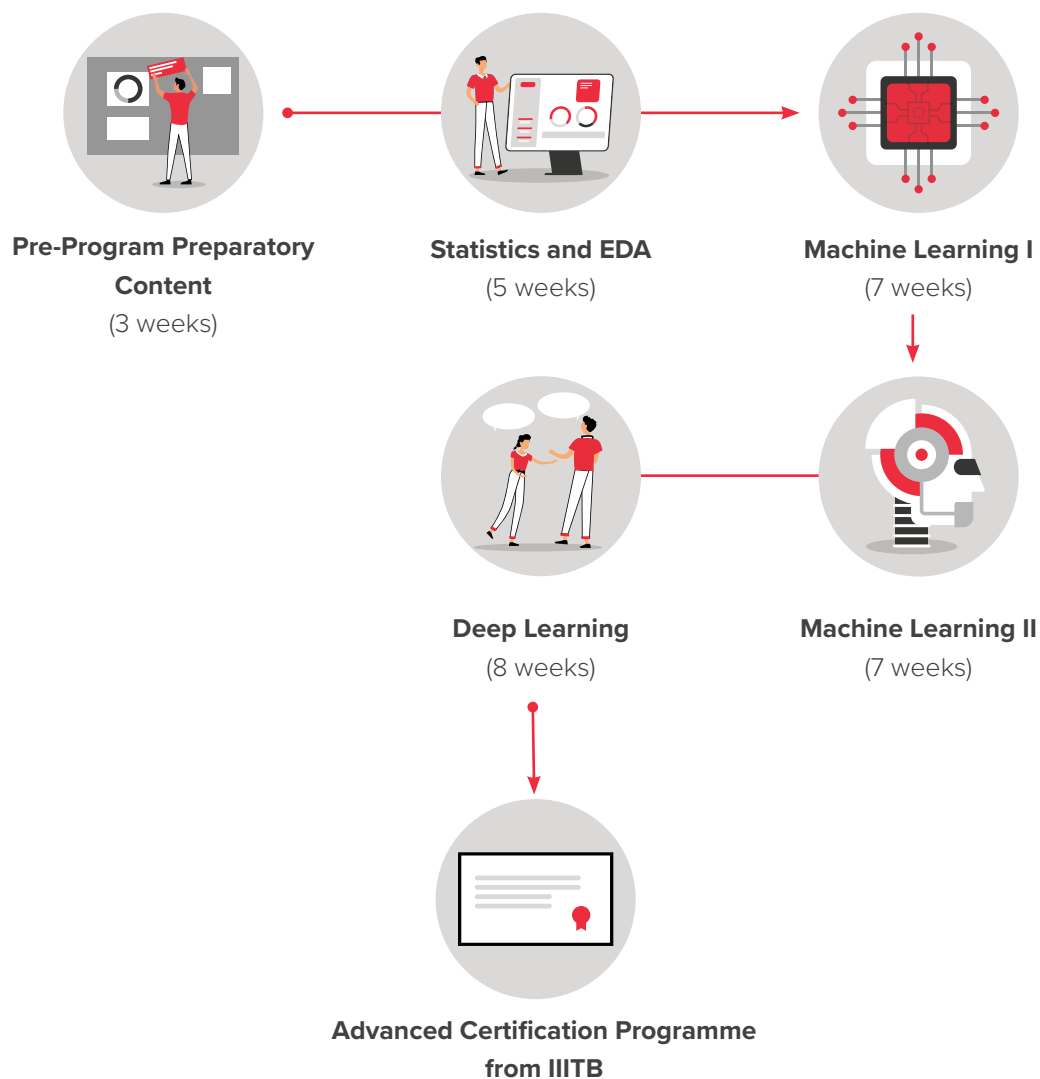- Career bootcamps to refresh your technical concepts and improve your soft skills

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 for non-academic queries
- You can write to us via studentsupport@upgrad.com Or for urgent queries, use the "Talk to Us" option on the Learn platform.

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

Pre-Program Preparatory Content
(3 weeks)

Statistics and EDA
(5 weeks)

Machine Learning I
(7 weeks)

Deep Learning
(8 weeks)

Machine Learning II
(7 weeks)

Advanced Certification Programme from IIITB

Programming Tools,
Languages & Libraries

Pandas, Matplotlib, Numpy, Seaborn, Scikit-learn, Statsmodels, Open CV, Python, Keras, Tensorflow, MySQL, Excel.

Program
Curriculum

Pre-Program Preparatory Content (3 Weeks)

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
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 Multivariable Calculus.

STATISTICS AND EXPLORATORY DATA ANALYTICS (5 Weeks)

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.

*Syllabus is subject to change by the university

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

MACHINE LEARNING I   (7 Weeks)

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 **MODULE 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   (7 Weeks)

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!

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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   (8 Weeks)

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 & categorise them to help the government ascertain the width and strength of the road.

3 **CONVOLUTIONAL NEURAL NETWORKS - ASSIGNMENT**
Build a neural network from scratch in Tensorflow to identify the type of skin cancer from image.

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, videos, etc.

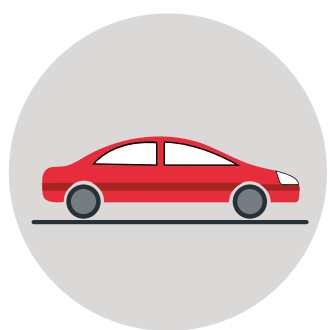**5** **NEURAL NETWORKS PROJECT - GESTURE RECOGNITION**
Make a Smart TV system which can control the TV with user's hand gestures as the remote control.

Industry
Projects

Investment Analysis

Fill in the shoes of an analyst at an investment bank and determine where the firm should invest. Explain your recommendations in lieu of the analysis conducted.

Lending Club Case

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.
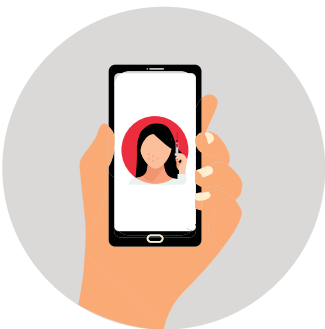
House Price Prediction

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

Industry
Projects

Telecom Churn Case

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

Skin Cancer Detection

Build a neural network from scratch in Numpy to identify the type of skin cancer from image.
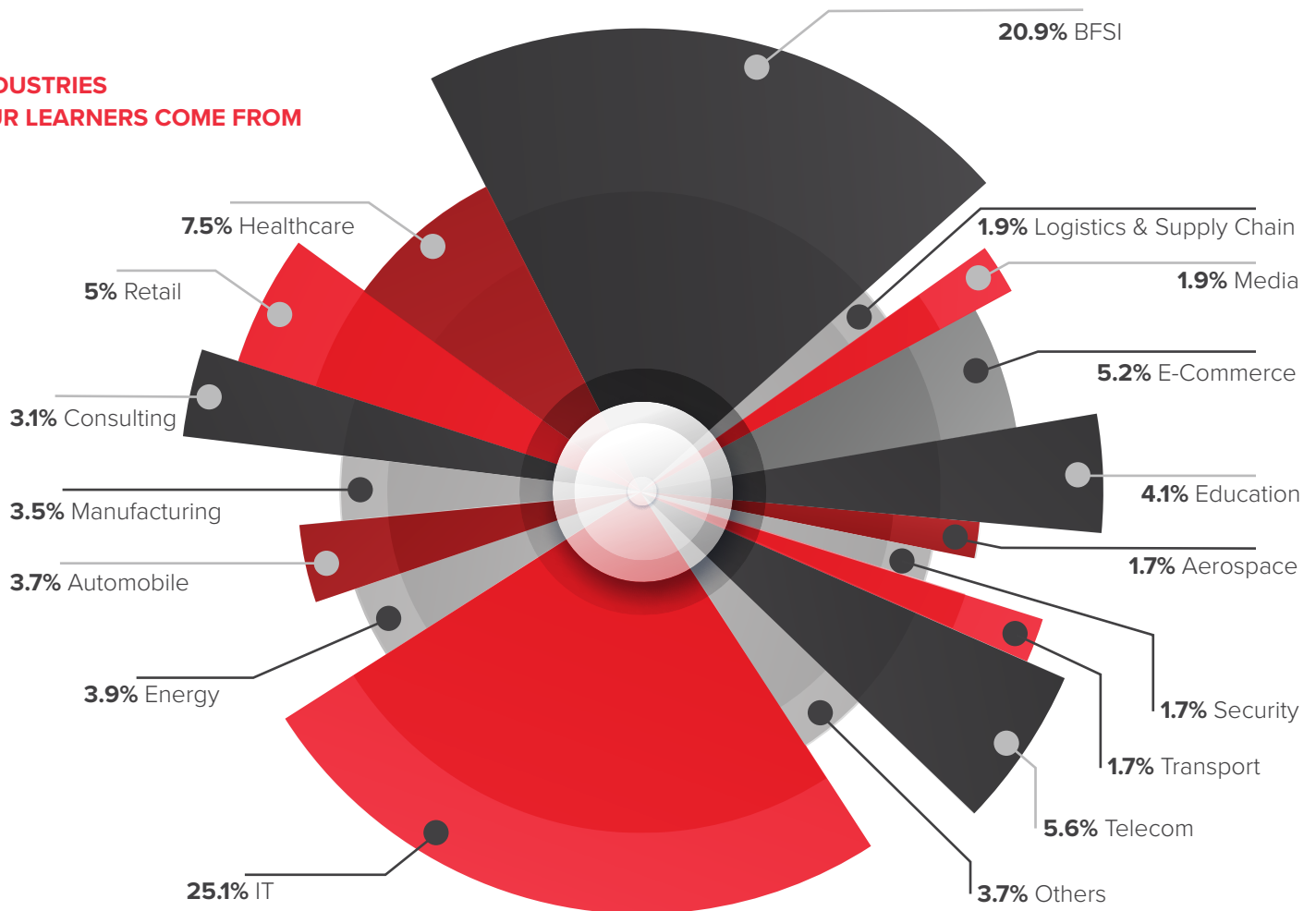

MINI CAPSTONE PROJECT:
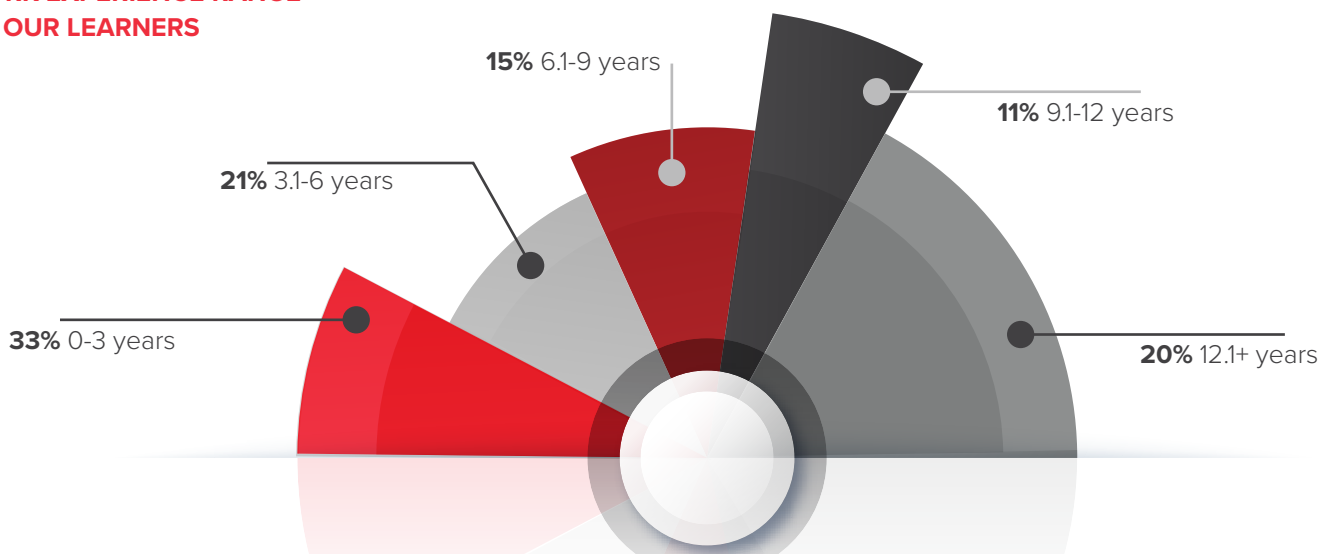### Gesture Recognition

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

Meet the **Class**

**INDUSTRIES
OUR LEARNERS COME FROM**

20.9% BFSI

7.5% Healthcare

5% Retail

3.1% Consulting

3.5% Manufacturing

3.7% Automobile

3.9% Energy

25.1% IT

1.9% Logistics & Supply Chain

1.9% Media

5.2% E-Commerce

4.1% Education

1.7% Aerospace

1.7% Security

1.7% Transport

5.6% Telecom

3.7% Others

**WORK EXPERIENCE RANGE
OF OUR LEARNERS**

15% 6.1-9 years

11% 9.1-12 years

21% 3.1-6 years

33% 0-3 years

20% 12.1+ years

Career
Support

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
- Realtime 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 biweekly 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

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 & 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

Ram Krishn Mishra, Experience: 9 Years
"If you are really thinking about being specialized in this area, IIITB is one of the best places. This program will give you: 1. Deep theoretical understanding of AI and ML from experienced professors from IIIT Bangalore . 2. Theoretical approach will be applied to practical problems with Python programming on real time data led by Industry experts."

Radhakrishnan Ramanathan
"This program / specialization has helped me in both aspects of understanding real analysis of problems & applying it to my work on Network optimization and customer analytics. The course content and the professor (Dr Raghavan) has been really good & apt for learning in a great way."

Yogesh Awate, Experience: 2.5 years
"This program on Machine Learning and Deep Learning makes you a completely skilled machine learning engineer. With industrial assignments and some leading industrial facilities, it tends to feed you with 'Ready to go' knowledge and skills. I highly recommend this program for those who want to be expertised in Machine Learning and Deep Learning."

Sidharth Goel, Experience: 2.5 years
"The program is well structured and cover every important concepts. You get proper feedback in all of your submitted assignments and regular follow ups from the student mentor assigned to you. They also arrange doubt clearing live sessions apart from the recordings which are very helpful. In all upGrad is provides quality education if someone wants to pursue a course in AI and Machine Learning."

Program Details and
Admission Process

PROGRAM DURATION AND FORMAT
8 Months | Online

PROGRAM FEE
Please refer to the website

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.

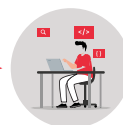**LIVE SESSION**
Every weekend.

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 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.

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

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