Advanced Certificate Programme in

DATA SCIENCE

Get the Right Picture

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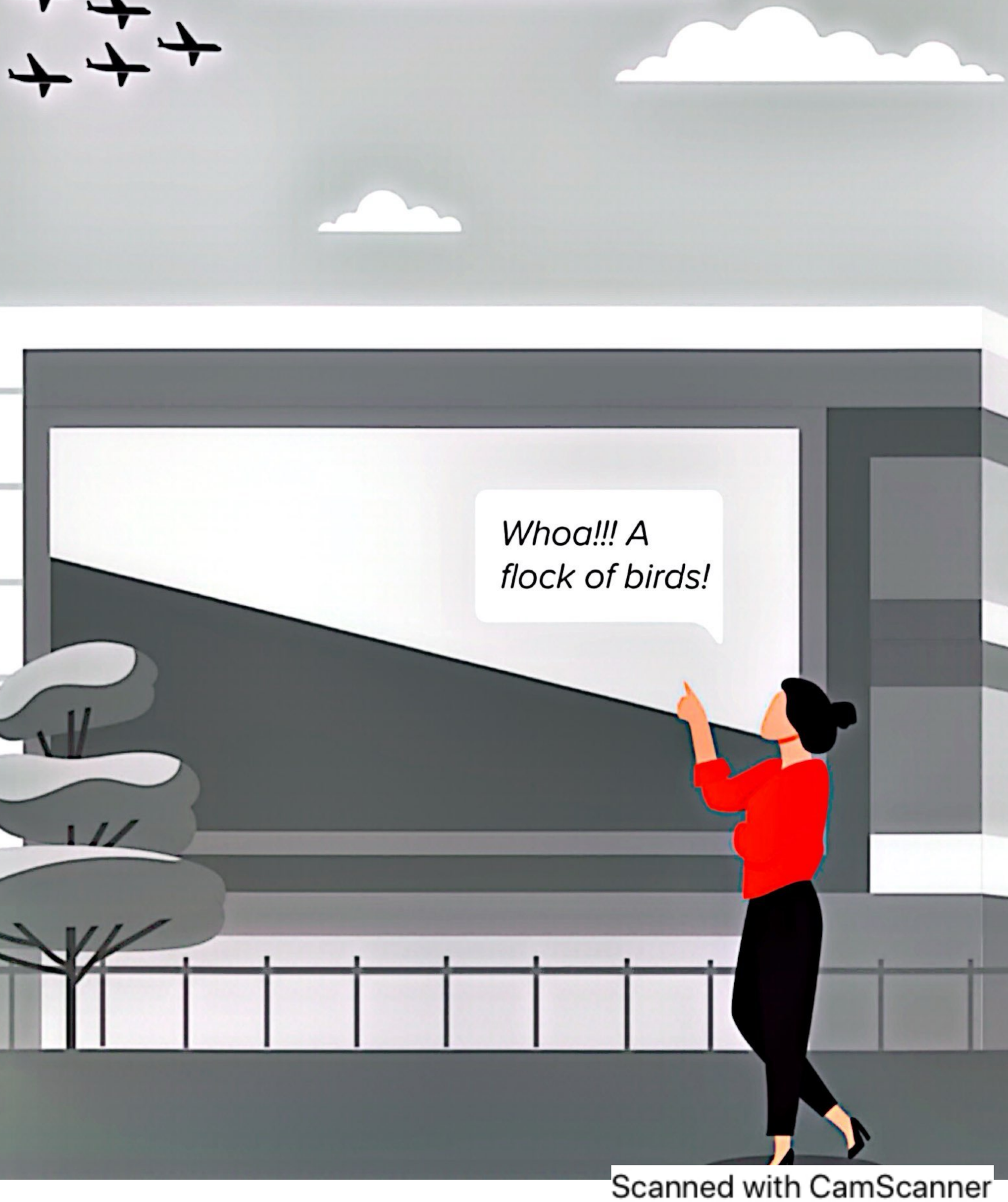
Touch for Your better Future.....



Program Curriculum

PRE-PROGRAMME PREPARATORY CONTENT

DATA ANALYSIS IN EXCEL

1. INTRODUCTION TO EXCEL
2. DATA ANALYSIS IN EXCEL - I: FUNCTIONS, FORMULAE, AND CHARTS
3. DATA ANALYSIS IN EXCEL - II: PIVOTS AND LOOKUPS

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.

ANALYTICS PROBLEM SOLVING

1. THE CRISP-DM FRAMEWORK - BUSINESS AND DATA UNDERSTANDING
2. CRISP-DM FRAMEWORK - DATA PREPARATION, MODELLING, EVALUATION AND DEPLOYMENT

This module covers concepts of the CRISP-DM framework for business problem-solving.

COURSE 1: DATA TOOLKIT

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Build a foundation for the most in-demand programming language of the 21st century.

2 WEEKS

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Program Highlights

Certification from IIITB

Get certified by IIITB on successful completion of the Advanced Certificate Programme in Data Science.

For The Industry, By The Industry

Learn from 7+ case studies and industry experts to mentor you throughout the program.

Dedicated Career Assistance

Receive 360 degree career support from mock interviews with hiring managers, resume building, career fairs, industry mentors and much more.

Personalised Mentorship

Get unparalleled personalised mentorship and doubt resolution from our panel of industry experts.

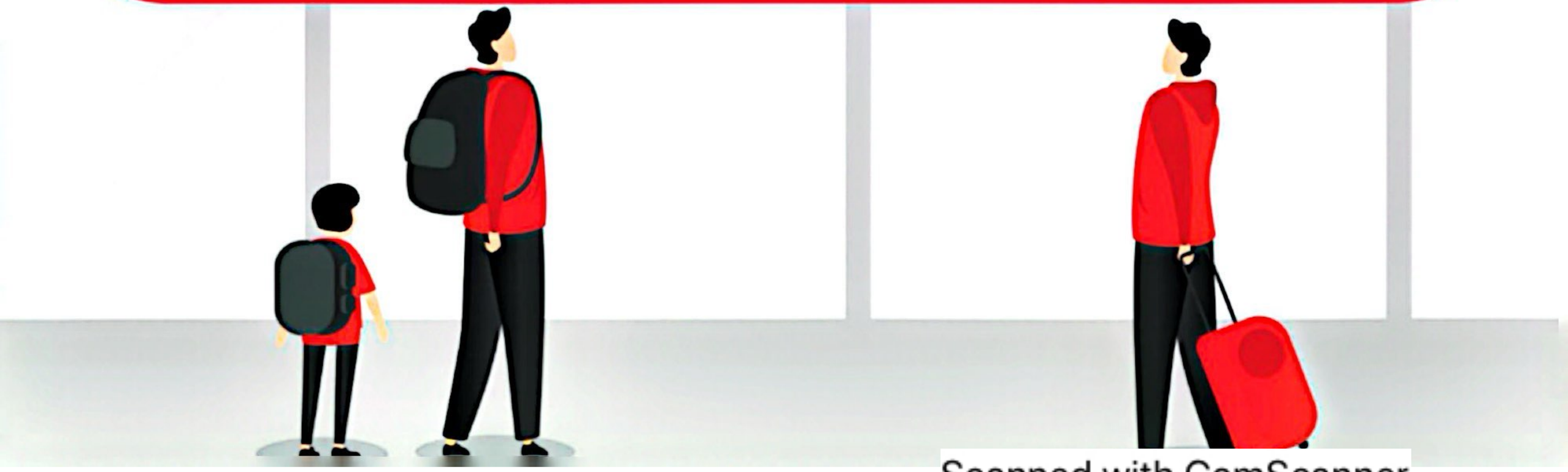
Blended Learning

Learn with the ease and flexibility of recorded sessions as well as live sessions and Personalised Industry sessions - designed to ensure a wholesome learning experience.

Articulate to a an Executive PG Programme in Data Science

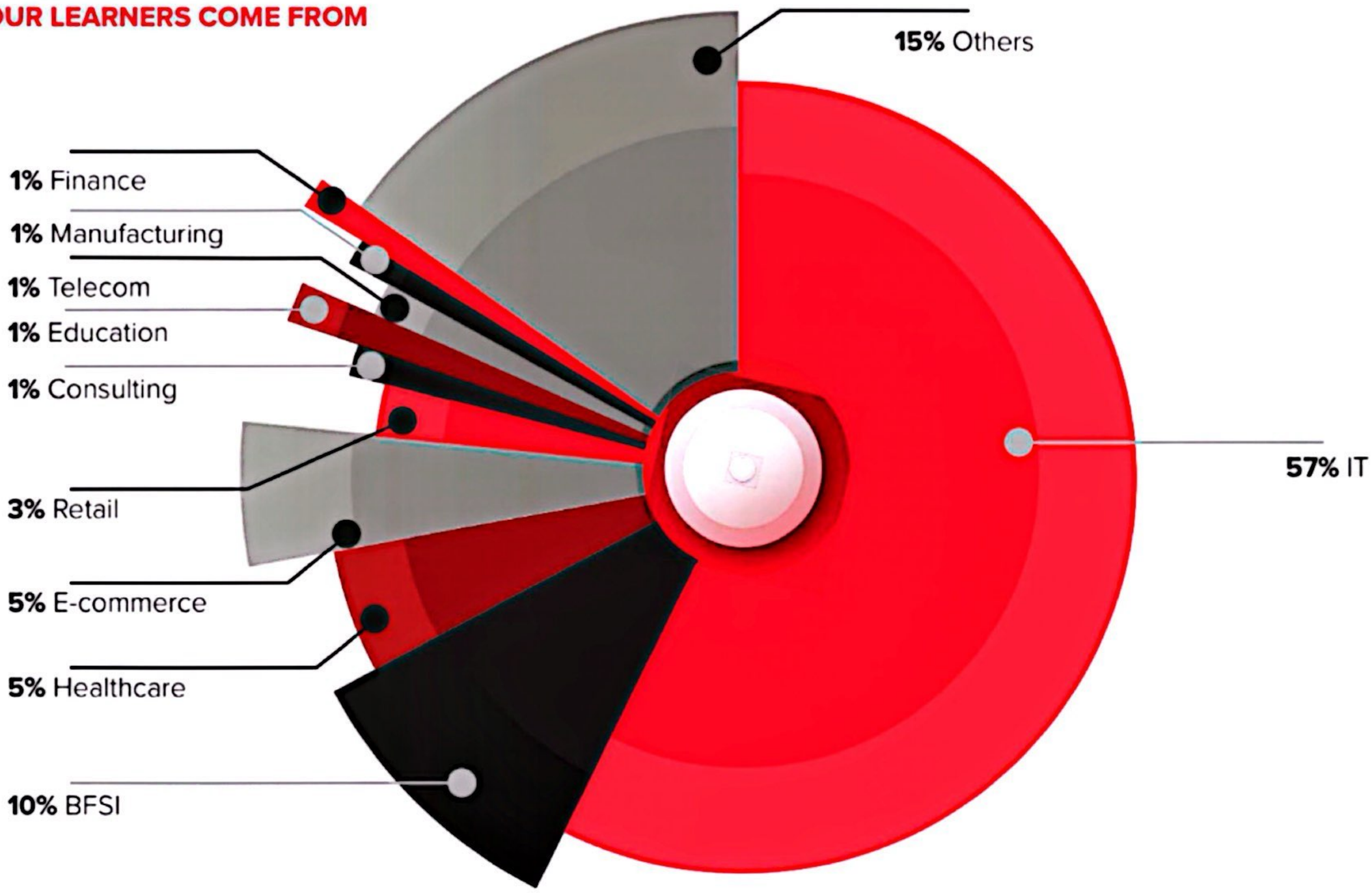
Upon successful completion of the Advanced Certificate Programme in Data Science, get an opportunity to upgrade to the NASSCOM Certified Executive PG Programme in Data Science from IIIT Bangalore wherein, on completing the program, you would receive alumni status from IIIT Bangalore and get a certification from NASSCOM FutureSkills. You can choose to specialise in any of the 5 specialisations of the Executive PG Programme

Learner is required to achieve 3 out of 4 CGPA to be eligible for the articulation

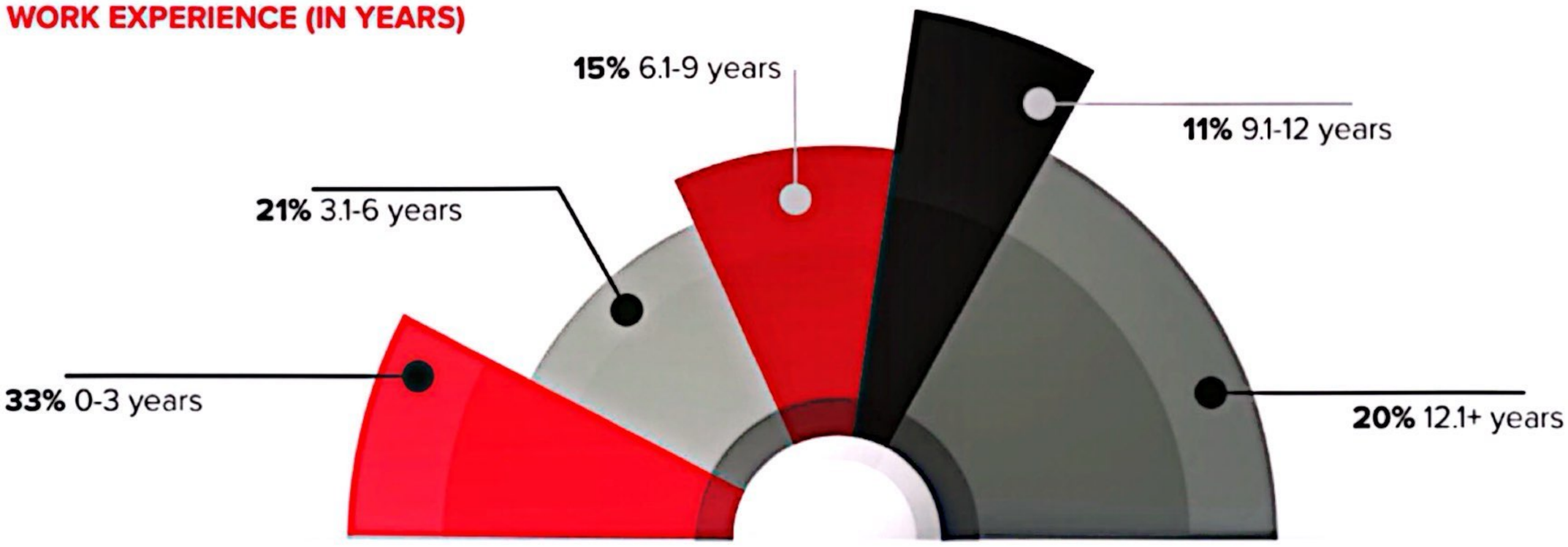


Meet the Class

INDUSTRIES OUR LEARNERS COME FROM



WORK EXPERIENCE (IN YEARS)



A few of the companies our students are from: Accenture, Amazon, Cognizant, Deloitte, Infosys, Microsoft, Wipro, EY, CitiBank, Cisco, Thomson Reuters

Career Support

Jobs on Career Centre

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

- Easy apply feature for upGrad hiring partner vacancies.
- Create a resume at profile builder 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
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- LinkedIn Profile Review
- Cover Letter creation

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

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

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

- Help you define your value proposition
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- 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
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- Classroom element
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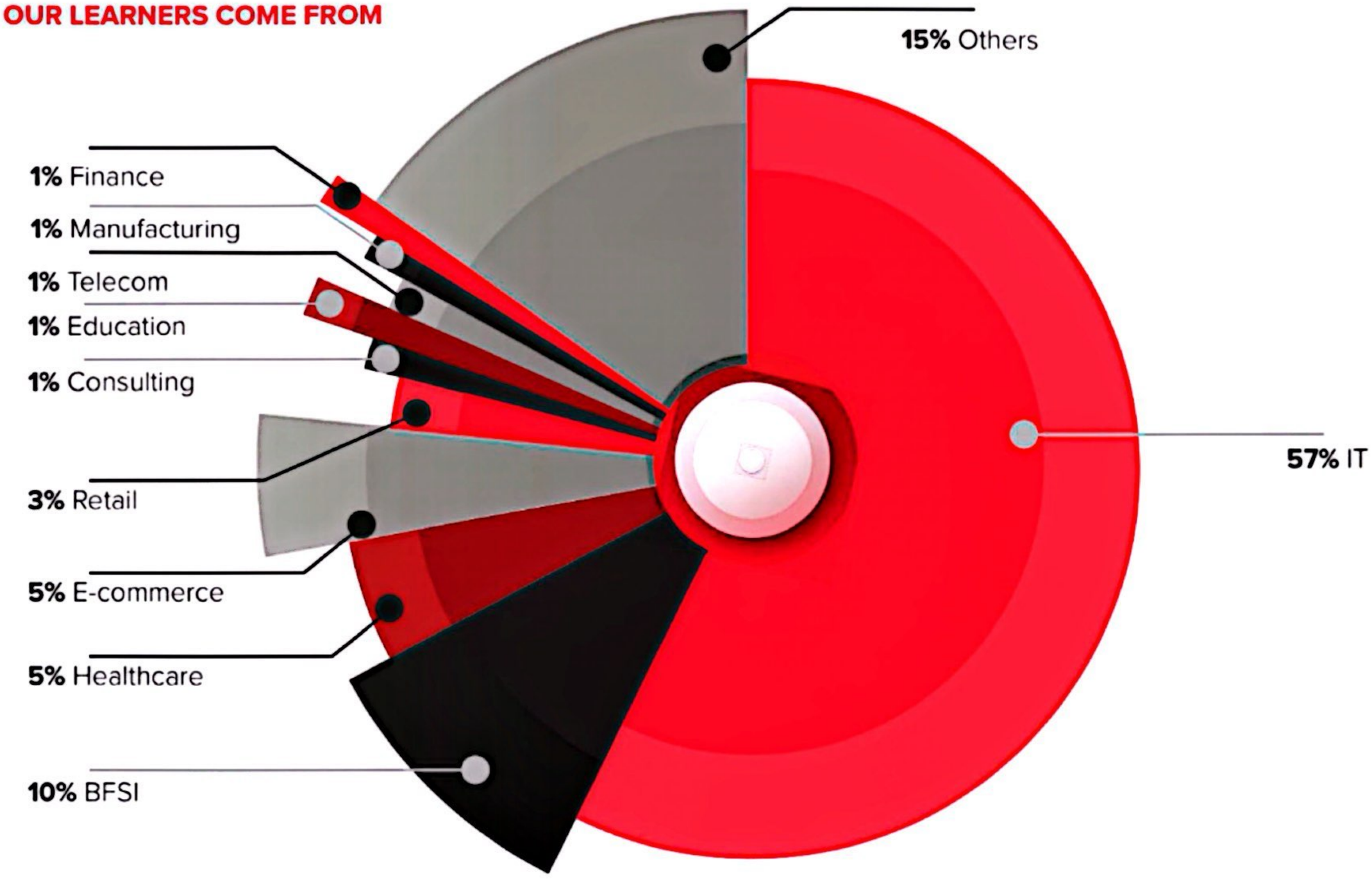

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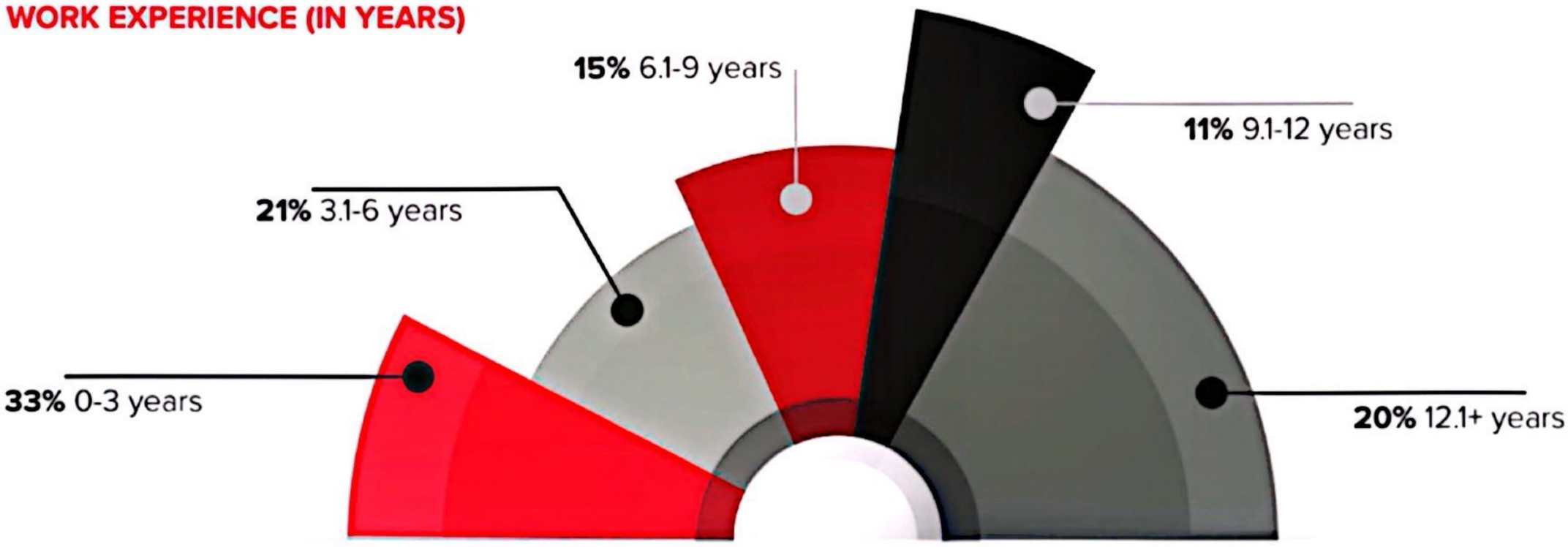

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New Additions

30-Hour Programming Bootcamp for Non-Tech Learners

- Non-tech background? No need to fear of Programming anymore.
- A 30-hour Python Programming boot-camp focusing on developing Basic + Intermediate Python Programming Concepts to assist non-tech learners.
- A blended learning experi-ence delivered via interactive live sessions and assessments.

Career Essential Soft-skills Program

- Excel at your personal & professional life with upGrad's soft skills program.
- Study three fundamental skills - Interview & Job Search, Corporate & Business Communication and Problem Solving.
- Get access to 40+ learning hours of soft skills content delivered by the best faculty & Industry experts.

Learning Path

Preparatory Course
0 week
Tools: Python, Excel

Data Toolkit- MySQL
12 weeks
Tools: Python, Excel, mySQL

Machine Learning
10 weeks
Tools: Python, Excel

Choose any of the 5 Specialisations
6 weeks

Deep Learning

Natural Language Processing

Business Analytics

Business Intelligence/ Data Analytics

Data Engineering

Advanced Certification in Data Science

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Advanced Certification in Data Science

Get an option to upgrade to Executive PG Programme in Data Science and choose from 5 specialisations

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2 WEEKS

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ADVANCED SQL & BEST PRACTICES

1. **WINDOW FUNCTIONS**
2. **CASE STATEMENTS, STORED ROUTINES AND CURSORS**
3. **QUERY OPTIMISATION AND BEST PRACTICES**
4. **PROBLEM-SOLVING USING SQL**

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

1 WEEK

SQL ASSIGNMENT: RSVP MOVIES

1. **PROBLEM STATEMENT**
2. **EVALUATION RUBRIC**
3. **FINAL SUBMISSION**
4. **SOLUTION**

In this assignment, you will work on a movies dataset using SQL to extract exciting insights.

1 WEEK

COURSE 2 - MACHINE LEARNING I

LINEAR REGRESSION

1. **SIMPLE LINEAR REGRESSION**
2. **SIMPLE LINEAR REGRESSION IN PYTHON**
3. **MULTIPLE LINEAR REGRESSION**
4. **MULTIPLE LINEAR REGRESSION IN PYTHON**
5. **INDUSTRY RELEVANCE OF 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 WEEKS

LINEAR REGRESSION ASSIGNMENT

1. **PROBLEM STATEMENT**
2. **EVALUATION RUBRIC**
3. **FINAL SUBMISSION**
4. **SOLUTION**

Build a model to understand the factors on which the demand for bike-sharing systems vary on and help a company optimise its revenue.

1 WEEK

LOGISTIC REGRESSION

1. **UNIVARIATE LOGISTIC REGRESSION**
2. **MULTIVARIATE LOGISTIC REGRESSION: MODEL BUILDING AND EVALUATION**
3. **LOGISTIC REGRESSION: INDUSTRY APPLICATIONS**

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

2 WEEKS

CLASSIFICATION USING DECISION TREES

1. **INTRODUCTION TO DECISION TREES**
2. **ALGORITHMS FOR DECISION TREES CONSTRUCTION**
3. **HYPERPARAMETER TUNING IN DECISION TREES**

Learn how the human decision-making process can be replicated using a decision tree and tune it to suit your needs.

1 WEEK

UNSUPERVISED LEARNING: CLUSTERING

1. **INTRODUCTION TO CLUSTERING**
2. **K-MEANS CLUSTERING**
3. **HIERARCHICAL CLUSTERING**
4. **OTHER FORMS OF CLUSTERING: K-MODE, K-PROTOTYPE, DB SCAN**

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

1 WEEK

BASICS OF NLP AND TEXT MINING

1. **REGEX AND INTRODUCTION TO NLP**
2. **BASIC LEXICAL PROCESSING**
3. **ADVANCED LEXICAL PROCESSING**

Do you get annoyed by the constant spam in your mailbox? Wouldn't it be nice if we had a program to check your spelling? In this module learn how to build a spell checker & spam detector using techniques like phonetic hashing, bag-of-words, TF-IDF, etc.

1 WEEK

BUSINESS PROBLEM SOLVING

1. **INTRODUCTION TO BUSINESS PROBLEM SOLVING**
2. **BUSINESS PROBLEM SOLVING: CASE STUDY DEMONSTRATIONS**

Learn how to approach open-ended, real-world problems using data as a lever to draw actionable insights.

1 WEEK

CASE STUDY: LEAD SCORING

1. **PROBLEM STATEMENT**
2. **EVALUATION RUBRIC**
3. **FINAL SUBMISSION**
4. **SOLUTION**

Help the Sales team of your company identify which leads are worth pursuing through this classification case study.

1 WEEK

SPECIALISATION - DEEP LEARNING

COURSE 3 - MACHINE LEARNING II

BAGGING & RANDOM FOREST

1. **POPULAR ENSEMBLES**
2. **INTRODUCTION TO RANDOM FORESTS**
3. **FEATURE IMPORTANCE IN RANDOM FORESTS**
4. **RANDOM FORESTS IN PYTHON**

Learn how powerful ensemble algorithms can improve your classification models by building random forests from decision trees.

1 WEEK

BOOSTING

1. **INTRODUCTION TO BOOSTING AND ADABOOST**
2. **GRADIENT BOOSTING**

Learn about ensemble modelling through bagging and boosting, and understand how weak algorithms can be transformed into stronger ones.

1 WEEK

MODEL SELECTION & GENERAL ML TECHNIQUES

1. **PRINCIPLES OF MODEL SELECTION**
2. **MODEL EVALUATION**
3. **MODEL SELECTION: BEST PRACTICES**

Learn the pros and cons of simple and complex models and the different methods for quantifying model complexity, along with general machine learning techniques like feature engineering, model evaluation, and many more.

1 WEEK

PRINCIPAL COMPONENT ANALYSIS

1. **PRINCIPAL COMPONENT ANALYSIS AND SINGULAR VALUE DECOMPOSITION**
2. **PRINCIPAL COMPONENT ANALYSIS IN PYTHON**

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

1 WEEK

ADVANCED REGRESSION

1. **GENERALISED LINEAR REGRESSION**
2. **REGULARISED REGRESSION**

In this module, take a more advanced look at regression models and learn the concepts related to regularisation.

1 WEEK

ADVANCED ML CASE STUDY

1. **PROBLEM STATEMENT**
2. **EVALUATION RUBRIC**
3. **FINAL SUBMISSION**
4. **SOLUTION**

Build a regularized regression model to understand the most important variables to predict house prices in Australia.

1 WEEK

OPTIONAL

1. **INTRODUCTION TO NEURAL NETWORKS AND ANN**
2. **BACKPROPOGATION IN NEURAL NETWORKS**
3. **HYPERPARAMETER TUNING IN NEURAL NETWORKS**

SPECIALISATION - NATURAL LANGUAGE PROCESSING

COURSE 3 - MACHINE LEARNING II

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3. FINAL SUBMISSION
4. SOLUTION

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1 WEEK

OPTIONAL

1. SYNTACTIC PROCESSING - I
2. SYNTACTIC PROCESSING - II

SPECIALISATION - BUSINESS ANALYTICS

COURSE 3 - ADVANCED MACHINE LEARNING

BAGGING & RANDOM FOREST

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1 WEEK

MODEL SELECTION & GENERAL ML TECHNIQUES

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2. MODEL BUILDING AND EVALUATION
3. FEATURE ENGINEERING
4. CLASS IMBALANCE

Learn the pros and cons of simple and complex models and the different methods for quantifying model complexity, along with general machine learning techniques like feature engineering, model evaluation, and many more.

2 WEEKS

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TIME SERIES FORECASTING

1. **INTRODUCTION TO TIME SERIES AND ITS COMPONENTS**
2. **SMOOTHING TECHNIQUES**
3. **INTRODUCTION TO AR MODELS**
4. **BUILDING AR MODELS**

In this module, you will learn how to analyse and forecast a series that varies with time.

2 WEEKS

MODEL SELCTION CASE STUDY

1. **PROBLEM STATEMENT**
2. **EVALUATION RUBRIC**
3. **FINAL SUBMISSION**
4. **SOLUTION**

Apply your business acumen to the newly learnt machine learning techniques, and select the most appropriate model for a provided business scenario.

1 WEEK

SPECIALISATION - BUSINESS INTELLIGENCE/ DATA ANALYTICS

COURSE 3: ADVANCED DBS AND BIG DATA ANALYTICS

DATA MODELLING

1. **DATABASE DESIGN RECAP**
2. **BUILDING BLOCKS OF DATA MODELLING**
3. **PROBLEM SOLVING USING DATA MODELLING**
4. **DATA MODELLING: OPTIONAL ASSIGNMENT**

In this module, you will learn and use data modelling on a dataset to solve a business problem.

1 WEEK

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

1 WEEK

INTRODUCTION TO BIG DATA AND CLOUD

1. **BIG DATA AND CLOUD COMPUTING**
2. **AMAZON WEB SERVICES**
3. **BIG DATA STORAGE AND PROCESSING - HADOOP**
4. **EMR CLUSTER IN AWS**

Understand the basics of big data and cloud and learn to work with an EMR cluster on a cloud-based service.

1 WEEK

ANALYTICS USING SPARK

1. **EXPLORATORY DATA ANALYSIS WITH PYSPARK**
2. **PREDICTIVE ANALYSIS WITH SPARK MLLIB**

Use PySpark to do EDA and Predictive Analysis using Spark's ML library.

2 WEEKS

BIG DATA CASE STUDY

1. **PROBLEM STATEMENT**
2. **EVALUATION RUBRIC**
3. **FINAL SUBMISSION**
4. **SOLUTION**

Use your analytics skills to work on a large dataset in cloud to solve an industry problem.

1 WEEK

SPECIALISATION - DATA ENGINEERING

COURSE 3 - DATA ENGINEERING - I

DATA MANAGEMENT AND RELATIONAL DATABASE MODELLING

1. ENTERPRISE DATA MANAGEMENT 2. RELATIONAL DATABASE MODELLING 3. NORMAL FORMS AND ER DIAGRAMS	Understand the concepts of Data Management and learn to model data from a Relational Database.	1 WEEK

INTRODUCTION TO BIG DATA (OPTIONAL)

1. 4Vs OF BIG DATA 2. BIG DATA: INDUSTRY CASE STUDIES	This module you will learn what big data is, its various characteristics, and its determining factors. You will also get an idea of the various sources of big data and the wide range of big data applications in different industries such as retail, healthcare, and finance.	0 WEEK

INTRODUCTION TO CLOUD AND AWS SETUP

1. INTRODUCTION TO CLOUD 2. AWS SETUP	Understand what is cloud and setup your AWS account which will be required during the program.	1 WEEK

INTRODUCTION TO HADOOP AND MAPREDUCE PROGRAMMING

1. CONCEPTS RETAILED TO DISTRIBUTED COMPUTING 2. HADOOP DISTRIBUTED FILE SYSTEM 3. MAPREDUCE PROGRAMMING IN PYTHON	Understand the world of distributed data processing and storage with Hadoop. Learn to write MapReduce jobs in Python.	1 WEEK

ASSIGNMENT (OPTIONAL)

1. **INTRODUCTION, PROBLEM STATEMENT AND GRADING RUBRICS**	Solve an assignment to brush up on the skills learnt so far.	**0 WEEK**

NOSQL DATABASES AND APACHE HBASE
NOSQL DATABASES AND MONGODB (OPTIONAL)

1. **CONCEPTS OF NOSQL DATABASES**	Learn the concepts of NoSQL databases. Understand the working of Apache HBase.	**1 WEEK**
2. **INTRODUCTION TO APACHE HBASE**		
3. **HBASE PYTHON API**		
4. **COMPARISON OF NOSQL DATABASES**		

DATA WAREHOUSING (OPTIONAL)

1. **INTRODUCTION TO DATA WAREHOUSE AND DATA LAKES**	Understand the intricacies behind designing a data warehouse and a data lake for use case(s).	**0 WEEK**
2. **DESIGNING DATA WAREHOUSING FOR AN ETL DATA PIPELINE**		
3. **DESIGNING DATA LAKE FOR AN ETL DATA PIPELINE**		

DATA INGESTION WITH APACHE SQOOP AND APACHE FLUME

1. **INTRODUCTION TO DATA INGESTION**	Get familiar with the challenges involved in data ingestion. Use Sqoop and Flume to ingest structured and unstructured data into Hadoop.	**1 WEEK**
2. **STRUCTURED DATA INGESTION WITH SQOOP**		
3. **UNSTRUCTURED DATA INGESTION WITH FLUME**		

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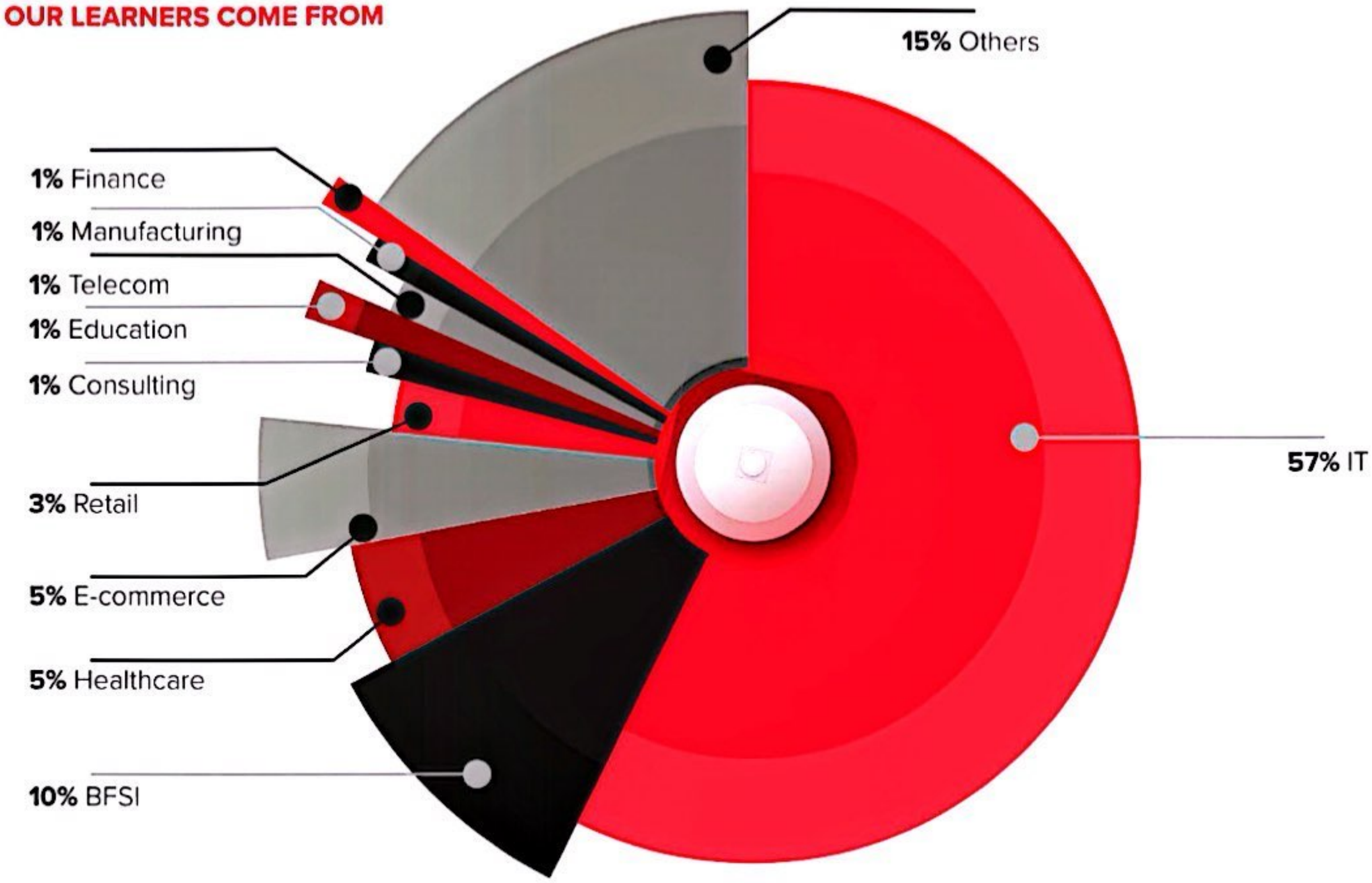

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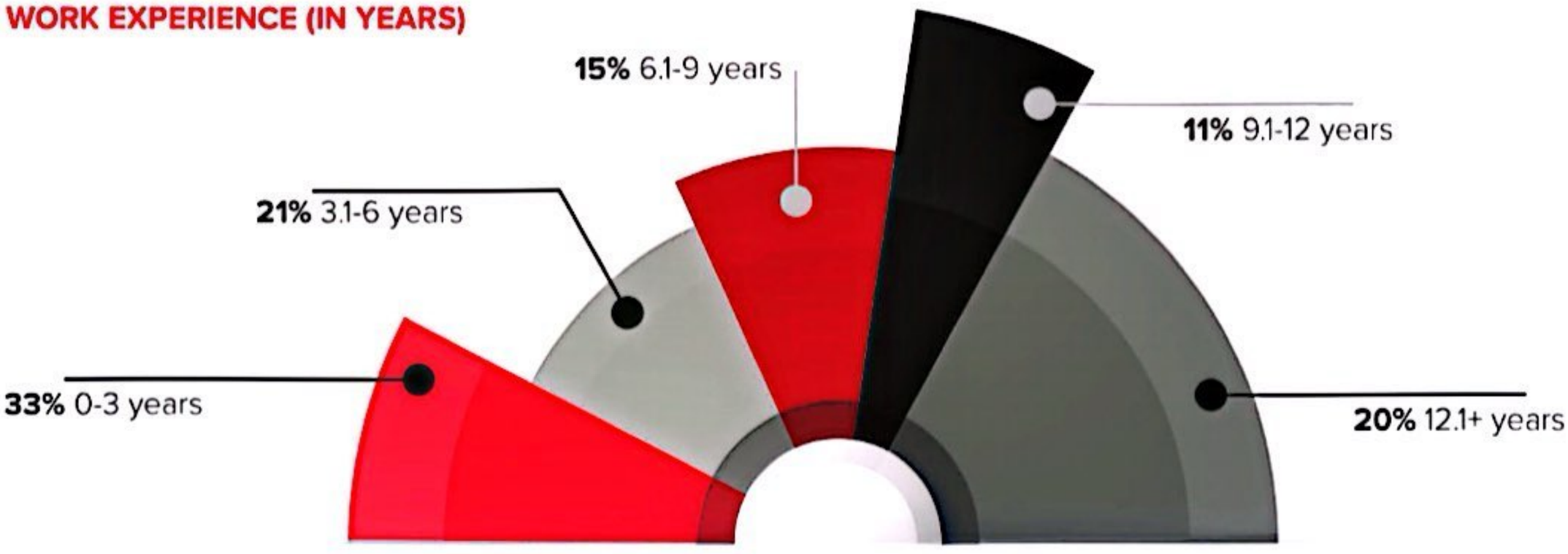

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