

Certificate Programme on

Business Analytics and Intelligence

Learn Analytics Through Case Studies

BATCH 14 (2023-24)



Course Starting:
Monday, 24 July 2023

Application Deadline:

Early Decision:*
Friday, 28 April 2023

Regular Decision:
Friday, 26 May 2023

*Early Decision: Only limited seats are available for this programme. The early you apply, the better are your chances of getting shortlisted.

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In the present day, Herbert Simon's theory of bounded rationality is more relevant than ever given the increasing complexity of business problems; the limited ability of the human mind to analyze alternative solutions; and the limited time available for decision making. In many organizations, the introduction of Enterprise Resource Planning (ERP) systems ensured data availability, but traditional ERP systems lacked data analysis capabilities that would support management in making decisions.

Business Analytics is a multi-dimensional and interdisciplinary concept. Various dimensions of Business Analytics include data governance, exploratory data analysis, pattern recognition, problem solving, solution deployment and ultimately value creation for all the stakeholders. To create value through data, we use multiple disciplines such as mathematics, statistics, artificial intelligence, machine learning, computer science and management strategy. Since the advent of analytics in solving business problems, the demand for Analytics, Machine Learning and Artificial Intelligence professionals has increased dramatically. Business Analytics creates capabilities for companies to compete effectively on the market and has become one of the main functional areas in most organizations. Thomas Davenport in his book titled, "Competing on analytics: The new science of winning", claims that a significant proportion of high- performance companies have high analytical skills among their personnel and doing extremely well.

The goal is to
turn data into
information, and
information
into insight.

— Carly Fiorina

1. Bart de Langhe and Stefano Puntoni, *THE NEW LEADERSHIP MINDSET FOR DATA & ANALYTICS*, *Leading With Decision-Driven Data Analytics* MIT Sloan Management Review December 07, 2020
2. *The Quant Crunch: How the Demand for Data Science Skills Is Disrupting the Job Market* – IBM research partnership with Burning Glass Technologies, and Business-Higher Education Forum (BHEF)

Banks and Financial Institutions, e-commerce, FMCG, healthcare, insurance, manufacturing, retail and services are fostering the revolution of Analytics and creating new roles by changing the landscape of employment ecosystem. In its recent survey², IBM reported that there will be 2.7million new job opportunities for roles that require skills in machine learning, data science, big data, and deep learning, which would raise 39% growth in employer demand. Amazon made a huge profit of \$11.59 billion in the first nine months of 2020 amidst the ramping COVID-19 pandemic. Amazon's success is attributed to its analytical capabilities, the recommender system that it has incorporated into its operations, as well as Amazon Web services. Corporate experience has shown that analytical skills improve the ability to make better decisions.

This course is designed to provide an in depth understanding of business analysis techniques and their applications in improving business processes and decision making by finding and analyzing the right data for a purpose rather than using data that already exists



Course Objectives

Using case studies based on Indian companies, this course provides in-depth knowledge of analytics and big data tools and techniques that can be used for decision-making and problem solving based on facts. By the end of the course, the participants will be able to:

- Understand the use of Artificial Intelligence (AI) and Machine Learning (ML) as a competitive strategy.
- Understanding of Artificial Intelligence and Machine Learning. Understanding of descriptive, diagnostic, predictive and prescriptive analytics.
- Demonstrate machine learning algorithms such as supervised, unsupervised, reinforcement and evolutionary algorithms with applications using case studies.
- Apply neural networks and deep learning algorithms and their applications in solving business problems.
- Use AI and ML in application areas such as customer requirement Analysis, General Management, Marketing, Finance, Operations and Supply Chain Management.
- Demonstrate applications of analytics in various industries such as Banking, Finance Services and Insurance (BFSI), Defense, E-Commerce, Healthcare, Manufacturing, Retail and Service Sector.
- Analyse unstructured data such as social media data, machine generated data, images, videos, and text (Natural Language Processing).
- Deploy AI with a special focus on neural networks and deep learning algorithms such as CNN, RNN, and Generative models.
- Understand sources of Big Data and the technologies and algorithms for analysing Big Data for inferences. Ability to analyse unstructured data such as social media data and machine generated data.
- Analyse and solve problems from different industries such as Manufacturing, Service, Retail, Software, Banking and Finance, Sports, Pharmaceutical, Aerospace, etc.
- Design and develop deployment strategies for the analytical models developed.
- Demonstrate data visualization and story telling through data.
- Understand Interpretable and Explainable AI model.
- Demonstrate Hands-on experience with software such as Microsoft Excel, Python, SPSS, R, Rattle, Tableau, Tensor flow and other proprietary software.
- Demonstrate Hands-on Julia, Big Data Solutions - Hadoop, Scala, Apache Spark, Microsoft Azure.

Key Takeaways

In October 2012, Harvard Business Review claimed that “Data Scientists” will hold the sexiest job of the 21st century. The Business Analytics and Intelligence Certificate Programme will equip the participants with analytical tools and prepare them for corporate roles in analytics-based consulting in marketing, operations, supply chain management, finance, insurance, and general management in various industries. The participants will also learn about operationalization of ML models.

Who should attend?

The course will benefit executives, project leaders and senior managers working in various sectors. The course is designed for professionals who would like to improve ROI for their companies’ using analytics.

Why IIMB?

IIMB is one of the first Institutes in the world to offer Business Analytics certificate course and the incoming batch will be the 14th batch. IIMB faculty members have published more than 35 analytics case studies at the Harvard Business Publishing a record for any Indian Institute. Students admitted to this group come from different organizations and different geographical locations across the world making it a great learning experience for students. Students get a chance to work on real world problems as part of the course.

The BAI course has the right blend of technical depth and practical examples, which is enforced by high quality individual assignments. The final project in this course is the LIVE problem that we solve to sponsoring organisation. IIMB provides full support to secure a project and the project guide challenges the team to not just code but develop an appropriate analytical model focusing the actual business need. As a business unit leader, this program has helped me to build my network, refresh my knowledge, and allows me to share with my team to build a robust data science capability.

Ravi Shanker (BAI 10)

Senior Vice President - Head of Knowledge Services, Marsh McLennan Global Services



Eligibility Criteria

The participants should have a bachelor's degree in engineering/science/commerce or arts with mathematics as one of the subjects during their Bachelor's programme. Preferable work experience is 3 years, in exceptional cases applicants with less than 3 years are admitted into the programme.

Selection Process

Short-listed candidates will be interviewed based on their performance on the online aptitude test and past academic performance, quality of work experience, and fit for an analytics position.



The BAI course is seamless tailor-made program that includes essential basics and advance level topics in analytics. One of the key differentiators in this course is the project work where the student gets an opportunity to solve a real time industry problem. Key learning in this journey has been to understand on how to approach any analytics problem and eventually present the solution to the customer as a story. I am sure this course is a good starting point for someone who is keen to take up Analytics as their career going forward. Overall, this course has given me full exposure to all the key areas of data science.

Rajarajan R (BAI 12)

*Sector Head & General Manager - New Technologies
Tata Consulting Engineers Limited*

Course Content

The course consists of fourteen course modules, two MOOC modules and a project. The modules and their contents are discussed in the following paragraphs. Case-based teaching will be used for all the modules using case studies from IIMB, Harvard Business School (HBS), Darden, Ivey, and Kellogg. Significant proportions of the cases used in the course are published by IIMB faculty at the Harvard Business Publishing. A few of them are published by the students from the previous batches based on their project work. IIMB distributes more than 40 analytics cases on Indian and Multi-national companies through Harvard Business Publishing which are used by more than 300 Institutions across more than +70 countries.



Modules 1-5

MODULE 1

Foundations of Data Science: Data Visualization and Interpretation (6 Days)

To facilitate fact-based decision making; managers must understand how to summarize, analyze, conduct hypothesis tests, interpret and communicate data using data visualization and descriptive statistics techniques. Statistical analysis is a fundamental method of quantitative reasoning that is extensively used for decision making. During this module, participants will become familiar with the most frequently used methods of statistical analysis, as well as appropriate statistical tests. The module is application-oriented without compromising the theoretical aspects.

Foundations of Data Science Module Contents

- Introduction to data science; Different types and scales of data (ratio, interval, nominal and ordinal); Data summarization and visualization methods; Tables, Graphs, Charts, Histograms, Frequency Distributions, Relative Frequency Measures of Central Tendency and Dispersion; Box Plot; Chebychev's Inequality.
- Data visualization.
- Basic probability concepts, Conditional probability, Bayes Theorem, Probability distributions, Discrete and Continuous distributions: Binomial, Poisson, Geometric, Exponential and Normal distribution. Decision Making under uncertainty.

- Sampling and Estimation: Random sampling, stratified sampling and cluster sampling; Sampling distribution; Central Limit Theorem (CLT), Point and Interval estimates, Confidence Intervals, Optimal sample size.
- Hypothesis testing: Constructing a hypothesis test; Null and alternate hypotheses; Test Statistic; Type I and Type II Error; Z test, t test, two sample t tests; Level of significance, Power of a test, ANOVA
- Test for goodness of fit, Non-parametric tests.
- Introduction to Python.

Case Studies: 1. Testing Marketing Hypotheses at WSES (IIMB Case); 2. Data-Enabled Insights from Sericulture: Jayalaxmi Agro Tech (IIMB Case); 3. A Dean's Dilemma: Selection of Students for the MBA Program (IIMB Case). 4. Fantasy sports- dream 11





MODULE 2

Storytelling through d

Communicating model outputs and insights to top management plays an important role in successful implementation of ML models. Data Storytelling is a skill and is a highly structured approach. This module involves – Data, Visuals and Narrative.

When narrative is paired with data, it helps to explain the occurrences in the data. Adding sufficient context and commentary help appreciate an insight. Combining visuals would enlighten the viewer to understandings that they wouldn't see without charts or graphs. When narrative and visuals are coupled together, they are highly engaging and influential.

Data Storytelling Module Contents

- Psychology behind data visualization
- Visualization Best Practices
- Learn why storytelling matters
- Understand the science behind storytelling
- Learn about various types of visual storytelling techniques
- Importance of business storytelling
- Narrative data visualization
- Seven different data story types

*MOOC MODULE

Data Preprocessing and Imputat

In this MOOC module, the students will be introduced to general framework of data curation – involving data preparation & imputation. This framework suits a broad variety of datasets. The session explains the approach for converting raw and messy data to a well-organized data that is ready for applying high level ML algorithms or any advanced methods of data analysis.

- Data Quality Check
- Data cleaning and Imputation.
- Missing data: Missing Completely at Random (MCAR), Missing at Random (MAR) and Missing not at Random (MNAR).
- K Nearest Neighbors (KNN) algorithm for data imputation

Machine Learning: Supervised Learning Algorithms (5 Days)

Based on historical data, the predictive analytics model predicts future events such as demand for a product, revenue forecast, customer churn, employee attrition, fraud, default in loan repayments, etc. Many business problems require dealing with data on multiple variables, sometimes more than the number of observations. Supervised learning algorithms such as Regression help us understand the relationships among these variables and how the relationships can be exploited to make decisions. This module aims to illustrate how Regression and Logistic Regression models can be applied to real-life problems such as prediction, classification, and discrete choice problems. The focus will be case-based practical problem-solving using predictive analytics techniques to interpret model outputs. The participants will be exposed to software tools such as MS Excel, R, Python and SPSS and how to use these software tools to perform regression and logistic regression.

Predictive Analytics Module Contents

- Regression model building framework: Problem definition, Data pre-processing; Model building; Diagnostics and Validation.
- Simple linear regression: Coefficient of determination, Significance tests for predictor variables, Residual analysis, Confidence and Prediction intervals.
- Multiple linear regression: Coefficient of multiple coefficient of determination, Interpretation of regression coefficients, Categorical variables, heteroscedasticity, Multi-collinearity, Outliers, Autoregression and Transformation of variables, Regression model building and deployment.
- Logistic and Multinomial regression: Logistic function, Estimation of probability using logistic regression, Deviance, Wald test, Hosmer Lemshow test, Classification table, Gini co-efficient; Multinomial logistic regression.
- Application of predictive analytics in retail, direct marketing, health care, financial services, insurance, supply chain, etc.



Case Studies: 1. Pricing of players in the Indian Premier League; 2. Package Pricing at Mission Hospital (IIMB Case -Popular at HBP case portal); 3. Colonial Broadcasting Company (HBS Case); 4. Breaking Barriers – Micro-Mortgage Analytics (IIMB Case); 5. A Game of Two Halves: In-Play Betting in Football (IIMB Case); 6. HR Analytics – Predicting Probability of Renege (IIMB Case -Popular at HBP case portal); 7. Marketing Head's Conundrum (IIMB Case) . 8. Hytex Catalogs; 9. Predicting Employee Attrition at Kramera Industries.

MODULE 4

Prescriptive Analytics (4 Days)

In Prescriptive Analytics, optimization models are used for arriving at optimal or near-optimal decisions for a given set of managerial objectives under diverse constraints. Many machine learning algorithms make use of optimization techniques such as gradient descent. Optimization is an integral part of operations analytics, particularly in operations and supply chain management. Students will gain an understanding of how to construct mathematical models for managerial decision situations and how to use Excel Solver and LINDO to obtain solutions and interpret their results.



Optimization Analytics Module Contents

- Introduction to Operations Research (OR), Linear Programming (LP), Formulating Decision problems using Linear programming, Interpreting the results and sensitivity analysis. Concepts of shadow price and reduced cost.
- Multi-period LP models. Applications of linear programming in product Mix, Blending, Cutting Stock, Transportation, Transshipment, Assignment, Scheduling, Planning and Revenue Management Problems. Network models and project planning.
- Integer Programming (IP) problems, mixed-integer and zero-one programming. Applications of IP in capital budgeting, Location decisions, Contracts.
- Multi-Criteria Decision Making (MCDM) techniques: Goal Programming (GP) and Analytic Hierarchy Process (AHP) and applications of GP and AHP in solving problems with multiple objectives.
- Non-linear programming, Portfolio theory, Gradient descent algorithm technique.

Case Studies: 1. Merton Truck Company (HBS Case), 2. Supply Chain Optimization at Madurai Aavin Milk Dairy (IIMB Case), 3. Red Brand Canners (Stanford Case); 4. Managing Linen at Apollo Hospitals (IIMB Case); 5. Case on Airline Operations (IIMB Case).

Stochastic Models (Reinforcement Learning Algorithms with Applications in Marketing and Retail Analytics) (4 Days)

Stochastic models provide powerful analytical tools for modeling and analyzing complex problems across a range of domains, including finance, retail, marketing, operations, and economics. Many measurements in business change over time and are inherently random. Stochastic models can be used to model and measure changes in metrics used for finance, marketing, operations, supply chain, etc. over a period of time. This module provides an introduction to stochastic processes and their applications in business and management. Stochastic models are also the basis for reinforcement learning algorithms.

In this course, we will focus on stochastic process modeling in applications based on case studies.

Stochastic Models Module Contents

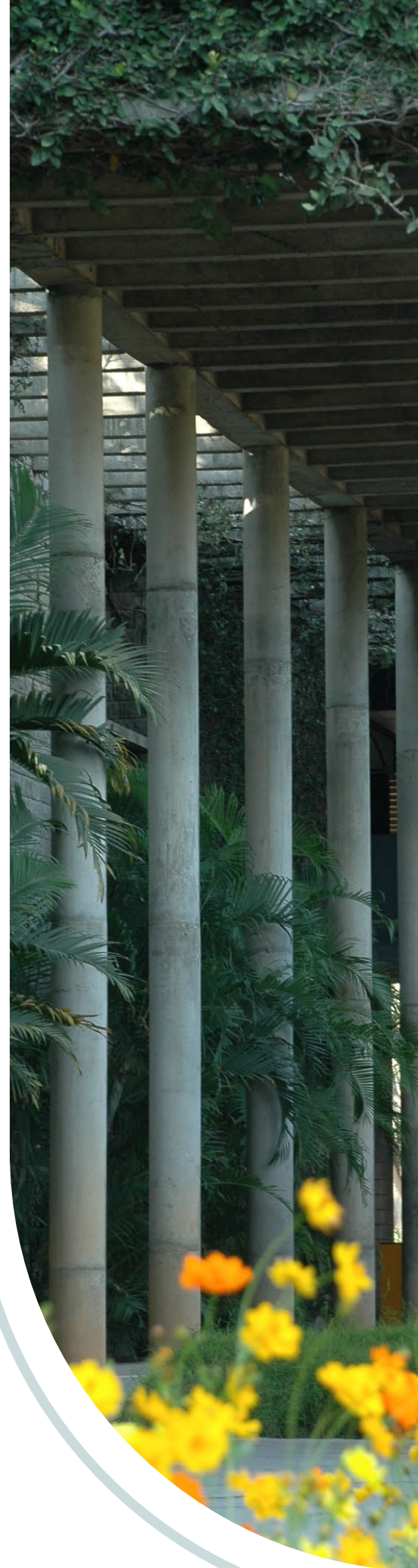
- Introduction to Stochastic models, Markov models, Classification of states, Steady-state probability estimation, Brand switching and loyalty modelling, Market share estimation in the short and long run. Google's ranking algorithm.
- Poisson process, Cumulative Poisson process, Applications of Poisson and cumulative Poisson in operations, marketing and insurance. Measuring effectiveness of retail promotions, warranty analytics.
- Reinforcement learning algorithms: Dynamic programming; Markov decision process, Applications of Markov decision process in sequential decision making.

Case Studies: 1. Customer Analytics at Flipkart (IIMB Case), 2. Browser Wars: Microsoft Vs Netscape (Darden Case), 3. Consumer Choices between House Brands and National Brands in Detergent Purchase at Reliance Retail (IIMB Case), 4. MNB ONE Credit Card Portfolio (Darden Case)

Modules 6 -14: Advanced Analytics

Advanced analytical tools will be taught in nine modules. The participants will be exposed to a complex decision-making scenario under uncertainty and how to deal with such problems using advanced tools and Big Data. A dedicated module on ML algorithms will expose the students to the recent advancements in analytics and big data.

Discussion problems will be drawn from many sectors such as finance, banking, insurance, IT, ITeS, retail, service, manufacturing, pharmaceuticals, etc.





MODULE 6

ML: Unsupervised Learning (2 Days)

Unsupervised learning algorithms are used extensively in customer segmentation, image and speech recognition, market basket analysis, recommendation engines and many more. These algorithms are used to analyze, cluster unlabeled data, and discover hidden patterns more robustly in large volume of data. These models use three main approaches, such as – clustering, association, and dimensionality reduction. Their ability to uncover the differences and similarities in unlabeled data makes it an ideal solution for exploratory analysis also.

Contents

- Principal component analysis.
- Factor analysis.
- Conjoint analysis.
- Discriminant analysis.
- Clustering - K-mean.
- Hierarchical, anomaly detection.

Case Study: Champo Carpets – Clustering

MODULE 7

Forecasting (2 Days)

Forecasting is an important activity for all organizations since the success of both short term and long-term planning depends on precise forecasting. During this module we will discuss the characteristics of time series data. This quantitative methodology of analyzing the trends and patterns of past and present data enables to project future developments of any business, allocate resources, strategically plan the activities and increase their chances to survive and remain competitive in the market, even during adverse situations.

Industries like manufacturing, airlines, stock market, call centers, healthcare extensively use forecasting as part of their critical business operations and planning.

Contents

- Moving average and exponential smoothing techniques.
- Stationary and non-stationary time series data.
- Auto-Regressive Integrated Moving Average (ARIMA) models.
- Seasonal ARIMA.
- ARIMAX.

Case Studies: 1. Apollo Hospitals: Differentiation through Hospitality (IIMB Case) 2. Demand forecasting for perishable short shelf-life homemade food at iD Fresh (IIMB Case - Popular at HBP).

MODULE 8

Supply Chain Analytics (2 Days)

Business operations and supply chain management generates challenging problems which can be solved effectively using analytical techniques and improved by Six Sigma methodology. Supply chain analytics are used by several organizations to eliminate process issues and effectively reduce variations in operations.

This module gives an overview of Lean Six Sigma approaches. Enable students to effectively plan for quality, quantify risk and uncertainty, and how to view any complex decisions through the lens of optimization.

Contents

Six Sigma as a problem-solving methodology.
DMAIC and DMADV methodology.
Network planning and optimization.
Inventory Optimization.

Case Study: Supply Chain Optimization at HAL



MODULE 9

Advanced Machine Learning (3 Days)

The focus of this module will be on ensemble methods which use several models to improve the accuracy of prediction and classification, reducing the bias. Sequential ensemble and parallel ensemble techniques are two broad categories. The application of each ensemble technique is specific to each business problem and nature of the data. But each method offers a prospect for the modelers to explore and a choice to make.

Due to rising computational power, training large ensemble learning in a practical time frame and their application has grown exponentially over years - from remote sensing to computer security, stock market financial decision making, speech recognition to medical imaging.

Contents

- Ensemble methods: Bootstrap Aggregating (Bagging), Random Forest, Adaptive boosting, Gradient Boosting, XGBoost, LightGBM.
- Recommender Systems, Collaborative Filtering: Cosine Similarity, Jaccard Coefficient. Advanced recommender system.
- Support vector machine.

Case Studies: 1. Predicting Earnings Manipulation by Indian Companies Using Machine Learning Algorithms (IIMB Case); 2. Customer Analytics At Bigbasket: Product Recommendations (IIMB Case - Popular at HBP case portal); 3. Improving Lead Generation at Eureka Forbes Using Machine Learning Algorithms. 4. Champo carpets

MODULE 10

Big Data Analytics (2 Days)

Many organizations generate huge volume of data at great speed which require innovative technological solution to store, manage and analyze data. Organizations with Big Data Analytics Systems and software can make quick Data-Driven Decisions that benefit business related outcomes. In this module, students are introduced to various tools and technologies that support Big Data Analytics Processes like open-source framework for storing and processing big data sets; data management systems, understanding of large storage repository, data warehouse in brief, data integration software - streamlined across different platforms, including cloud.

Contents

- Big Data Overview
- Key Challenges
- Data Lake
- Metastore and Data Formats
- Map Reduce & Spark
- Spark Dataframes & Spark SQL
- Scalable Machine Learning
- No-SQL Overview
- On Premise and Cloud Deployments



Course Evaluation

The participants will be evaluated through take home assignments, quizzes, classroom group activities and project work, at the end of each module. The participants will be given a take-home assignment that should be completed and submitted within 5 weeks.

MODULE 11

Artificial Intelligence and Deep Learning (4 Days)

Artificial neural networks and deep learning enable organizations to generate innovative solutions. Deep learning being the fastest growing field in AI, with its advanced neural network techniques is solving the most challenging cases. Deep learning is on the way to becoming the industry standard for predictive analytics within business analytics and operations in the near future.

During this module we will focus on various AI and DL techniques and applications in different domain.

Contents

- Introduction to Artificial Intelligence - Representational Learning.
- Introduction to Artificial Neural Networks (ANN), Back-propagation algorithm; Multi-layer Perceptron.
- Fine-Tuning Neural Network hyper-parameters (Learning Rate, Batch Size, Epoch, Hidden layers, and neurons) and Training Deep Neural Networks - Faster Optimizers, Avoiding Overfitting.
- Autoencoders - Unsupervised Pre-training, Anomaly Detection.
- Convolutional Neural Networks - Convolutions, Filters/Kernels, Layers - Pooling, Global Average Pooling.
- Understanding CNN Architectures - VGG, ResNet, Inception etc.
- Transfer Learning - Feature Extraction and Fine Tuning.
- Advanced Time Series Analysis; Recurrent Neural Networks - LSTM/GRU Architecture.

Case Study: Leveraging AI in a skilling ecosystem



The ease with which this book caters to the needs of both the avid enthusiast and the hardcore analytics professional is truly astonishing and commendable. The best part about this book is its lucid elaboration of the theoretical concepts with a healthy mix of illustrations, solved examples, back exercises and apt case studies from varied industries, which renders it not only informative, but also highly engaging. Designed to be a companion for students to strengthen their basics in statistical learning, it also simultaneously serves as a launchpad to understand complex machine learning algorithms. Not just during my term as a student of the BAI programme, this book still helps me to date in being the “Gita” of Business Analytics.

Sharan Sivakumar, (BAI 11)
Entrepreneur

Artificial Neural Networks and Deep Learning (8 weeks)

This MOOC module will provide a strong foundation in deep learning using TensorFlow/Keras by providing real-life case studies and examples. Difference between machine learning and deep learning will be discussed. Range of topics in ANN will be covered from building and training simple neurons, perceptron using algorithm such as gradient descent, back propagation to networks / architectures with hyper-parameter tuning.

Deep learning has solved complex problems in the field of computer vision, Natural Language Processing etc through architectures such as convolutional neural network, recurrent neural networks, transformer models etc. We shall cover all these in detail and provide step-by step approach on how to explore and build these models.

Contents

- Introduction to Artificial Intelligence and Deep Learning: Relationship between ML and Deep Learning.
- Learning process: Representational learning; Deep Learning's application area; Challenges and Frameworks; Google.
- Artificial Neural Networks: Biological and Mathematical Neurons; Perceptron Model - Multi-Layer Perceptron; Back-propagation Algorithm; Activation Functions.
- Training deep neural networks: Hyper-parameter Tuning, Optimizers, Addressing overfitting issues: Regularization and Dropout; Grid Search.
- Unsupervised Learning using Autoencoders and Transfer Learning.

Convolutional Neural Networks (CNN) and Computer Vision

- Understand the concept of convolutions and various operations/layers such as padding, striding, pooling etc. which form convolutional neural networks.
- Building and training CNNs for computer vision problem such as image classification.
- Understand CNN architectures such as VGG, ResNet, Inception, Xception etc. in detail and learn to perform transfer learning by applying these pre-trained models and weights on different datasets.
- (Optional) Understand the concept of object localization, detection, anchor boxes, fully convolutional networks, You Only Look Once (YOLO).

Natural Language Processing (NLP), Recurrent Neural Network (RNNs) and Transformers

- Understand the components of NLP pipeline and the shortcomings of encodings such as one hot encoding, TF-IDF and learn word embeddings such as word2vec, GloVe.
- Apply word embedding and convolution 1D for sentiment analysis.
- Understand the architecture of RNNs and its ability to handle sequential data, learn to train it using Back-Propagation Through Time (BPTT) and understand its limitations and learn different types of architectures such as Long-Short Term Memory (LSTM) and Gated Recurrent Unit (GRU), bi-directional RNNs and stacked RNNs.
- Language modeling and applying RNNs for applications such as character prediction and encoder-decoder architecture for machine language translation.
- Learn the state-of-the-art models such as attention layers, transformer models, GPT and deep contextualized embeddings such as ELMo, BERT and learn to apply them.

** Students will have to complete MOOC Module on Artificial Neural Networks and Deep Learning before Module 13

MODULE 12

Natural Language Processing (2 Days)

Natural Language Processing (NLP) is one of the challenging problems in AI with several applications across different domains. NLP uses ML to make the human-computer interactions easy and efficient. During this module, we will focus on different NLP techniques and models with real world applications.

Contents

- Text processing tasks - Tokenization; Stopwords; N-Grams; Stemming/Lemmatization
- Vectorization and Encodings - One Hot; Frequency based; TF-IDF
- Word Embeddings - GloVe, Word2Vec
- Topic Modeling - Latent Semantic Analysis/Truncated SVD; Non-negative Matrix Factorization
- Deep Learning Models - Encoder Decoder Architecture (Seq2Seq); Attention Mechanism; Transformers; BERT
- NLP Applications - Named Entity Recognition, Text Classification, Summarization etc

Case Study: Enhancing visitor experience at ISKCON using text

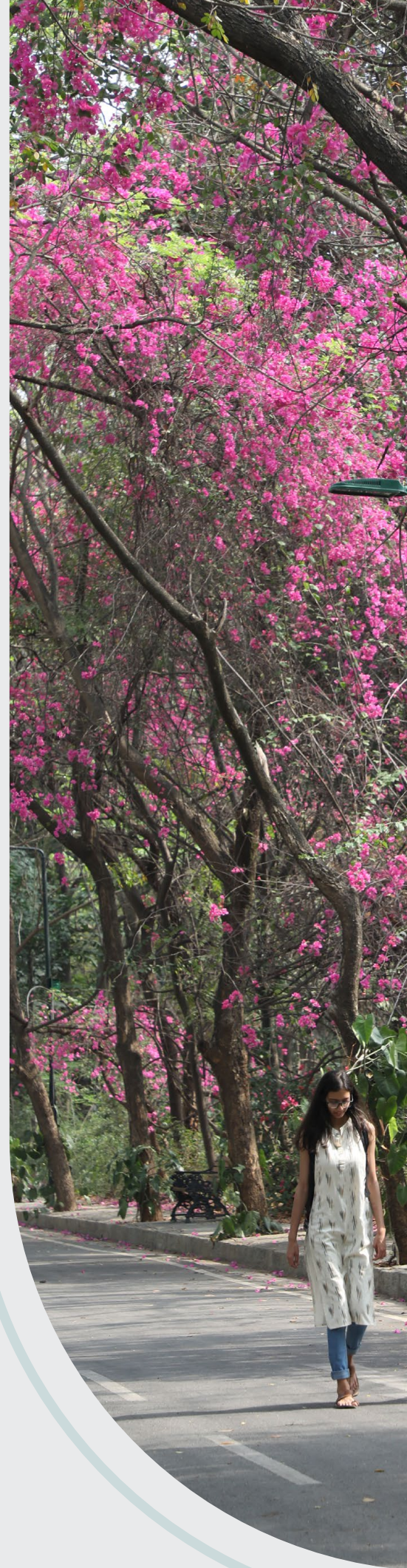
MODULE 13

ML Operations and Explainable AI (3 Days)

Businesses would never probe to comprehend the AI adoptions or its algorithms as long it gave correct output. But now the focus has changed to human interpretable models through growing Explainable AI (XAI). XAI has helped to characterize model accuracy, objectivity, transparency, and outcomes in AI-powered decision making. This module introduces the learner to set of tools and frameworks that help to understand and interpret predictions made by ML Models.

Contents

- DevOps Vs MLOps Data Labelling, Active Learning Sampling, Data Augmentation
- Model Development: AutoML, Experiment Tracking
- Model Deployment: Batch & Online Prediction, Model in service, Model as Service
- Model Serving: Model as Library, Model as Restful API or Containerized Service
- Model Monitoring: Model Drifts
- Model Explainability: LIME, Shapley Values, PDP and ICE
- Explainable AI (DL) -> Visualization of Convolution layers; GradCAM technique



MODULE 14

AI in practice (2 Days)

Contents

Artificial intelligence is transforming the way we do business. AI is currently attracting significant interest and attention from industry, researchers, governments as well as investors, who are investing huge money into the development of new machine learning technologies and applications.

During this module, large scale applications of AI across domains will be discussed by industry leaders and influencers.

The BAI programme has helped broaden my perspective and has given me the ability to offer innovative solutions to problems. From the fundamentals of data science to advanced topics like Deep and Reinforcement learning, this course has given me full exposure to all the key areas of data science.

Ajay Kumar Kunhambu (BAI 9)
Director, Barclays

This course played a vital role in my career progression. Use of case driven curriculum helped in understanding the applications of analytics in everyday work. Proud to be a part of this course. Highly recommended.

Sudalai Rajkumar (BAI 4)
Data Scientist, H2O

Programme Directors



Professor U Dinesh Kumar

Dr. U Dinesh Kumar is a Professor of Decision Sciences and Chairperson of Data Centre and Analytics Lab (DCAL) at IIM Bangalore and holds a Ph.D. in Mathematics from IIT Bombay. Dr Dinesh Kumar introduced Business Analytics elective course in 2008 to the PGP students at IIM Bangalore and started one of the first certificate programmes in Business Analytics in India in 2010. He has over 20 years of teaching and research experience and has published more than 70 research articles in leading academic journals.

Forty of his case studies on Business Analytics based on Indian and multinational organizations have been published at the Harvard Business Publishing's (HBP) Case portal. Nine of his case studies are best sellers at HBP. His case studies are used by more than 250 Institutions across 70+ countries across the world. He has authored 5 books, his recent book is titled, "Business Analytics– The Science of Data Driven Decision Making", published by Wiley in 2017 and "Machine Learning Using Python" are Amazon Best Seller.

Dr Dinesh Kumar has carried out predictive and prescriptive analytics consulting projects for organizations such as The Boston Consulting Group (India) Private Limited, Hindustan Aeronautics Limited, Qatar Airways, Mission Hospital, Manipal Hospitals, Scalene Works, Wipro Limited, UNIBIC and the World Health Organization etc.

Dr Dinesh Kumar conducts corporate training programmes in Analytics and has trained more than 1000 professionals in the field of analytics.

For any queries contact Professor U Dinesh Kumar (Email: dineshk@iimb.ac.in)



Professor Rajluxmi Murthy

Associate Professor – Decision Sciences

Professor Murthy's research and teaching interests are in the field of Optimization and Simulation, especially in their applications to logistics management and service industries.

Education:

PhD (Operations Research), Southern Methodist University, Texas, USA, 1994.

MS (Applied Mathematics), Florida State University, Tallahassee, Florida, USA, 1988.

MSc (Mathematics), IIT Roorkee (Univ. of Roorkee), Roorkee, India, 1984.

BA (English, Mathematics, and Economics), Garhwal University, Dehradun, 1982



Course Project

Each participant should carry out an individual project for 6 months based on a real-life problem/ data. IIMB encourages students to publish cases studies based on their course project. The following cases were published by the previous batch students at Harvard Business Publishing based on their project reports:

- A Dean's Dilemma: Selection of Students for the MBA Programme
- Consumer Choice between House Brands and National Brands in Detergent Purchases at Reliance Retail
- Central Parking Solutions Private Limited
- Breaking Barriers – Micro-mortgage Analytics
- Larson and Toubro – Forecasting Demand for Spare Parts
- Marketing Head's Conundrum
- HR Analytics at ScaleneWorks – Predicting Renege
- Customer Analytics at Flipkart
- Customer Analytics at Bigbasket: Product Recommendations
- Markdown Optimization at an Indian Retails Store
- Predicting Earnings Manipulation by Indian Firms using Machine Learning Algorithms
- Predicting Net Promotor Score (NPS) to Improve Patient Experience at Manipal Hospitals
- Demand Forecasting for Perishable Short Shelf Life Home Made Food at iD Fresh Food
- Using Markov Chain to Forecast Sales Booking
- Leveraging Artificial Intelligence in a Skilling Ecosystem
- Champo Carpets: Improving Business-to-Business Sales Using Machine Learning Algorithms


Previous batch students undertook projects with organizations such as Apollo Hospitals, Aris Global, Big Basket, BESCO, BMTC, Central Parking Solutions, Columbia Asia, Flipkart, Fortis Hospital, Future Group, HP, IBM, KSRTC, L&T, Manipal Healthcare Services PVT Ltd, Reliance Retail, Reliance Trends, Shubham Housing Development Finance, Spicejet, Toyota Kirloskar, Walmart, UNICEF etc.

Project Timelines

The project report should be submitted tentatively by 25 May 2024. The participants have to submit the project proposal tentatively by 25 February 2024. The projects will be supervised by an IIMB faculty member.




Few of the cases published by the previous batch students at Harvard Business Publishing based on their project reports have been Best Sellers and used by more than 250 Institutions across 70+ countries.

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Main Case **BESTSELLER**

A Dean's Dilemma: Selection of Students for the MBA Program


Dhimant Ganatra, Dinesh Kumar Unnikrishnan Sep 2014 • 6 p •
IMB483-PDF-ENG • English • Supplemental materials

Easwaran Iyer, Dean of the Jain University's Business School, wanted to ensure that they admitted the right set of students to their Master...
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Main Case **BESTSELLER**

Package Pricing at Mission Hospital


Sriram TK, Shailaja Grover, Satyabala Hariharan, Dinesh Kumar Unnikrishnan Jul 2015 • 9 p • IMB527-PDF-ENG • English • Supplemental materials

Mission Hospital started its operations on April 02, 2008 with the aim of providing highest quality patient care facilities to all...
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Main Case **BESTSELLER**

HR Analytics at ScaleneWorks: Behavioral Modeling to Predict Renege


Rahul Kumar, Dinesh Kumar Unnikrishnan Jan 2016 • 12 p •
IMB551-PDF-ENG • English • Supplemental materials

ScaleneWorks People Solutions LLP (ScaleneWorks), is a Bangalore-based talent management company, which commenced its operations in the...
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Main Case **BESTSELLER**

Customer Analytics at Bigbasket - Product Recommendations

Paul Abraham, Manaranjan Pradhan, Lakshminarayanan S, Ganesh Iyer, Dinesh Kumar Unnikrishnan May 2016 • 6 p • IMB573-PDF-ENG • English • Supplemental materials

Bigbasket was India's largest online grocery and food store established in 2011 by a group of entrepreneurs Hari Menon, Vipul Parekh, V S...
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Main Case **BESTSELLER**

Demand Forecasting for Perishable Short Shelf Life Home Made Food at iD Fresh...

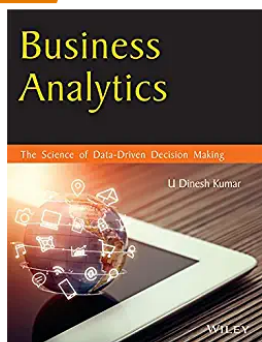
Raman Narasimhan, Amardeep Sibia, Shirsha Ray Chaudhuri, S.R. Vigneshwaran, Dinesh Kumar Unnikrishnan Jan 2018 • 11 p •
IMB653-PDF-ENG • English • Supplemental materials

iD Fresh Food (India) Private Ltd., is a leading ready-to-cook and eat packaged food company serving several cities in India. The company...

The books authored by Prof. Dinesh Kumar titled, “Business Analytics– The Science of Data Driven Decision Making”, published by Wiley in 2017 and “Machine Learning Using Python” are Amazon Best Seller.

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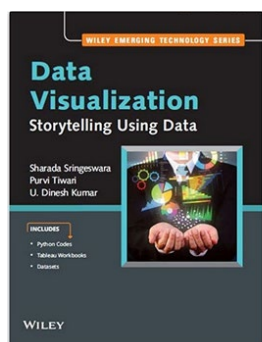
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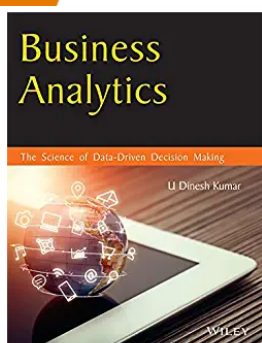
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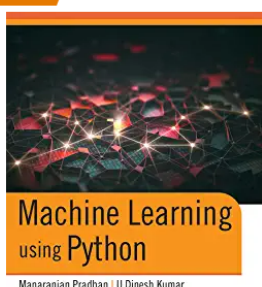
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BAI Batch 14 (2023-2024) Programme Schedule

	Modules	Dates	#Days	No of Sessions	Venue
1	Foundations of Data Science: Data Visualization and Interpretation	24-29 July 2023 (Monday-Saturday)	6	30	IIMB Campus
2	Storytelling through data	11-12 August 2023 (Friday-Saturday)	2	10	Hybrid Mode
3	ML: Supervised Learning Algorithms	21-25 August 2023 (Monday-Friday)	5	25	Hybrid Mode
4	Optimization Analytics (Prescriptive Analytics)	22-23 September 2023 (Friday- Saturday)	2	10	Hybrid Mode
		6 -7 October 2023 (Friday- Saturday)	2	10	Hybrid Mode
5	Stochastic Models (Reinforcement Learning Algorithms)	27 - 28 October 2023 (Friday-Saturday)	2	10	Hybrid Mode
		10 - 11 November 2023 (Friday-Saturday)	2	10	Hybrid Mode
6	ML: Unsupervised Learning Algorithms	24 - 25 November 2023 (Friday-Saturday)	2	10	Hybrid Mode
7	Time Series Data and Forecasting	8 - 9 December 2023 (Friday- Saturday)	2	10	Hybrid Mode
8	Supply chain analytics	22 - 23 December 2023 (Friday-Saturday)	2	10	Hybrid Mode
9	ML: Advanced Machine Learning	12 - 14 January 2024 (Friday-Sunday)	3	15	Hybrid Mode
10	Big Data Analytics	26-27 January 2024 (Friday- Saturday)	2	10	Hybrid Mode
11	Artificial Intelligence and Deep Learning	9-10 February 2024 (Friday - Saturday)	2	10	Hybrid Mode
		23-24 February 2024 (Friday - Saturday)	2	10	Hybrid Mode
12	Natural Language Processing	8-9 March 2024 (Friday - Saturday)	2	10	Hybrid Mode
13	ML Operations and Explainable AI	22-24 March 2024 (Friday-Sunday)	3	15	IIMB Campus
14	AI in practice	5-6 April 2024 (Friday - Saturday)	2	10	IIMB Campus

Programme Delivery

The programme will be conducted live in the classrooms at IIMB. The sessions will be beamed instantaneously in India and abroad through Webex using video conferencing facilities that allows a large number of geographically dispersed participants to participate in highly interactive sessions with the faculty. The system incorporates two-way data and audio-video interactivity.

Programme Fee

Rs. 7,75,000/- + GST (as applicable) per participant. The fee is payable in three installments as per indicated schedule. The payment schedule is as follows:

Rs. 1,00,000/- + GST	Confirmation Fee
Rs. 2,45,000/- + GST	I installment on or before July 9, 2023
Rs. 2,15,000/- + GST	II installment on or before October 1, 2023
Rs. 2,15,000/- + GST	III installment on or before December 31, 2023



The BAI course bridges the gap between knowledge and application. The content is highly structured and precise, right from data visualization to optimization and to advanced machine learning techniques. This is the right time to step into the limitless world of data with the help of the IIMB BAI Programme.

Anshul Garg (BAI 7)

Principal Data Scientist, Cimpres India

Please Note: *Please add GST at prevailing rates to the programme fee.

Award of Certificate

A certificate of completion will be awarded by IIMB to the participants at the end of the programme upon successful completion of the programme satisfying the programme requirements.

Other Awards: Best Project Awards, High Recommended Project Awards, Best Academic Performance Awards

Alumni

Successful completion of the programme also entitles participants to be admitted to IIMB EEP Alumni Association.

Important Dates

Application Deadline:

Early Decision - Friday, 28 April 2023

Regular Decision - Friday, 26 May 2023

Online Test:

Early Decision : Saturday , 6 May 2023

Regular Decision: Saturday , 3 June 2023

Announcement of Early Decision:

Monday, 13 June 2022

Announcement of Regular Decision:

Monday, 3 July 2023

Course Commencement:

Monday, 24 July 2023

MOOCs

Data Preprocessing and Imputation
(2 days)

Artificial Neural Networks and Deep Learning (8 weeks)

The Indian Institute of Management Bangalore (IIMB) is a leading graduate school of management in Asia. Under the IIM Act of 2017, IIMB is an Institute of National Importance. Established in 1973, IIMB today offers a range of post-graduate and doctoral level courses as well as executive education programmes. With a faculty body from amongst the best universities worldwide, IIMB has emerged as a leader in the area of management research, education and consulting. IIMB's distinctive feature is its strong focus on leadership and entrepreneurial skills that are necessary to succeed in today's dynamic business environment.

IIMB has around 100 full time faculty members, more than 1200 students across various long duration programmes and nearly 6000 annual Executive Education participants.

Post Graduate and Doctoral programmes offered by IIMB

- Doctor of Philosophy (Ph.D.), 5 years, Full-time
- Master of Business Administration (MBA), 2 years, Full-time
- Master of Business Administration (MBA), 1 year, Full-time
- Master of Business Administration (MBA), 2 years, Weekend
- Master of Business Administration (Business Analytics), (MBA (BA)), 2 years, Full-time

Certificate Programmes

- Faculty Development Programmes for teachers in universities and colleges
- Mahatma Gandhi National Fellowship
- N. S. Ramaswamy Pre-doctoral Fellowship

IIMB has obtained the European Quality Improvement System (EQUIS) accreditation awarded by the European Foundation for Management Development (EFMD). IIMB has been ranked No. 2 in the India Rankings 2021 in the Management Education category under National Institutional Ranking Framework (NIRF) by the MHRD.

Executive Education Programmes

The Executive Education engages with the industry through its various Custom and Open enrolment programmes with a view to impart the knowledge and skills necessary to succeed in today's environment. IIMB's Executive Education ranks among the Top 50 Global schools as per Financial Times Executive Education Ranking 2022.

VISION

To be a global, renowned academic institution fostering excellence in management, innovation and entrepreneurship for business, government and society



INDIAN INSTITUTE OF MANAGEMENT BANGALORE
Bannerghatta Road, Bangalore 560 076

Registration

The organizations interested in nominating their employees and individuals interested in the programme may apply online.

Aditi Chaturvedi
Executive Education Programmes
Indian Institute of Management Bangalore
Bannerghatta Road, Bangalore 560 076

Phone: +91 - 80 - 2699 3380
Mobile: +91 - 895 128 1611
Fax: +91 - 80 - 2658 4004
Email: aditi.chaturvedi@iimb.ac.in
Web: www.iimb.ac.in/eep

Participants interested in the programme may contact IIMB at the above-mentioned address for clarifications, if any. Once registration is accepted, cancellation / refund queries and requests will not be entertained.