भारतीय प्रबंध संस्थान कोषिक्कोड
Indian Institute of Management Kozhikode
Globalizing Indian Thought

Agent-Based Modelling For Business Problem Solving

October 17 - 19, 2024

What is the programme about?

How should you design the layout of a retail-store given the fact that ¬¬your revenues depend on which parts of the store is visited by thousands of autonomous customers? Whom should you purchase inputs from so as to minimize the risk of production-disruption due to sudden non-availability of inputs? Suppose you have decided to enter a new market, is there a way to simulate how existing firms might respond to your product and pricing strategy? Why do employee bonuses sometimes reduce productivity? How would you estimate the tail risk of your assets, i.e. the risks associated with the occurrence of extreme events? How can you estimate the revenues from a toll-road before building it? And why did NASDAQ's decision to reduce the 'size of ticks' generate an increase in the spread between bids and asks? These are some of the many questions that traditional approaches such as spreadsheet analysis, regression analysis, and systems-dynamics models find difficult to answer. Which is why many companies including Macy's, Société Générale, and Hewlett-Packard have turned to agent-based modelling. Agent-based modelling, or ABM for short, is a technique which allows us to build virtual stores, organizations, supply-chains, stock markets, and even complete economies in silicio. These virtual organizations and economies are populated with artificial "agents" whose behavior is calibrated using real world data. The "artificial agents" may be customers walking into a store, employees, creditors, suppliers of inputs, or competitors. Once an agent-based model is constructed and calibrated to granular real world data, these virtual worlds are used as testbeds to formulate optimal decisions. For instance, in a model of customer movement within a retail store, we can run millions of experiments with different store layouts. In a model of supply-chain risk, we can run many experiments that study the consequences of the shutdown of critical input-suppliers. Agent-based modelling therefore is a state-of-the-art tool for making intelligence business decisions. As Eric Bonabeau put it in his Harvard Business Review article titled Predicting the Unpredictable, agent-based modelling "could completely revolutionize certain fields". This course intends to put you at the forefront of the revolution by teaching you what agent-based models are, how to build them, and how to effectively use them to solve your business problems. Familiarity with Python or another general purpose programming language is a required for this programme.

What are the learning outcomes?

(1) You will learn what agent-based models are and why they are useful

(2) You will learn how to build agent-based models

(3) You will learn how to calibrate agent-based models to real world data

(4) You will learn about real-world applications of agents-based models across a variety of domains including operations, strategy, pricing, and finance

(5) You will learn about software tools and other resources that are useful to build agent-based models at your place of work

Who should apply?

(1) Analysts who would like to use cutting-edge tools that go well beyond spreadsheets and regression analysis
(2) Operations managers who would like to build models to access supply-chain risks
(3) Bankers and banking-managers who would like to develop granular models of risk assessment
(4) Consultants and entrepreneurs who would like to offer agent-based modeling services to their clients across a variety of domains
(5) Engineers and coders would like to leverage their computing skills to deliver novel business solutions

What are the modules?

Day 1
I – Emergence and complexity
II – What are agent-based models?
III – Some real-world business applications of agent-based models
IV – Python for agent-based modeling

Day 2
I – Accessing supply chain risks using agent-based models: A model of the COVID lockdowns
II – Accessing financial risks using agent-based models
III – Build your first agent-based model
IV - Agent-based models with "intelligent agents"

Day 3
I – Calibrating your model to real world data
II - "Understanding our own creations": analyzing the data generated by agent-based models
III - Hardware and software required to develop agent-based models
IV – The Big Picture

Facilitator:

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Programme Fee:
Rs. 50000 (Residential),
Rs. 40000 (Non-Residential) + GST @ 18%

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