Indian Institute of Management Bangalore

GNAM October 17-21, 2022

Artificial Intelligence and Applications for Managers

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Introduction

In 2021, PwC surveyed 1000+ managers from companies across the world about their adoption of AI: 50% said they have already adopted AI or have developed strong application cases, and over 90% are involved with AI in some manner. Most were convinced that AI was needed for better customer experience, process innovation, better decision making, reducing costs, and improving efficiency.

These surveys underscore the widespread and massive interest in AI that currently suffuses the business landscape. AI technologies now pervade our lives – from question answering systems on mobile phones and home speakers, to online recommendation engines, to medical diagnosis systems and automatic translators. News outlets are replete with articles about new uses of AI, and also the challenges that AI is likely to pose in the future, related to changes in job profiles, competitiveness of firms, skills required and the prospects of machine domination.

The objective of this course is to understand the field of AI from the perspective of a manager. The idea is to understand AI and the impact it has on managers and firms, the nature of automation in organisations, and the future of competition in digital enterprises. The course overviews the development of AI over the decades and ways in which machine intelligence is viewed and conceived. The focus is on basic concepts and approaches, rather than on the details of the technology. Many of these technologies are used in disciplines such as Analytics, Data Science, Knowledge Discovery and Machine Learning. This course also examines the economic and social impact of AI, with a view to understanding developments and disruptions in the future.

Course Objectives
1. Understand what is AI and where the field currently stands (also know what is not AI).
2. Have an idea of how AI is shaping business practice and competition.
3. Understand AI from a historical perspective: how the field has evolved and why certain methods have become practical and useful.
4. Understand the basic concepts of Representation and Search and how they are at the heart of AI.
5. Understand autonomy in systems.
6. Understand the basic concepts of neural networks and deep learning, their applications and their limitations. Also, understand how they can be deployed within organisations.
7. Analyse and understand cases of organisations building AI for commercial deployment.
8. Understand the ethics of using AI systems.

Textbook
Artificial Intelligence: A Guide for Thinking Humans, Melanie Mitchell, Pelican Books, 2019.

Grading and Assessment
The course grade will be based on class participation and group presentations (50% each).

Session Plan

During the GNAM week, 17-21 October, 2022, the topics will be covered over 5 days, with 4 sessions a day. The fourth day, Thursday, will have field visits. Participants are expected to read the assigned readings in advance.

Note: Some sessions may be re-arranged to accommodate logistical contingencies.

Session	Coverage
1. Introduction to AI Reading: 1. "The Business of Artificial Intelligence: What it Can—and Cannot—Do for Your Organization." Brynjolfsson, Erik and Andrew McAfee. *Harvard Business Review*, July 2017.	Overview of Course AI today - Business of AI
2. Digital Transformation with AI Reading: TBD	Implementation of AI in organisations
3. AI Today Reading: "Competing in the Age of AI", Iansiti, M., & Lakhani, K. R. *Harvard Business Review*, 2020. "The Simple Economics of Machine Intelligence", Agrawal, A., Gans, J. and Goldfarb, A. *Harvard Business Review*, 2016.	Competing with AI AI as Prediction machines Regulating AI
4. Case Analysis: AI Product HBS Case - Feeling Machines: Emotion AI at Affectiva	Developing a market for an AI product
5. Origins of AI History of AI Reading: Text: Chapters 1-3.	AI History - Origins of automation and AI - Human vs Rational approaches Cognitive Approaches - Turing's main argument
6. Symbolic Processing and Search; Expert Systems	Search - Search and Representation - Waterjug problem - Kinds of Search Expert Systems
7. Autonomous Agents and Robotics Reading:	Autonomous Agents - Agent design - Meaning of autonomy Autonomous agents and Human-

"Collaborative Intelligence: Humans and AI are joining forces" by Wilson and Daugherty, *HBR*, 2018.	Machine Interactions
8. Machine Learning; Neural Networks basics	Overview of Machine Learning - Data, Training Strategy Neural networks - basic theory
9. Neural Networks and Deep Learning Reading: Text: Chapters 4-5. Additional Reading:	NNs - Backpropagation Deep learning - Convolutional networks - Recurrent NNs
10. Deep Learning Applications	Neural networks Deep learning Generative Adversarial Networks (GANs)
11. Natural Language Processing Reading: Text: Chapters 11-12.	Word Embeddings Meaning and semantic comparison Chatbots
12. Reinforcement learning Required Reading: Text: Chapter 8-9.	Reinforcement Learning - Q-learning – Simple example
13-14. AI Product Field Visit	
15-16. AI Startup Field Visit	
17. Evolutionary Systems: Genetic Algorithms	Genetic Algorithms - Basic idea Example of GA – Touring Salesman problem
18. Machine learning – other methods	Decision Trees; Random Forests Analogical Reasoning Ant Colony Optimisation

19. AI and Ethics Required Reading: Text: Chapters 6-7, 16.	AI and Ethics - Algorithmic Bias - Explainability - Trolley problems AI and Future of Work - Jobs at risk
20. Student presentations	Student presentations

Additional Readings

"Special Issue Editorial: AI in Organizations: Current State and Future Opportunities" Benbya, H., Davenport, T.H., and Pachidi, S., *MIS Executive*, Dec 2020.

LeCun, Y., Bengio, Y. and Hinton, G. "Deep Learning," *Nature*, Vol 521, pp. 436-444, 2015.

Schuetzler, R. M., Grimes, G. M., Giboney, J. S., & Rosser, H. K. (2021). Deciding Whether and How to Deploy Chatbots. *MIS Quarterly Executive*, 20(1).

Yang, J., Chesbrough, H., & Hurmelinna-Laukkanen, P. (2021). How to appropriate value from general-purpose technology by applying open innovation. *California Management Review,* 64(3): 24-48.

"The Ant System: Optimization by a colony of cooperating ants" by Dorigo, Maniezzo, Colorni, *IEEE Sys Man & Cybernetics*, 1996.