

Emerging AI and ML Capabilities

Enabling the Informed Manager and Analyst

About This Course

The Emerging Need for Better Manager and Analyst Insight

The key use of the new and emerging analytics is for both programmed and on demand analytics. The role of AI/ML today is increasing in significance and value. Also, the rate of change of AI/ML exceeds that of other technologies impacting the ranking of which AI/ML options to choose for a project. Keeping up with the changes and the new opportunities they provide is a key need of managers and professionals.

Recent advances in AI/ML analytics provide better insight into the information that managers and analysts rely on when making better decisions. The use of machine learning analytics by managers is best enabled when managers and business analysts have access to AI/ML knowledge, methods, techniques, and tools easy to use.



Better Insight – A key need for the manager and analyst of the future

Use of AI/ML provides insight adding to core value of the organization. Managers and analysts, especially business analysts need three things to integrate AI/ML into their organizations:

1. A strong awareness of the AI/ML capabilities and technologies so they can understand developers, consultants, and vendors
2. A clear understanding of how to match AI/ML capabilities to the organization on the strategic, tactical, and operational levels. This requires some new business analysis skills
3. Knowledge about the issues in the business management of an AI/ML project portfolio



Machine learning value in Decision Making productivity

This course is about increasing the skills of managers and analysts to understand AI/ML enough to assure success in blending AI/ML into the organization. Improvements in artificial intelligence, neural nets, and machine learning now provide managers and analysts with this insight. Once the realm of data scientists, analytic tools are now available with templates that enable easy insight into future direction.

Emerging AI and ML Capabilities

Understanding The Value of AI/ML Efforts

Day One

The Artificial Intelligence and Machine Learning Approach

There is explosive growth in the discipline of machine learning. What is missing is the clear linkage between opportunities and problems in the organization. Machine learning solutions can resolve problems and capture the benefit of an opportunity. The results should help with the everyday decisions the organization makes. The focus today is applying AI/ML techniques to situations that provide operational as well as strategic insight value.

Section 1: The Organization of Artificial Intelligence and Machine Learning space

- The relationship of AI and ML
- Machine Learning Today –Is About Data, Algorithms and Prediction
- Types of ML
 - *Supervised, unsupervised and reinforcement*
- Categories of ML, Traditional and Emerging
- The ML value proposition
- Issues with ML, Bias, and Reliable Forecasting

Video – Understanding Machine Learning

Working Session: What ML projects do you have or need today?

Section 2 – The AI/ML implementation space

- The machine learning business road map
- What AI/ML Technology is available?
 - *The ML methodology today*
 - *Data preparation and Model Building*
 - *Application development needs*
 - *Emerging Hardware technologies e.g. CPU/GPU/TPU*
 - *Machine Learning Operations (MLOps) the development environment*
- *Video and Discussion: Machine Learning Today*

Section 3 – Business needs and the technology relationship

- Mapping organization needs to technology
- Defining ML Projects
- The machine learning project portfolio
- Prioritizing needs – the ML project portfolio
- Evaluation and ranking of alternatives

Exercise: The Needs versus Technology Matrix.

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Day Two

Theme: ML Analytics for Managers and Analysts

The key use of machine learning analytics today is for programmed or on demand analytic needs such as decision support. The most familiar machine learning analytics that managers and analysts use are those coming from statistics. Statistical techniques look for patterns in data. They give you averages, ranges, correlation, regression and of course capability for drill-down. But they have limitations. What they do not give you are analytics for insight into why something is happening.

Section 4: The Most Common ML for Prediction: Statistical

- What are some core predictive techniques?
 - *Trends, Correlation, regression, and correlation matrices*
- Uses of correlation
- Regression and trending
- Correlation matrices and ranking opportunities
- The linearity issue with trends

Exercise – Correlation, Regression, and trends

Section 5: Supervised, Unsupervised and Semi Supervised Learning

- Why over 100 ML statistical algorithms?
- What do we mean by supervision?
- How does this work?
- Issues in these types of algorithms
- Unsupervised learning – the cluster analysis

Exercise and Demo – Building and Interpreting a Correlation Matrix

Section 6: Reinforcement Learning

- The reinforcement learning cycle
- Agent ideas
- Environments
- Actions and rewards
- Applications of reinforcement learning

Video and Discussion – Reinforcement Learning

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Day Three

Theme: NN and Deep Learning

Neural nets use data sets ranging from small data sets (hundreds or thousands of rows) to big data (millions or billions of rows). Many problems that relate to decisions deal with small to medium data set sizes, usually up to a few thousand rows of the most recent data. The more features and objectives you have as input the more rows you need to predict something. Today, **a new age of machine learning** is emerging with the use of Large Language Models (LLM) and neural nets.

Section 7 – Linear Neural Net Algorithms

- Linear neural net structure
- A key purpose of linear nets – Influence of features
- Using driver diagrams to identify the features
 - Example - Property analysis of projects
- Using linear NN tools
- Small data sets and *genetic* algorithms

Working Session: NN Video – How does a neural net work?

Section 8 – Deep Learning and Transformation Architecture

- Two most common neural net types:
 - *Recurrent neural Nets, Convolution neural nets*
- Transformation Architecture for learning
- Deep learning net structure
- The neural and pooling layers
- The value/risk proposition
- *Exercise: List 3 potential applications of Deep Learning*

Section 9 – Emerging Deep Learning Approaches – The New ML

- Semantic machine learning and Large Language Models (LLM)
- What are LLMs all about?
 - The foundation model
 - The NN algorithm
- Multi Modal and the nine types of LLM today
- The ‘truth’ issue with Chat GPT and other LLM applications
- The emerging use of *Chaos theory* in machine learning

Video and Discussion:

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Day Four

The current hot topic today is the emergence of generative AI, particularly the popularity of Chat GPT. Generative AI can modify a picture, write a document, write some music based on a theme, modify a work of art transforming it into something different and so on. This is different from creating something completely new. So what is its value and use?

Theme – The Generative AI Revolution

Section 10: What is Generative AI

- It Started with Chatbots and Text analytics
- The Generative AI Concept
- Generative AI
 - Foundation models
 - Language, Custom, Focused and other models
 - Algorithms that drive generative AI – The transport model
- Example - Chat GPT (General Purpose Transport)
- Issues with scaling up the generative apps
 - *Costs, size, complexity, scope, impact, skills, risk*

Exercise and Discussion – What are your content opportunities?

Section 11 – Key Generative AI Tools – The Enterprise-Wide View

- The primary use is for information discovery
- The key players today:
 - ChatGPT
 - MS CoPilot
 - Google Gemini and Bard
 - IBM – Watsonx
- Complementary Analytic Technology for Decision support
- Example – Collaboration and Gen AI

Interactive Discussion – How would you use Gen AI ?

Section 12 - Applications of Generative AI and ML content Methods

- What is the best use of generative AI today?
- Content development, marketing, research
- Summarization of large volumes of text
- Process augmentation and Generative AI
 - *Financial, Retail, Healthcare, Manufacturing, Government*

Interactive Discussion – Identify Uses of Generative AI

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Day Five

Theme – The Data Side of Machine Learning

A key part of machine learning is knowing what kind of data is used, where it comes from, how much data to use and what preparation it takes for the algorithm of choice. How much semantic data do you need for a semantic algorithm such as large language models? Are you doing large scale analysis with millions of rows or large collections of text, objects, voice, and video? Are you doing facial, license plate or object recognition? A key part of the data side is understanding the sourcing of data and the format.

Section 13 – Current data Sources

- *Transaction data and history*
 - Historical and operational data
 - Big data and small data
- *Aggregate data – E. G. Business Intelligences*
 - The data warehouse
 - Analytic workflows
 - Dashboards

Video and Discussion: Data Analysis and Machine Learning

Working Session: What operational measures are Important??

Section 14 - Emerging Data Sources:

- *Streaming Data*
 - Streaming technology
 - Usage of streaming data
- *Meta Data*
 - The idea of meta data
 - Sourcing meta data – e.g., Social Data
 - Using meta data in marketing

Video and Topic Discussion – Uses of Meta Data

Section 15 – Important Format and Structure Issues with Data Sources:

- *Too much, Not enough, and Incomplete data*
- *Poor quality (noisy)*
- *Incorrect or unusable format*
- *Bias in the data*

Course Questions and Wrap

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Learning Objectives

The managers and analysts who attend this course can expect to learn how to use the most recent developments in management analytics.

- Describe the key machine learning analytics in use today.
- Explain how 'easy to use' analytics can help gain insight to problems
- Applying ML analytics to identify performance issues
- Identify when to use specific ML analytics for organization performance
- Know when to apply the ML analytics in operations
- Verify that the ML analytic is providing management insight
- Comparing the results of multiple ML analytic types
- Using analytics to predict what might happen next

This professional training session provides hands-on and conceptual skill-oriented working knowledge of the ML analytic techniques that managers and analysts should consider and use. The learning approach uses discussions, interactive participation, videos, demonstrations, that focus on outcomes that lead to results success. Participants can apply this learning as soon as they get back to their office.

ML analytics typically support multiple needs of the manager and analysts such as: Decision making, Process improvement, Process consolidation, Organizational change, Hiring needs, Performance analysis, Financial analysis, Predictive and Diagnostic analysis, Traditional data analysis, Organization alignment, and more.

Who should attend?

Managers, Process Analysts, Business Analysts, Managers, Professionals, IT Specialists, IT and Business Architects.

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