

## Applied AI & Machine Learning- Development

### Course Summary

#### Description

This is the only class of its kind that places analytic model development directly in the context of a broader enterprise-level implementation framework. This Model Development course is not just about the mechanics of building a predictive model – it's about building models that drive tangible, measurable results for the direct benefit of the organization.

Attendees will directly experience the natural messiness and realities of organizational analytic implementation through work-along labs and guided discussions that build upon a highly realistic overall project. No other course conveys this level of knowledge transfer, experiential engagement and skill reinforcement.

Organizations now contain so much data that it has become very difficult to understand just what that data can tell us. All this data has meaning for making better prospective organizational decisions and anticipating customer needs and preferences. But how do you discover those needs and preferences within data stores that contain endless amounts of seemingly incomprehensible numbers and facts? Predictive analytics can do just that.

Only predictive analytics can transform the rapidly growing mass of inert data into actionable information assets. These assets can be leveraged for measurable gain through improved and automated decision-making. The practitioners who develop these transformative skills will be the leaders in their field.

The intent of this course is to present participants with

- An understanding of how various methods and tools apply to different kinds of data-intensive problems
- Techniques to overcome limitations that frequently cause predictive models to under-perform
- A roadmap for model-building that addresses the unique dynamics inherent in larger organizations
- Effective ways to translate model accuracy into performance metrics valued by the organization

This course does not restrict or skew the presentation of machine learning methods through a single product. Rather, it gives broad consideration of predictive analytics from a purely vendor-neutral perspective.

Live modeling demonstrations will precede follow-along exercises. Participants will directly experience the natural messiness of data mining to discover what really works, as well as what doesn't and why. The instructor will show how to evaluate various features and available products based upon strengths, limitations, function, value, and general performance. This course, like no other, insists upon making predictive analytics purposeful, measurable, and actionable in a larger and more complex organizational setting.

#### Objectives

After taking this course, students will be able to:

- Apply a formal process for data preparation, model development and validation of results
- Recognize and avoid common, costly pitfalls in data preparation, method selection and results interpretation
- Ensure that your model is adequately generalized and has not memorized the training set
- Take an incremental low-risk / high-impact approach to model development with vendor-neutral tool exposure
- Better understand trade-offs between model accuracy and explainability when selecting modeling methods
- Guide your IT staff to build an analytics sandbox for rapid model development and minimal IT dependency
- Proceed confidently with the formal process, session files, and direct experience gained through follow-along labs, guided discussion and team engagement

#### Topics

- Core Concepts
- Model Development Introduction
- The Tasks of the Model Phase
- Wrap-up and Next Steps

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### **Course Summary (cont'd)**

#### **Audience**

This course is designed for:

- Data Scientists: who desire to extend their analytical toolbox with formal process and methodological practice at the organizational level
- Functional Analytic Practitioners: Customer Relationship Managers, Risk Analysts, Business Forecasters, Statistical Analysts, Social Media and Web Data Analysts, Fraud Detection Analysts, Audit Selection Managers, Direct Marketing Analysts, Medical Diagnostic Analysts, Market Timers who desire to lead their teams and initiatives with greater functional confidence
- Big Data Analysts: who are under increasing pressure to transform their deluge of data from a liability to an asset
- Project Leaders: who want to gain a stronger command of predictive modeling methods and techniques to better manage and interact with practitioners
- Business Analysts: who must develop and interpret the models, communicate the results and make actionable recommendations
- IT Professionals: who wish to gain a better understanding of the data preparation, analytics and analytic sandbox development requirements to more fully support the growing demand for analytic IT support
- Anyone Overwhelmed with Data and Starved for Actionable Insights

#### **Prerequisites**

While this course is designed to be taken independently, it is helpful to understand its place and function within the overall 'The Predictive Analytics Operation' comprehensive course.

Prior education or experience in analytics or statistics is helpful, but not required. Those seeking a deep drill-down into the mathematical or theoretical underpinnings of machine learning algorithms should refer to available academic or on-demand online offerings. The analytic algorithms in this course are actively demonstrated and conveyed from a functional perspective.

Registrants will be required to view a three-hour online "Core Concepts" orientation prior to attending this event. Access details for the Core Concepts orientation will be shared with participants prior to the start of the course.

Participants need only supply a laptop computer with Microsoft Excel. Instructions on how to download lab data and any analytic tools will be provided in a preparatory email. The instructor can assist attendees with any preparation during breaks, and before or after class.

#### **Duration**

Two days

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### Course Outline

- I. **Core Concepts**
  - A. Prerequisite Three-Hour Preparatory Orientation
  - B. View the full Core Concepts Topic Outline
  - (3) Naïve Bayes Classification
  - (4) Support Vector Machines
  - (5) Decision Trees
  - (6) Ensemble Methods
- II. **Model Development Introduction**
  - A. Current Trends in Analytic Modeling, Data Mining and Machine Learning
    - 1. Algorithms in the News: Deep Learning
    - 2. The Modeling Software Landscape
    - 3. The Rise of R and Python: The Impact on Modeling and Deployment
    - 4. Do I Need to Know About Statistics to Build Predictive Models?
  - B. Strategic and Tactical Considerations in Choosing a Modeling Algorithm
    - 1. What is an Algorithm?
    - 2. Is a "Black Box" Algorithm an Option for Me?
  - 2. Value Estimation and Regression
  - 3. Clustering
  - 4. Association Rules
  - 5. Other Modeling Techniques
    - a) Times Series
    - b) Text Mining
    - c) Factor Analysis
  - D. Model Assessment
    - 1. Evaluate Model Results
      - a) Check Plausibility
      - b) Check Reliability
    - 2. Model Accuracy and Stability
    - 3. Lift and Gains Charts
  - E. Modeling Demonstration
    - 1. Assess Model Viability
    - 2. Select Final Models
  - F. Why Accuracy and Stability are Not Enough
  - G. What to Look for in Model Performance
  - H. Exercise Breakout Session
    - 1. Create & Document Modeling Plan
    - 2. Determine Readiness for Deployment
  - I. What are Potential Deployment Challenges for Each Candidate Model?
  - J. Exercise Breakout Session and Guided Project Discussion
- III. **The Tasks of the Model Phase**
  - A. Generate Test Design
    - 1. Train-Test Validation
    - 2. Accept or Reject Modeling Parameters
    - 3. Test / Test / Validate
  - B. Optimizing Data for Different Algorithms
  - C. Build Models
    - 1. Classification
      - a) Issues Unique to Classification Problems
      - b) Why Classification Projects are So Common
      - c) An Overview of Classification Algorithms
        - (1) Logistic Regression
        - (2) Neural Networks
- IV. **Wrap-up and Next Steps**
  - A. Supplementary Materials and Resources
  - B. Conferences and Communities
  - C. Get Started on a Project!
  - D. Options for Implementation Oversight and Collaborative Development