Cognitive Intelligence for Big Data

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Agenda

• IBM Research (WATSON)

• Translation of Domain Knowledge

• Goals
  – Industrial Sectors
  – Industrial Translation
  – Domain Areas
  – Decision Trees
  – Big Data Requirements
Goals

• Improve production thru recovery of domain knowledge that can be used for machine learning
• Define approach to structure data sets so they can be rapidly used to reveal information
• Provide a means that is extensible and adapts to changes including minimization of storage and transport of information
Translation of Domain Knowledge

• Industrial control
• Many years of experience
• Domain experts in many cases is limited
• Artificial Intelligence has been applied where it was difficult to control a process
  – Expert System
  – Fuzzy Logic
  – Neural Networks
Industrial Sectors

• Metals and Mining
  – Cement Manufacturing
• Power
  – Long Distance Power Lines use of Synchrophasors
  – Smart Grid
• Chemicals
• Food
  – Organics
• Pharmaceutical
• Manufacturing
Industrial Translation

• The following areas require domain knowledge:
  – First Principles Modeling (Conceptual Design)
  – Startup/Shutdown
  – Process disturbances
  – Emergency considerations
  – Safety considerations
  – Security considerations
  – Environmental monitoring and reporting
  – Shifts in quality of materials
  – Equipment outages and scheduling
  – Changes in company policy
Domain Areas

- Process Engineering
- Operations
- Quality Control
- Environmental
  - EPA
- Project Management
  - Planning
- Executive Management
  - Corporate
Decision Trees

- Shifts to age of equipment
- Shifts in production requirements
  - Types of products
- Shift in environmental changes
  - Weather (rain, snow, wind, cold, heat)
- Shifts that may effect energy consumption
Big Data Requirements

• Different protocols used to collect data
  – Conversion of data sets into a common format
• Unique identification of domain knowledge
  – Collected data may mean something different
• Metadata definition of Relationships
  – XML
• Transport protocol with built-in Security
  – XMPP (Instant Sensor Messaging) to provide alerts and notifications to users including mobile devices
Thank You

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