



AI Fundamentals: An Introduction to Artificial Intelligence

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Module 0. About the Course (6 min)

Module 1. AI In Everyday Life (48 min)

- Introduction
- Ubiquitous AI is the “New Normal”
- Great Benefits of AI Across Industries
- AI In Everyday Life
 - AI’s Immense Impact on Our Daily Lives
 - Emma’s Daily Routine
 - 6:30 AM Wake-up
 - 6:35 AM Brush Teeth
 - 6:40 AM Morning Run
 - 7:15 AM Breakfast and News
 - 7:30 AM Get Ready for Work
 - Speech Recognition to the Rescue
 - 7:44 AM Check on Pet at Home
 - 7:45 AM Commute Work
 - Smart Home Applications
 - 8:30 AM Checking E-Mail
 - 11:15 AM Meeting Request
 - 1:30 PM Call from the Bank
 - 3:00 PM Smart Home Message
 - 6:30 PM Dinner
 - Social Network Applications
 - Pinterest – Improved Content Delivery
 - 8:00 PM Relax with a Good Movie
 - Machine Learning Driven Recommendations
 - Additional Interesting AI Applications

Module 2. AI Introduction (44 min)

- What is AI?
- Artificial Intelligence in Real Life
- AI Popularity
- What Drives AI Popularity?
- AI is Enjoying Significant Hype and Investment
- Definition of AI
 - What is Artificial Intelligence?
 - What is AI?
 - What is Intelligence?
 - Intelligence Components
 - AI Definitions
 - Other AI Definitions
 - What is Artificial Intelligence? Parts 1 & 2
- AI Purpose and Goals
 - The Purpose of AI
 - Goals of AI
 - Examples
 - Branches of AI
 - Applications of AI
 - Real AI



- Short History of AI
 - AI History Parts 1-3
 - Modern AI
- The Foundations of AI
 - The Foundations of AI Parts 1 & 2
 - AI Topics

Module 3. Intelligent Systems (44 min)

- What is Intelligence Composed Of?
- What AI Should be Able to Do?
- Types of AI Systems: Parts 1 & 2
- Act Rationally/Act Like a Human
- Systems that Act Like Humans
 - Testing for Human Behavior
 - Act Like Humans?
 - Example of Imitation Game
 - Computer Passes the Turing Test
 - AI Disciplines
 - The Total Turing Test
 - Turing Test on Unsuspecting Judges
 - Eliza
 - What Is/Was Eliza?
- Systems that Think and Act Rationally
 - Systems that Think Rationally
 - Human Vs. Machine Intelligence
 - Systems that Act Rationally
 - “Rational Agent” Components
- Systems that Act Rationally
 - Advantages
 - Rational Agents
 - Intelligence Agent Structure
 - Types of Intelligence Agents
 - Simple Reflex Agent
 - Condition Action Rule
 - Model-Based Reflex Agent
 - Goal Based Agent
 - Utility Based Agent
 - Learning Agents
 - Environments
 - Environments Characteristics

Module 4. Search (50 min)

- Search Algorithms
 - Search
 - Blind vs. Heuristic Strategies
 - Search
 - Search: Game Theory
 - Search Terminology
 - Many Search Strategies
 - Informed Heuristic Search



- Local Search Algorithms
- Search Problem
- Basic Search Concepts
- Node Data Structure
- Fringe (Frontier)
- Search Strategies
- Breadth-First Search
 - Breadth-First Strategy: Parts 1 & 2
 - Breadth-First Explores the Layers
 - Evaluation
- Depth-First Strategy
 - Depth-First Strategy
 - Evaluation
- Bidirectional Strategy
- Uniform Cost Search
 - Uniform Cost Strategy
- Comparison of Strategies
- Informed or Heuristic Search
 - Informed or Heuristic Search Strategies
 - Adapted Best-First Search
 - Romania with Step Costs in Km
 - Greedy Best First Search
 - Greedy Best First Search Examples 1-3
 - Properties of a Greedy Best First Search
 - A* Search Parts 1-2
 - A* Search Example Parts 1-2
- Local Search Algorithms
 - Local Search Algorithms
 - Learning Heuristics From Experience
 - Optimization Problems Parts 1 & 2
 - Hill Climbing Parts 1-3
 - Local Beam Search Algorithm
 - Simulated Annealing
 - Traveling Salesman Problem

Module 5. Planning & Expert Systems (35 min)

- Planning
 - Planning
 - Classical Planning Environment
 - Planning Introduction
 - Planning Systems
- Formal Definition of Planning
 - Planning Requirements
 - Planning Output
 - Real-world Planning
- Basic Planning Algorithms
 - Partial-Order Plan vs. Total-Order Plan
 - Wash Dishes: Partial Order
 - Wash Dishes: Total Order
 - Clobbering



- Planning Problems Consideration
 - Search vs. Planning
- Formalizing Planning Problems
 - STRIPS
 - STRIPS Planning System
 - STRIPS Operators
 - A Simple Example – Blocks World
 - Graphical Representation
- Forward Chaining Planning
 - What is Forward Chaining?
 - Blocks World Parts 1 & 2
 - Forward Chaining Example
- Backward Chaining
 - What is Backward Chaining?
 - Backward Chaining Example
 - Forward Chaining
 - Backward Chaining
- Expert Systems
 - What is an Expert System?
 - Expert System Application
 - Expert System Components
 - Expert System User Interface
 - Expert System Application
 - Expert System Limitations

Module 6. Learning (62 min)

- Learning
 - Interacting with the Environment
 - AI, Machine, and Deep Learning
 - Types of Learning
 - Machine Learning Defined
 - Machine Learning Basics
 - Many Machine Learning Algorithms
 - Many Functions
 - Many Learning and Modeling Algorithms
 - From Natural to Artificial Systems
 - Neural Networks
 - Artificial Neuron
 - Activation Function
 - Network Structure
 - About Neural Networks
 - Example Four-Layer Network
 - Training
 - Many Artificial Neural Network Types
 - What is “Backprop”?
- Deep Learning
 - Deep Learning
 - Deep Learning Popularity
- Natural Language Processing
 - Natural Language Processing
 - NLP Components



SC-06 AI Fundamentals

- What is NLP?
- NLP System Components
- NLP Use Cases
- NLU Challenges
- Content Analysis
- Natural Language Recognition
- Watson's Sources of Information
- Robotics
 - Robotics
 - Components
 - Robots Vs. AI
 - Computer Vision
 - Robotics Applications
- Self-Driving Vehicles
- Self-Driving Cars Impact
- AI Issues
- Ethical Issues in AI