



Intro to AI,
Autumn, 2025



Introduction to Artificial Intelligence

Faculty of DS & AI
Autumn semester, 2025

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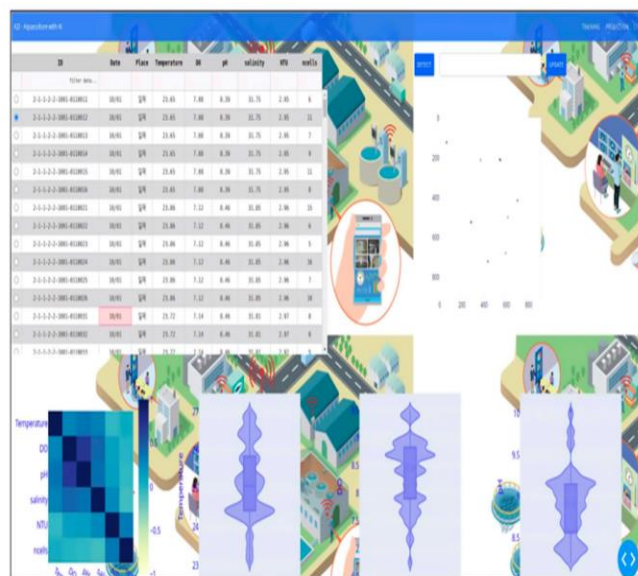
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About

- Bio
 - 02.2025: *PhD., Chonnam National Univ., Korea.*
 - Contact: trongnghia7171@gmail.com or nghiant@neu.edu.vn
- Research Interest
 - Computer vision
 - ML/ AI



Person Re-identification



Smart Aquaculture

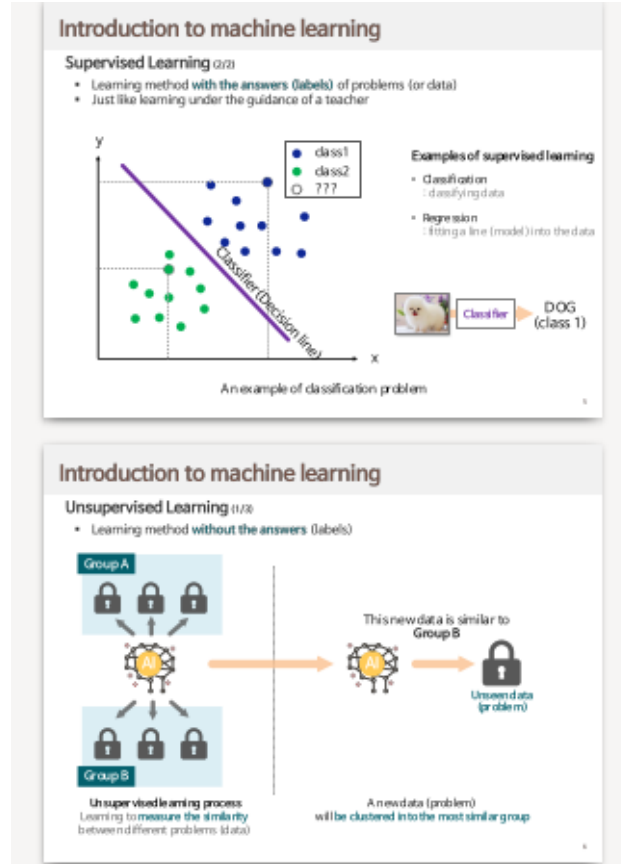
- Time-series analysis



Clinical Emergency
Medicine

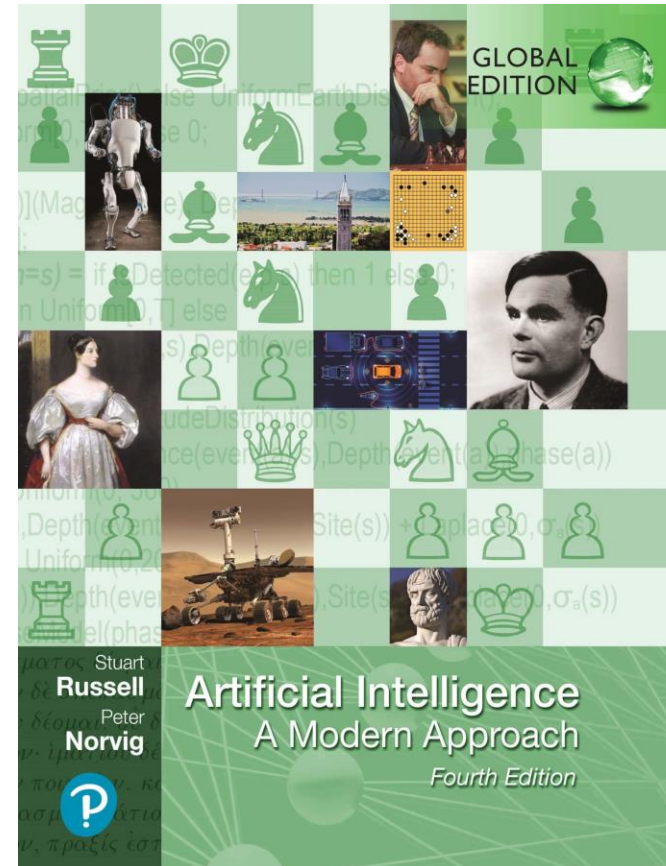
Textbooks

- Main



PPT

- Supplementary



E-book

- This class is...

VIE

ENG

70% English

Lecture Overview

- **Course Introduction**

Objectives & assessment methods

- **What is AI**

Definitions & approaches

- **History of AI**

From 1950 to present

- **Current AI Applications**

Current AI Applications

- **Summary & Next steps**

Summary & Next Steps

Learning Objectives

I Artificial Intelligence

1 Introduction	19
1.1 What Is AI?	19
1.2 The Foundations of Artificial Intelligence	23
1.3 The History of Artificial Intelligence	35
1.4 The State of the Art	45
1.5 Risks and Benefits of AI	49
Summary	52
Bibliographical and Historical Notes	53
2 Intelligent Agents	54
2.1 Agents and Environments	54
2.2 Good Behavior: The Concept of Rationality	57
2.3 The Nature of Environments	60
2.4 The Structure of Agents	65
Summary	78
Bibliographical and Historical Notes	78
II Problem-solving	
3 Solving Problems by Searching	81
3.1 Problem-Solving Agents	81
3.2 Example Problems	84
3.3 Search Algorithms	89
3.4 Uninformed Search Strategies	94
3.5 Informed (Heuristic) Search Strategies	102
3.6 Heuristic Functions	115
Summary	122
Bibliographical and Historical Notes	124
4 Search in Complex Environments	128
4.1 Local Search and Optimization Problems	128
4.2 Local Search in Continuous Spaces	137
4.3 Search with Nondeterministic Actions	140
4.4 Search in Partially Observable Environments	144
4.5 Online Search Agents and Unknown Environments	152
Summary	159
Bibliographical and Historical Notes	160
5 Constraint Satisfaction Problems	164
5.1 Defining Constraint Satisfaction Problems	164
5.2 Constraint Propagation: Inference in CSPs	169

5.3 Backtracking Search for CSPs	175
5.4 Local Search for CSPs	181
5.5 The Structure of Problems	183
Summary	187
Bibliographical and Historical Notes	188
6 Adversarial Search and Games	192
6.1 Game Theory	192
6.2 Optimal Decisions in Games	194
6.3 Heuristic Alpha-Beta Tree Search	202
6.4 Monte Carlo Tree Search	207
6.5 Stochastic Games	210
6.6 Partially Observable Games	214
6.7 Limitations of Game Search Algorithms	219
Summary	220
Bibliographical and Historical Notes	221

III Knowledge, reasoning, and planning

7 Logical Agents	226
7.1 Knowledge-Based Agents	227
7.2 The Wumpus World	228
7.3 Logic	232
7.4 Propositional Logic: A Very Simple Logic	235
7.5 Propositional Theorem Proving	240
7.6 Effective Propositional Model Checking	250
7.7 Agents Based on Propositional Logic	255
Summary	264
Bibliographical and Historical Notes	265
8 First-Order Logic	269
8.1 Representation Revisited	269
8.2 Syntax and Semantics of First-Order Logic	274
8.3 Using First-Order Logic	283
8.4 Knowledge Engineering in First-Order Logic	289
Summary	295
Bibliographical and Historical Notes	296
9 Inference in First-Order Logic	298
9.1 Propositional vs. First-Order Inference	298
9.2 Unification and First-Order Inference	300
9.3 Forward Chaining	304
9.4 Backward Chaining	311
9.5 Resolution	316
Summary	327
Bibliographical and Historical Notes	328

Learning Objectives

10 Knowledge Representation	332
10.1 Ontological Engineering	332
10.2 Categories and Objects	335
10.3 Events	340
10.4 Mental Objects and Modal Logic	344
10.5 Reasoning Systems for Categories	347
10.6 Reasoning with Default Information	351
Summary	355
Bibliographical and Historical Notes	356
11 Automated Planning	362
11.1 Definition of Classical Planning	362
11.2 Algorithms for Classical Planning	366
11.3 Heuristics for Planning	371
11.4 Hierarchical Planning	374
11.5 Planning and Acting in Nondeterministic Domains	383
11.6 Time, Schedules, and Resources	392
11.7 Analysis of Planning Approaches	396
Summary	397
Bibliographical and Historical Notes	398

IV Uncertain knowledge and reasoning

12 Quantifying Uncertainty	403
12.1 Acting under Uncertainty	403
12.2 Basic Probability Notation	406
12.3 Inference Using Full Joint Distributions	413
12.4 Independence	415
12.5 Bayes' Rule and Its Use	417
12.6 Naive Bayes Models	420
12.7 The Wumpus World Revisited	422
Summary	425
Bibliographical and Historical Notes	426

13 Probabilistic Reasoning	430
13.1 Representing Knowledge in an Uncertain Domain	430
13.2 The Semantics of Bayesian Networks	432
13.3 Exact Inference in Bayesian Networks	445
13.4 Approximate Inference for Bayesian Networks	453
13.5 Causal Networks	467
Summary	471
Bibliographical and Historical Notes	472

14 Probabilistic Reasoning over Time	479
14.1 Time and Uncertainty	479
14.2 Inference in Temporal Models	483

18 Probabilistic Programming	64
18.1 Relational Probability Models	64
18.2 Open-Universe Probability Models	64
18.3 Keeping Track of a Complex World	65
18.4 Programs as Probability Models	66
Summary	66
Bibliographical and Historical Notes	66

V Machine Learning

19 Learning from Examples	66
19.1 Forms of Learning	66



Contents

19.2 Supervised Learning	671
19.3 Learning Decision Trees	675
19.4 Model Selection and Optimization	683
19.5 The Theory of Learning	690
19.6 Linear Regression and Classification	694
19.7 Nonparametric Models	704
19.8 Ensemble Learning	714
19.9 Developing Machine Learning Systems	722
Summary	732
Bibliographical and Historical Notes	733

20 Knowledge in Learning	739
20.1 A Logical Formulation of Learning	739
20.2 Knowledge in Learning	747
20.3 Explanation-Based Learning	750
20.4 Learning Using Relevance Information	754
20.5 Inductive Logic Programming	758
Summary	767
Bibliographical and Historical Notes	768

21 Learning Probabilistic Models	772
21.1 Statistical Learning	772
21.2 Learning with Complete Data	775
21.3 Learning with Hidden Variables: The EM Algorithm	788
Summary	797
Bibliographical and Historical Notes	798

22 Deep Learning	801
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19.2 Supervised Learning	671
19.3 Learning Decision Trees	675
19.4 Model Selection and Optimization	683
19.5 The Theory of Learning	690
19.6 Linear Regression and Classification	694
19.7 Nonparametric Models	704
19.8 Ensemble Learning	714
19.9 Developing Machine Learning Systems	722
Summary	732
Bibliographical and Historical Notes	733

20 Knowledge in Learning	739
20.1 A Logical Formulation of Learning	739
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20.3 Explanation-Based Learning	750
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20.5 Inductive Logic Programming	758
Summary	767
Bibliographical and Historical Notes	768

21 Learning Probabilistic Models	772
21.1 Statistical Learning	772
21.2 Learning with Complete Data	775
21.3 Learning with Hidden Variables: The EM Algorithm	788
Summary	797
Bibliographical and Historical Notes	798

22 Deep Learning	801
22.1 Simple Feedforward Networks	802
22.2 Computation Graphs for Deep Learning	807
22.3 Convolutional Networks	811
22.4 Learning Algorithms	816
22.5 Generalization	819
22.6 Recurrent Neural Networks	823
22.7 Unsupervised Learning and Transfer Learning	826
22.8 Applications	833
Summary	835
Bibliographical and Historical Notes	836

23 Reinforcement Learning	840
23.1 Learning from Rewards	840
23.2 Passive Reinforcement Learning	842
23.3 Active Reinforcement Learning	848
23.4 Generalization in Reinforcement Learning	854
23.5 Policy Search	861
23.6 Apprenticeship and Inverse Reinforcement Learning	863

Assessment Methods

- Class Participation: 30%

Homework, group presentation, etc.

- Midterm Exam: 30%

Could be project (flexible)

- Final Exam: 40%

Focus knowledge

Lecture Overview

- Course Introduction
Objectives & assessment methods
- What is AI
Definitions & approaches
- History of AI
From 1950 to present
- Current AI Applications
Current AI Applications
- Summary & Next steps
Summary & Next Steps

What is Artificial Intelligence?

"Artificial Intelligence is the study of how to make computers do things at which, at the moment, people are better."

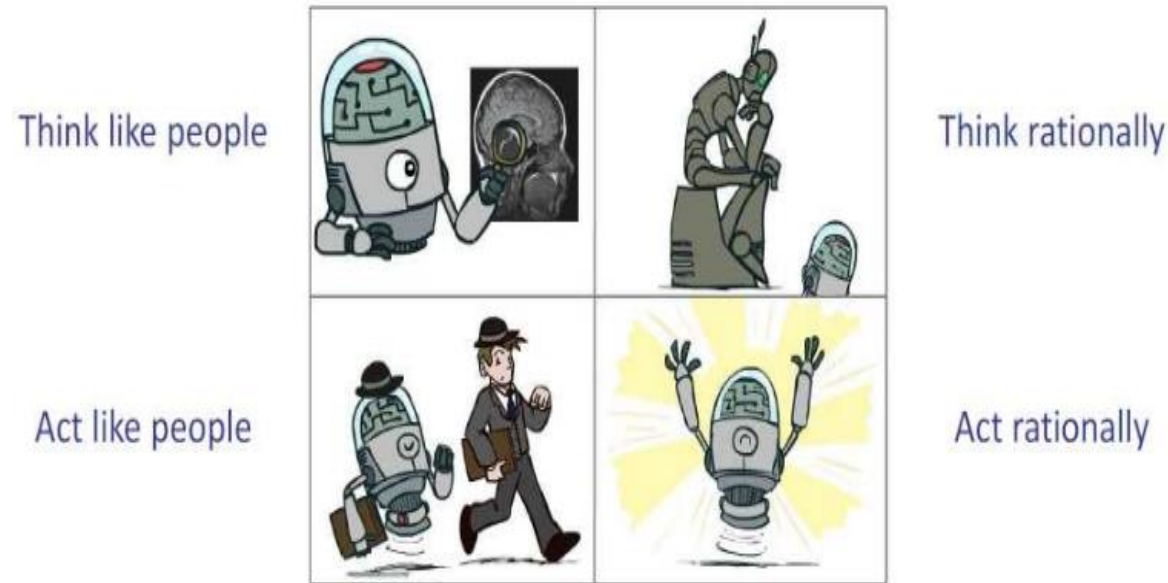
— Elaine Rich, 1983

Artificial Intelligence is the field of study that focuses on creating computer systems capable of performing tasks that typically require human intelligence.

Core Concepts:

- Learning from experience
- Solving complex problems
- Pattern recognition
- Intelligent decision making

Four Categories of AI



Acting Humanly

Systems that act like humans

Turing Test: Systems that behave indistinguishably from humans

Examples: Chatbots, virtual assistants

Thinking Humanly

Systems that think like humans

Cognitive Modeling: Modeling the human thought process

Examples: Artificial neural networks

Thinking Rationally

Systems that think rationally

Laws of Thought: Using logic and reasoning

Examples: Expert systems, logic programming

Acting Rationally

Systems that act rationally

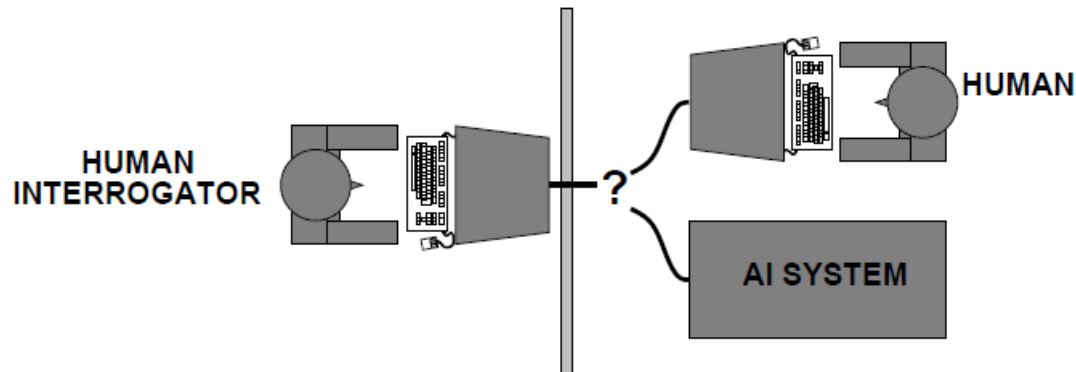
Rational Agents: Acting optimally in an environment

Examples: Autonomous vehicles, game-playing AI

(1) Acting Humanly – Turing Test

Alan Turing(1950) “Computing machinery and intelligence”

- ◇ “Can machines think?” → “Can machines behave intelligently?”
- ◇ Operational test for intelligent behavior: the Imitation Game



- ◇ Predicted that by 2000, a machine might have a 30% chance of fooling a lay person for 5 minutes
- ◇ Suggested major components of AI: knowledge, reasoning, language understanding, learning
- ◇ Total Turing test: computer vision, robotics

(2) Thinking Humanly – Cognitive Science

Cognitive Revolutions in 1960s

Get inside: introspection, psychological experiments, brain imaging

Requires scientific theories of internal activities of the brain

- What level of abstraction? “Knowledge” or “circuits”?
- How to validate? Requires
 - 1) Predicting and testing behavior of human subjects (top-down)
 - or 2) Direct identification from neurological data (bottom-up)

Both approaches (roughly, Cognitive Science and Cognitive Neuroscience) are now distinct from AI

Both share with AI the following characteristic: **the available theories do not explain anything resembling human-level general intelligence.** Hence, all three fields share one principal direction!

(3) Thinking Rationally – Laws of Thought

Aristotle Syllogism – “Right Thinking”

Several Greek schools developed various forms of logic:
notation and rules of derivation for thoughts;
may or may not have proceeded to the idea of mechanization

Logicist tradition with AI hopes to build on such programs to create intelligent systems.

Problems:

- 1) Not all intelligent behavior is mediated by logical deliberation
- 2) What is the purpose of thinking? What thoughts should I have out of all the thoughts (logical or otherwise) that I could have?

rationally

adverb

UK  /ˈræʃ.ən.ə.li/ US  /ˈræʃ.ən.ə.li/

Add to word list 

in a way that is based on reason and clear thought, rather than emotions:

- You can't assume that people will always behave rationally.
- Rationally, he knows that she won't go back to him, but emotionally he can't accept it.

rationality

adverb

một cách hợp lý

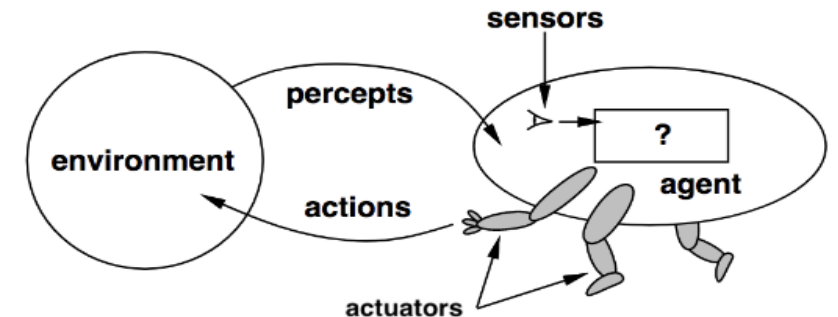
- We need to consider the situation rationally.

(4) Acting Rationally – Intelligent Agent

Rational Behavior – doing the right thing

The right thing: that which is expected to maximize goal achievement, given the available information

Doesn't necessarily involve thinking—e.g., blinking reflex—but thinking should be in the service of rational action



Rational Agent

An agent is a function from percept histories to actions:

$$f : \mathcal{P}^* \rightarrow \mathcal{A}$$

For any given class of environments and tasks, we seek the agent (or class of agents) with the best performance

Lecture Overview

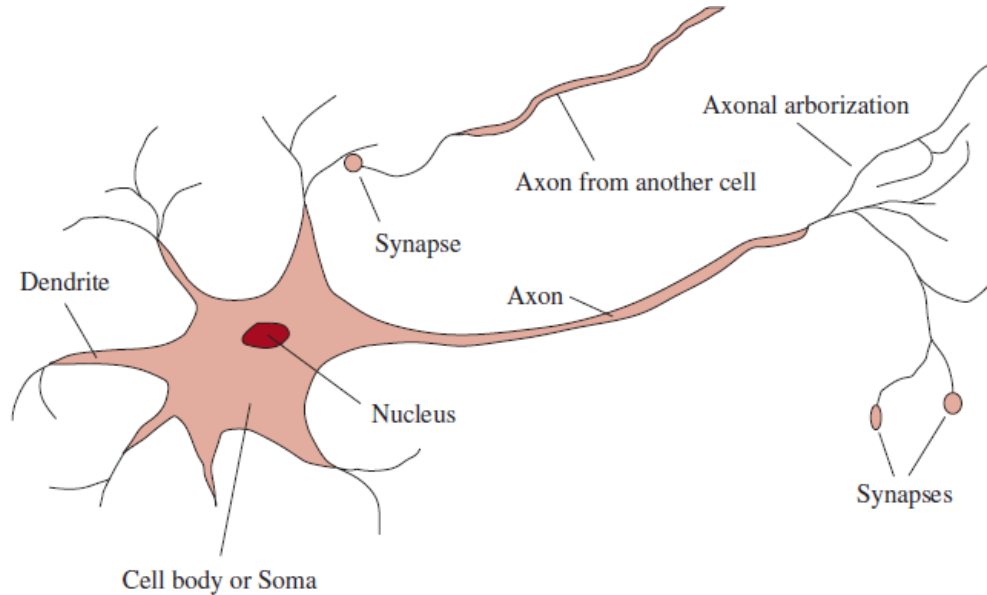
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The Foundations of AI

Philosophy	logic, methods of reasoning mind as physical system foundations of learning, language, rationality
Mathematics	formal representation and proof algorithms, computation, (un)decidability, (in)tractability probability
Psychology	adaptation phenomena of perception and motor control experimental techniques (psychophysics, etc.)
Economics	formal theory of rational decisions
Linguistics	knowledge representation grammar
Neuroscience	plastic physical substrate for mental activity
Control theory	homeostatic systems, stability simple optimal agent designs

The Foundations of AI

Neuroscience vs Deep Learning

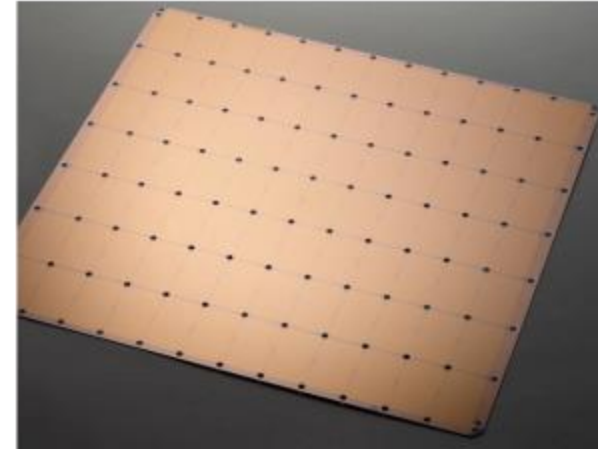
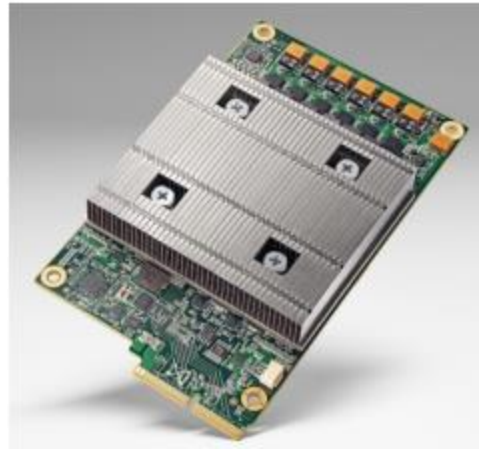


	Supercomputer	Personal Computer	Human Brain
Computational units	10^6 GPUs + CPUs 10^{15} transistors	8 CPU cores 10^{10} transistors	10^6 columns 10^{11} neurons
Storage units	10^{16} bytes RAM 10^{17} bytes disk	10^{10} bytes RAM 10^{12} bytes disk	10^{11} neurons 10^{14} synapses
Cycle time	10^{-9} sec	10^{-9} sec	10^{-3} sec
Operations/sec	10^{18}	10^{10}	10^{17}

The Foundations of AI

Computer Engineering

- Moore's law: performance doubled every 18 months (1960~2012)
- GPU, TPU, WSE: performance doubled every 100 days (2012~)
 - > a full day training in 2014 → 2 minutes training in 2018



- Quantum Computing
 - > far greater accelerations

The History of AI

The gestation (1943~1956)

- 1943, McCulloch & Pitts, model of neurons
- 1946, Hebb, Hebbian learning for updating the connection strengths
- 1950, Alan Turing, Turing Test, machine learning, reinforcement learning
- 1956, McCarthy et al., Dartmouth College, 2-months Workshop
 - > birth of 'Artificial Intelligence'



AI@50 conference (2005) :

Trenchard More,
John McCarthy, Marvin Minsky, Oliver SelfridgeRay
Solomonoff

The History of AI

Early enthusiasm, great expectations (1952~1969)

- Logic Theroist, General Problem Solver, Playing checkers
- McCarthy: LISP(1958), Time sharing(1959), Advice Taker
- Minsky: Microworld problmes, algebra story problems, blocks world
- Rosenblatt: Perceptron(1962)
- Block et al., Perceptron Convergence Theorem(1962)

The History of AI

A dose of reality (1966~1973)

- Friedberg, Machine evolution (genetic programming)
- Sputnix(1966), Translate Russian scientific paper
- Minsky(1969), Perceptron, limitation of perceptrons

Expert Systems (1969~1986)

- DNEDRAL, MYCIN
- Prolog(1972)
- Minsky, Frames and OOP
- Japan(1981), 5th Generation Computer, 10-year project for a prolog machine
- McDermott(1982), R1, the first successful commercial expert system

MYCIN

Have you obtained positive cultures?

Yes.

What type of infection is it?

Primary bacteremia.

When did the symptoms first appear?

May 5

I recommend gentamycin using a doze of

The History of AI

The return of neural networks (1986~present)

- Rumelhart and McClelland (1986), Back-propagation learning algorithm
- Multi-layer Perceptrons
- complements the symbolic approaches

Probabilistic reasoning and machine learning (1987~present)

- Hidden Markov models, 1980s
- Bayesian networks, J. Pearl

The History of AI

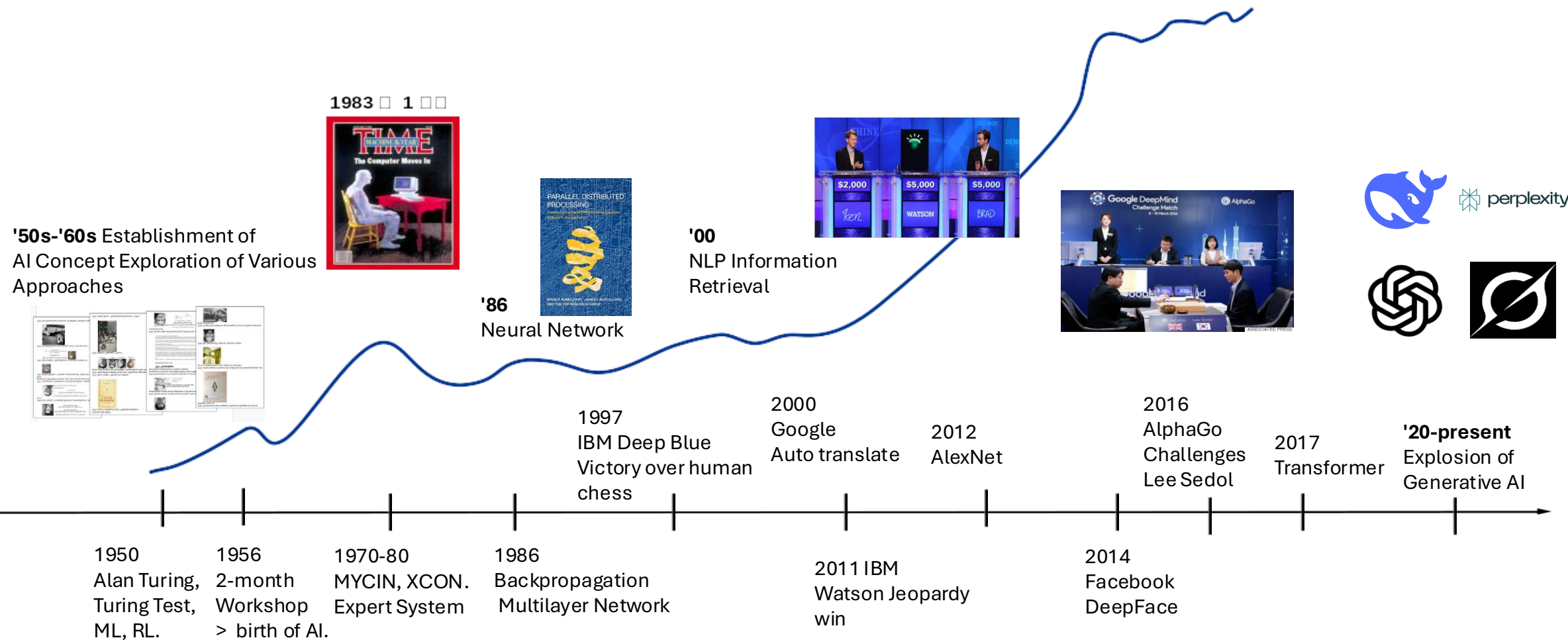
Big data (2001~present)

- Advances in computing power and IoT's with WWW → Big data
- IBM Watson, winner of Jeopardy (2011)

Deep learning (2011~present)

- Convolutional Neural Networks, LeCun(1995)
- Winner of ImageNet challenge J. Hinton(2012)
- AlphaGo, Silver et al. (2016)
- GPU, TPU, FPGA

The History of AI



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Current AI Application



Generative AI

GPT-4o, Gemini 2.5, advanced multimodal creation



Agentic AI

Autonomous AI agents for complex workflows



Autonomous Systems

Self-driving cars, robotics, drones



Healthcare AI

>90% diagnostic accuracy, drug discovery



AI for Productivity

Microsoft Copilot, AI assistants everywhere



Vietnam Spotlight

FPT AI, VinAI, local innovations

Current AI Application



Generative AI Leaders 2025



Text & Conversation AI

ChatGPT GPT-4o

Real-time voice, vision, text

- Multimodal conversations
- Code generation & debugging
- Real-time problem solving



Google Gemini 2.5

Advanced reasoning & integration



Claude 3

Constitutional AI with safety focus

Grok-3

Real-time X (Twitter) integration



Image & Video Generation

Midjourney v7

Photorealistic image generation

- Style consistency
- Character reference
- Brand integration



DALL-E 3

Precise text-to-image generation



OpenAI Sora

60-second video generation

- Complex scene understanding
- Physics simulation
- Temporal consistency

Google Veo

High-quality video synthesis

Current AI Application



Agentic & Productivity AI 2025

Office AI Integration

Microsoft Copilot

Integrated across Office suite

- Word: Document drafting & editing
- Excel: Data analysis & charts
- PowerPoint: Presentation creation
- Outlook: Email composition & scheduling

Google Workspace Gemini

Smart assistance in Docs, Sheets, Gmail

Workflow Automation

Notion Q&A

AI assistant for knowledge bases

Zapier AI Agents

Autonomous workflow automation

- Multi-step task execution
- Cross-platform integration
- Natural language automation

Meeting & Coding Assistants

Fathom AI

Meeting transcription & summaries

tldv

Video meeting insights & clips

GitHub Copilot

AI pair programming

- Code completion & generation
- Bug fixing suggestions
- Multi-language support


Cursor

AI-first code editor

Current AI Application


Industry Breakthroughs 2025

Healthcare AI Revolution


-  **Diagnostic Excellence >90%**
- **Cambridge Coeliac AI:** Gut disease detection
 - **Early Cancer Detection:** Radiology AI systems
 - **Pathology AI:** Tissue analysis automation
 - **Drug Discovery:** Molecule design acceleration

Autonomous Transportation

 **Waymo One Robotaxi** Fully autonomous rides in major cities

 **Tesla FSD v12** Full Self-Driving capabilities

- End-to-end neural networks
- City street navigation
- Real-time decision making


 **Boston Dynamics Spot** Industrial robotics & inspection

Vietnam AI Innovations

 **FPT AI Agents** Enterprise automation solutions

- Conversational AI platforms
- Document processing OCR
- Customer service automation

 **Viettel eKYC & AI Camera** Identity verification & surveillance

 **VinAI Autonomous Driving** Self-driving research & development

Current AI Application

Group Discussion: "AI Around Us"

Instructions:

1. Form groups of 4-5 students
2. Choose one discussion topic
3. Discuss for 10 minutes
4. Present key insights (3 minutes per group)

Generative AI Impact

- How has ChatGPT/AI changed your daily life?
- Which AI tool do you find most valuable?
- What are the risks of AI dependency?

AI in Vietnamese Context

- What Vietnamese AI products do you use?
- How can Vietnam compete globally in AI?
- What AI careers exist in Vietnam?

AI Ethics & Society

- Should AI replace human teachers/doctors?
- How to prevent AI bias and misinformation?
- What rules should govern AI development?

Future of Human-AI Collaboration

- Which jobs will AI enhance vs replace?
- How to stay relevant in an AI world?
- What skills should students focus on?

Current AI Application

Quiz: "Generative AI Capabilities"

Which tasks can GPT-4o perform effectively?

Select all that apply:

☒ A Real-time voice conversation

☒ B Radiology image segmentation

☒ C Grocery delivery logistics

☒ D Poetry writing

Submit Answer

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Summary & Next Steps

Summary of key points



AI Definition

Four approaches: Acting/Thinking Humanly vs Rationally



Historical Evolution

From symbolic AI to modern generative AI breakthroughs



2025 AI Landscape

GPT-4o, autonomous systems, 90%+ diagnostic accuracy

Reading Assignment

Required Reading

Russell & Norvig "AI: A Modern Approach" 4th Edition

For Next Class:

- **Chapter 3:** Solving Problems by Searching
- Focus on: Problem-solving agents, search algorithms
- Pay attention to: State space, search strategies

Reading Tips

Take Notes

Write down key concepts and questions

Think Critically

Consider real-world applications

Discuss

Talk with classmates about concepts

Research

Look up unfamiliar terms

Thank you!

You're now ready to explore the exciting world of AI!
Next Lecture: Search and Problem Solving