Electronics and Telecommunication

Elective II : Artificial Intelligence

कृत्रिम बुद्धिमत्ता

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Objective

What is Intelligence?

Intelligence, taken as a whole, consists of the following skills:-

1. The ability to reason
2. The ability to acquire and apply knowledge
3. The ability to manipulate and communicate ideas

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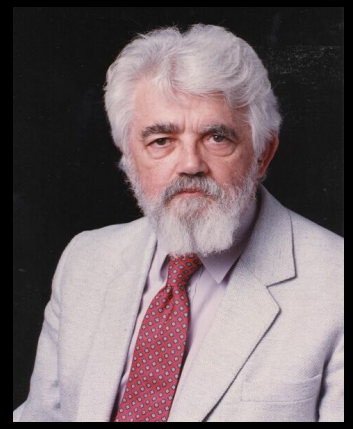
Definitions of AI

- "AI is the study of how to make computers do things, which, at the moment, people do better."

Marvin Minsky

- " ... the science of making machines do things that would require intelligence if done by humans"



John McCarthy

- AI is the part of computer science concerned with designing intelligent computer systems

Oral /Theory

Turing's Test

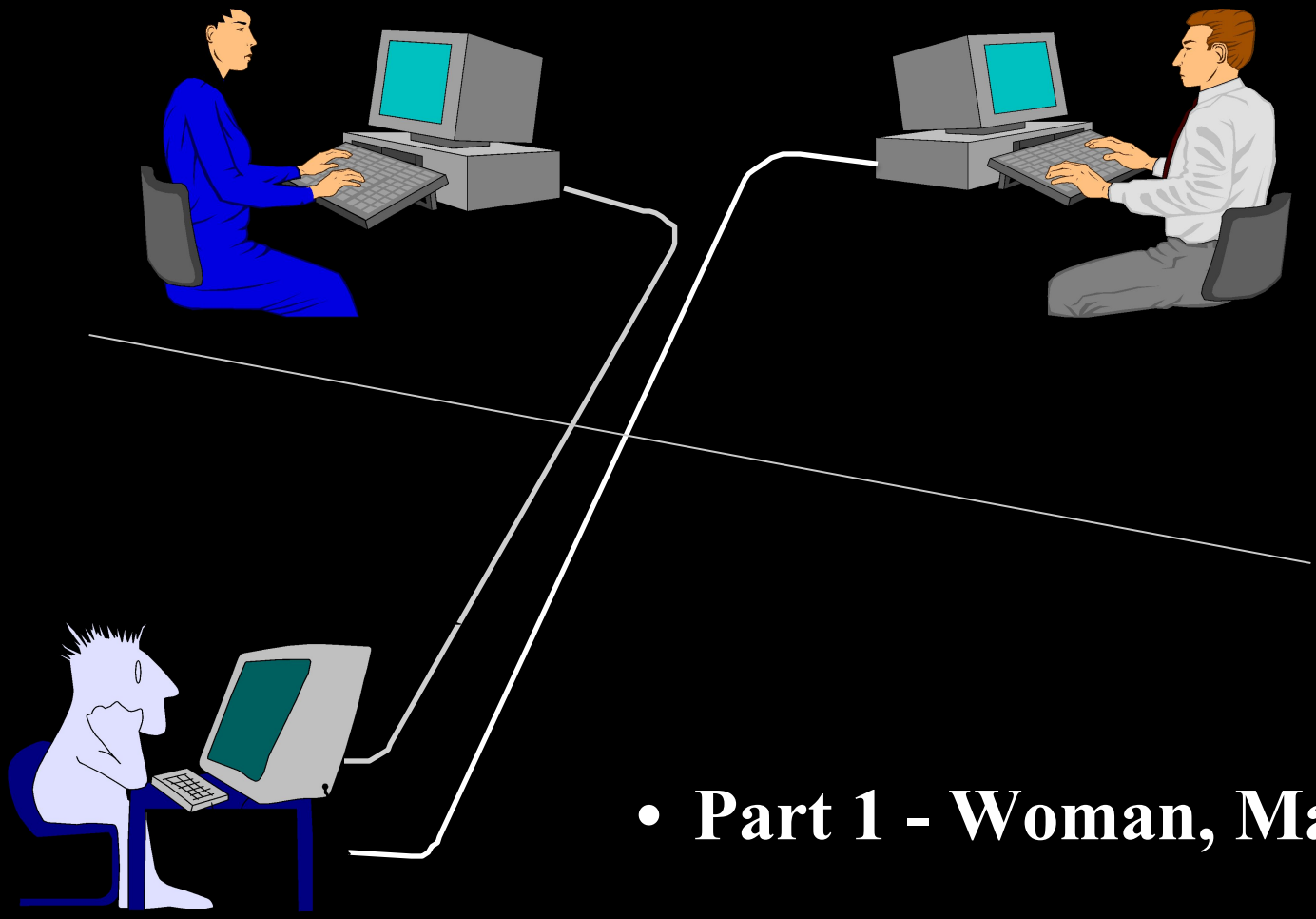
In 1950 Alan Turing published his famous paper "Computing Machinery and Intelligence."

In its most basic form, a human judge sits at a computer terminal and interacts with the subject by written communication only.

The judge must then decide if the subject on the other end of the computer link is a human or an AI program imitating a human.

http://www.turing.org.uk/turing/

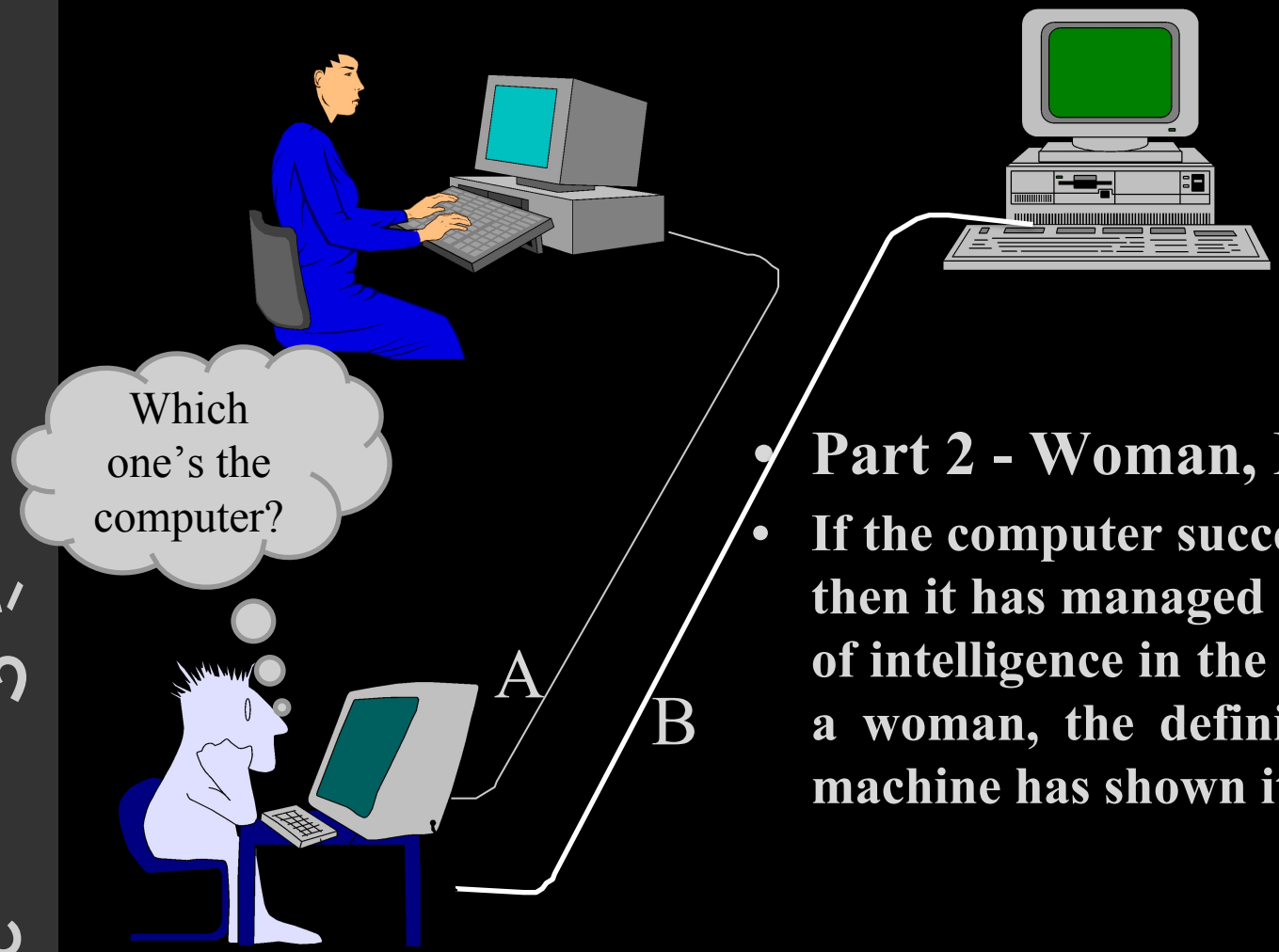
Turing's Test - Part 1



- **Part 1 - Woman, Man & Judge.**

Who was he ??

Turing's Test - Part 2



- **Part 2 - Woman, Machine & Judge.**
- **If the computer succeeds in fooling the judge then it has managed to exhibit a human level of intelligence in the task of pretending to be a woman, the definition of intelligence the machine has shown itself to be intelligent.**

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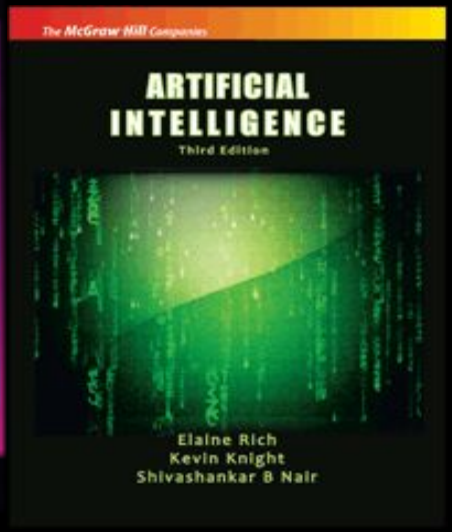
Oral

References



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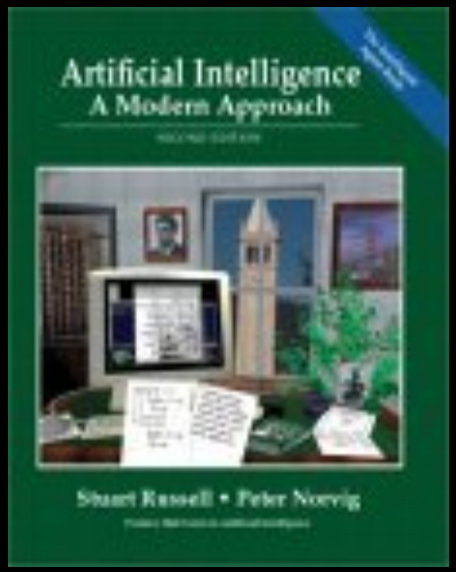

Artificial Intelligence: A Modem Approach
Stuart Russell & Peter Norvig

कृत्रिम बुद्धिमत्ता

Unit 1: Foundation

- Intelligent Agents, Agents and environments, Good behavior, The nature of environments, structure of agents, Problem Solving, problem solving agents, example problems,
- Searching for solutions, uniformed search strategies, avoiding repeated states, searching with partial information.

Unit 2: Searching

- Search and exploration, Informed search strategies, heuristic function, local search algorithms and optimistic problems, local se arch in continuous spaces, online search agents and unknown environments, Constraint satisfaction problems (CSP), Backtracking search and Local search for CSP, Structure of problems,
- Games: Optimal decisions in games, Alpha- Beta Pruning, imperfect real-time decision, games that include an element of chance.

Unit 3: Knowledge Representation

- First order logic, representation revisited, Syntax and semantics for first order logic, Using first order logic, Knowledge engineering in first order logic, Inference in
- First order logic, prepositional versus first order logic, unification and lifting, forward chaining, backward chaining,
- Resolution, Knowledge representation, Ontological Engineering, Categories and objects, Actions - Simulation and events, Mental events and mental objects

Unit 4: Learning

- Learning from observations: forms of learning, Inductive learning, Learning decision trees, Ensemble learning, Knowledge in learning, Logical formulation of learning, Explanation based learning, Learning using relevant information, Inductive logic programming, Statistical learning methods, Learning with complete data, Learning with hidden variable, EM algorithm, Instance based learning,
- Neural networks - Reinforcement learning, Passive reinforcement learning, Active reinforcement learning, Generalization in reinforcement learning.

Unit 5: Perception and Expert System

- Visual perception
- Waltz's algorithm,
- Introduction to Expert System,
- Architecture and functionality,
- Example Expert system

Unit 6: Natural Language Understanding

- Why NL, Formal grammar for a fragment of English,
- Syntactic analysis,
- Augmented grammars, Semantic interpretation,
- Ambiguity and disambiguation, Discourse understanding,
- Grammar induction, Probabilistic language processing, Probabilistic language models