

The image shows a spiral-bound notebook with a light brown, textured cover. The spiral binding is on the left side. The text is centered on the cover.

Artificial Intelligence

Introduction

BSc/UOL

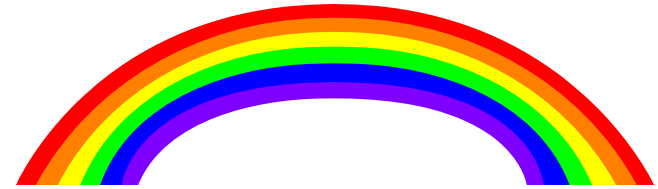
Lecture 1

(August 11, 1999)

Tralvex (Rex) Yeap MAAAI MSCS

University of Leeds

Outline: Introduction to AI



☰ N-ways Introduction

- Personal Information and Background
- Students' Information and Background

☰ Course Outline:

- Requirements and Expectation
- Module Assessment
- Recommended Books
- Layout of Course (14 lessons)
- Virtual Office Hours

☰ Course Delivery Methods

☰ General Reference for the Course

☰ Goals and Objectives of module

☰ Introduction to AI

- What is Intelligence?
- An Intelligent Entity
- The Age of Intelligent Machines
- Definitions of AI
- Behaviourist's View on Intelligent Machines
- Turing's Test - Part 1 & 2
- History of AI
- Examples of AI systems

☰ AI Case Study

- Radiosity for Virtual Reality Systems
- Robot World Cup - Robocup
- Scrablet

☰ Class Activity

☰ What's in Store for Lecture 2

Personal Information and Background

📄 CIS310 Lecturer (SG):
Tralvex (Rex) Yeap MAAAI MSCS
E-mail: tralvex@acm.org
Home : <http://tralvex.com>
ICQ: 20248117



📄 Educational Background:

- Master of Science (Distinction) in Vision, Visualization and Virtual Environments at U. Leeds
- Read Bachelor Science in Computing (Systems Development) at Monash University.

Personal Information and Background (cont'd)

Current Work:

- Part-time: Lecturer for USQ, UOL, UOS, UCE, UOW and TVU.
- Full-time: Managing corporate Patent portfolio for Asia largest Research Institute in Information Technology.
- More than 10 years of Computing experience.

Personal Information and Background (cont'd)

Past Work:

- Lecturer for Artificial Intelligence, Open Systems, Information System for Managers, Project Management, Strategy & Information Management, Neural Networks and Website Development.
- Software Engineer at System Engineering (SysEng) R&D work on real-time embedded systems.
- Games & CAI developer (Champion in National Software Competition 1991' Open Category).

Future Work:

- Lecturer: same subjects + Strategy Management in IT (UCE).
- Patent Analysis and Mapping activities.

Students' Information and Background

- ☰ Name
- ☰ Company
- ☰ Internet Access: Yes / No
- ☰ AI / Expert Systems / Agents
/ Neural Networks / NLP /
Vision / GA / Simulated
Annealing / CBR / Fuzzy
Logic / Alife / Computer
Networks / Data
Communications / TCP/IP
- ☰ Other comments



Course Outline:

Requirements and Expectation (cont'd)

Internet Access:

- You should have access to the Internet.
- Preferably using Netscape or Internet Explorer.

Bulletin Board Access:

- For those with a modem and no Internet account.
- Preferably using ANSI graphics (text + colors) supported communication software, such as Qmodem or Telix.

Course Outline: Module Assessment

📄 Two assignments - ??%

📄 One written Examination - ??%



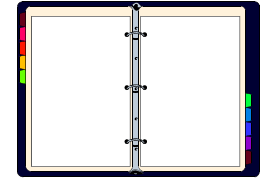
Course Outline: Recommended Books



- 📖 **Artificial Intelligence by Patrick Henry Winston**
- 📖 **Logical Foundations of Artificial Intelligence by Michael R. Genesereth, Nils J. Nilsson, Nils J. Nilsson**
- 📖 **Artificial Intelligence : A Modern Approach by Stuart J. Russell, Peter Norvig**
- 📖 **Artificial Intelligence by Elaine Rich, Kevin Knight (good for logic, knowledge representation, and search only)**

Course Outline:

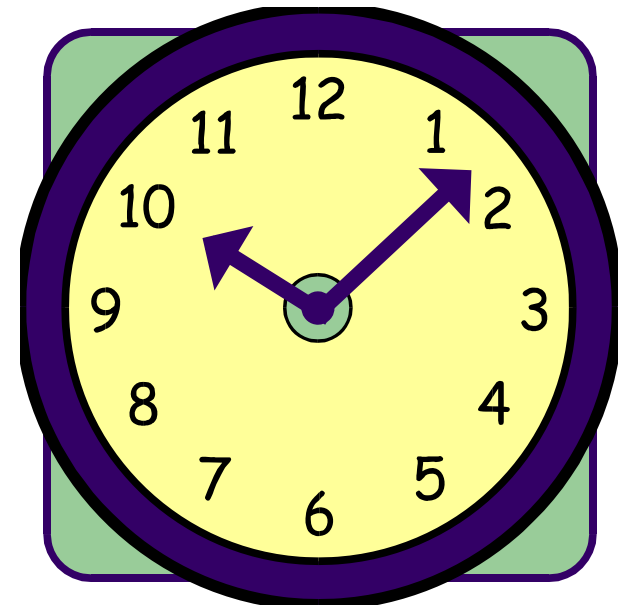
Layout of Course (Lecture 1-14)



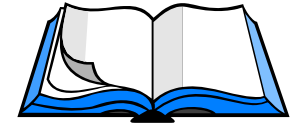
- 📄 L1: Introduction to AI
- 📄 L2: Intelligent Agents
- 📄 L3-5: Search Strategies
- 📄 L6-8: Knowledge Representation
- 📄 L9: Planning
- 📄 L10-11: Natural Language Processing
- 📄 L12-14: Philosophy

Course Outline: Virtual Office Hours

- 📄 Via Internet e-mail
- 📄 Via Bulletin Board System e-mail
- 📄 Before or after class (for in-class students only).



Course Delivery Methods



Live lecturing

Use of WWW (<http://tralvex.com/ai>):

- Soft copies of notes (in Powerpoint format) can be downloaded.
- **Full set of previous lecture notes, Past years assignments, examination papers and reviews/feedback** are also located in the same webpage.
- Include many **relevant links** to AI resources on the web.

Use of **Internet e-mails**:

Students may submit their queries to me anytime

Use of a **24hrs BBS** (Bulletin Board System) - (65) 270-8066:

- All soft materials can also be downloaded from here
- Availability of a Mail Conference for all students to interact.

General Reference for the Course



📄 AI related information.

📄 General computer-related news sources.

📄 General Information Technology issues.

📄 All web links in my AI website.

📄 Whatis.com (Computer Science Dictionary)

<http://whatis.com/search/whatisquery.html>

📄 Technology Encyclopedia

<http://www.techweb.com/encyclopedia/>

📄 Computing Dictionary

<http://wombat.doc.ic.ac.uk/>

📄 Webster Dictionary

http://work.ucsd.edu:5141/cgi-bin/http_webster

Goals and Objectives of module



- 📄 Understand motivation, mechanisms, and potential of Artificial Intelligence techniques.
- 📄 Balance of breadth of techniques with depth of understanding.
- 📄 Critical and objective study with a goal of leading to productive research.

Introduction to AI:

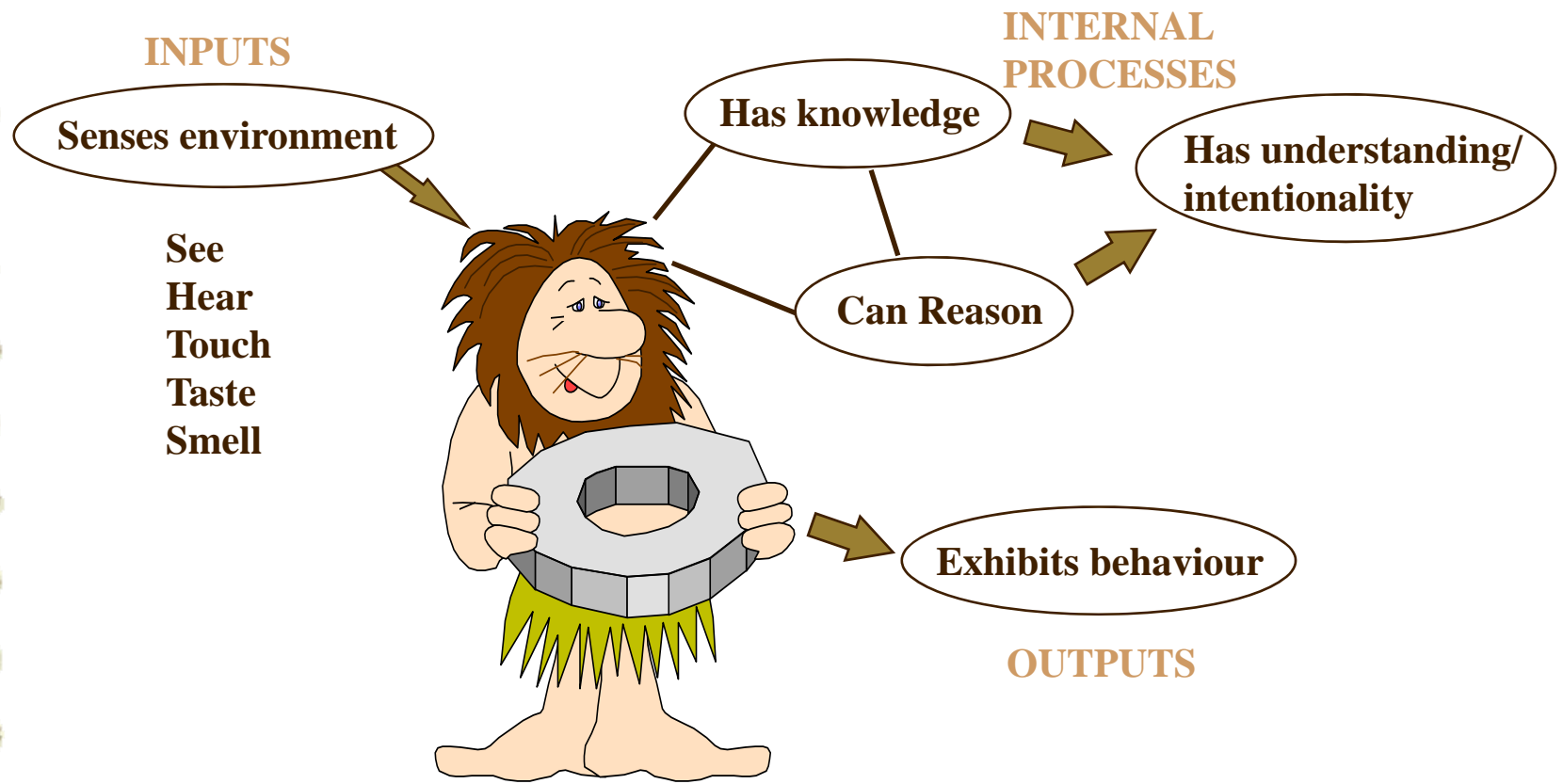
What is Intelligence?



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

Introduction to AI: An Intelligent Entity



Introduction to AI:

The Age of Intelligent Machines

- 📄 **1st Industrial Revolution:** the Age of Automation:
Machines extend & multiply man's physical capabilities
- 📄 **2nd Industrial Revolution:** the Age of Info Tech:
Machines extend & multiply man's mental capabilities
- 📄 **Information & Knowledge Revolution:** the Age of
Knowledge Technology "..working smarter, not harder."
How do we make our systems smarter? - by building in
intelligence

Introduction to AI:

Definitions of AI

- ☞ " ... the science of making machines do things that would require intelligence if **done by humans**" - Marvin Minsky
- ☞ AI is the part of computer science concerned with **designing** intelligent computer systems -E. Feigenbaum
- ☞ Systems that can demonstrate **human-like reasoning capability** to enhance the quality of life and improve business competitiveness - Japan-S'pore AI Centre

Introduction to AI:

Behaviourist's View on Intelligent Machines

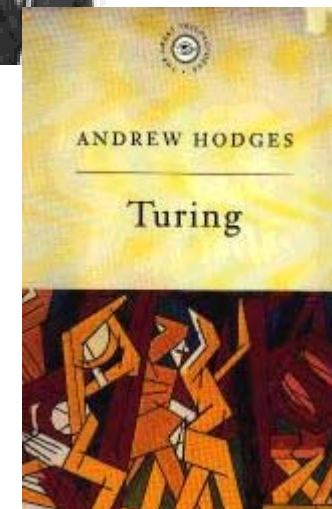
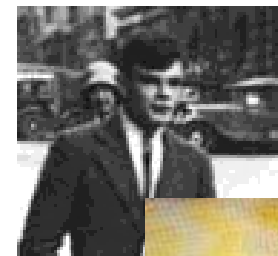


- ☞ Many scientists believe that only things that can be **directly observed** are “scientific”
- ☞ Therefore if a machine behaves “**as if it were intelligent**” it is meaningless to argue that this is an illusion.
- ☞ Turing was of this opinion and proposed the “**Turing Test**”
- ☞ This view can be summarised as: “**If it walks like a duck, quacks like a duck and looks like a duck - it is a duck**”

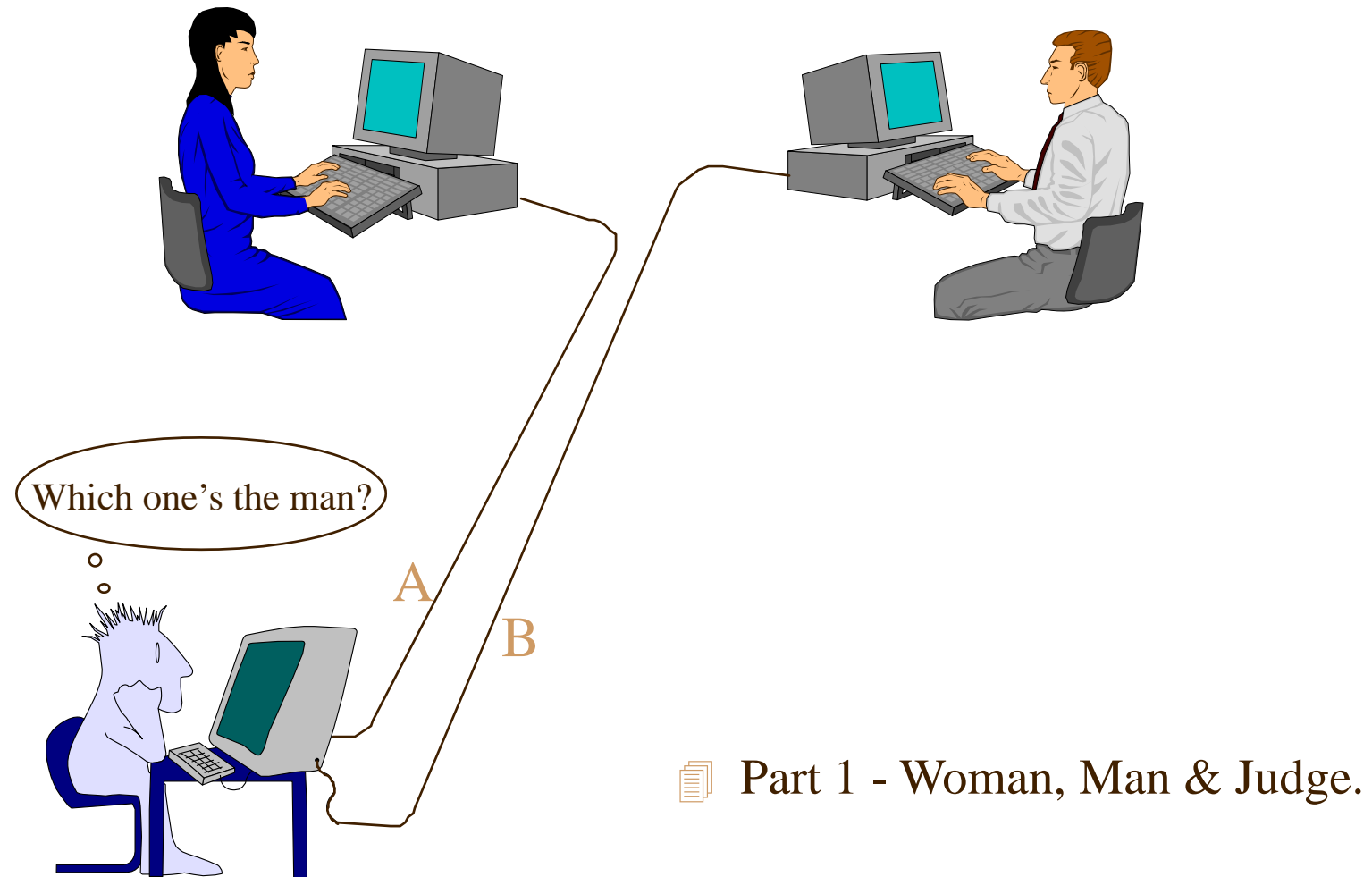
Introduction to AI:

Turing's Test

- 📄 In 1950 Alan Turing published his now famous paper "**Computing Machinery and Intelligence.**" In that paper he describes **a method for humans to test AI programs.**
- 📄 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/>

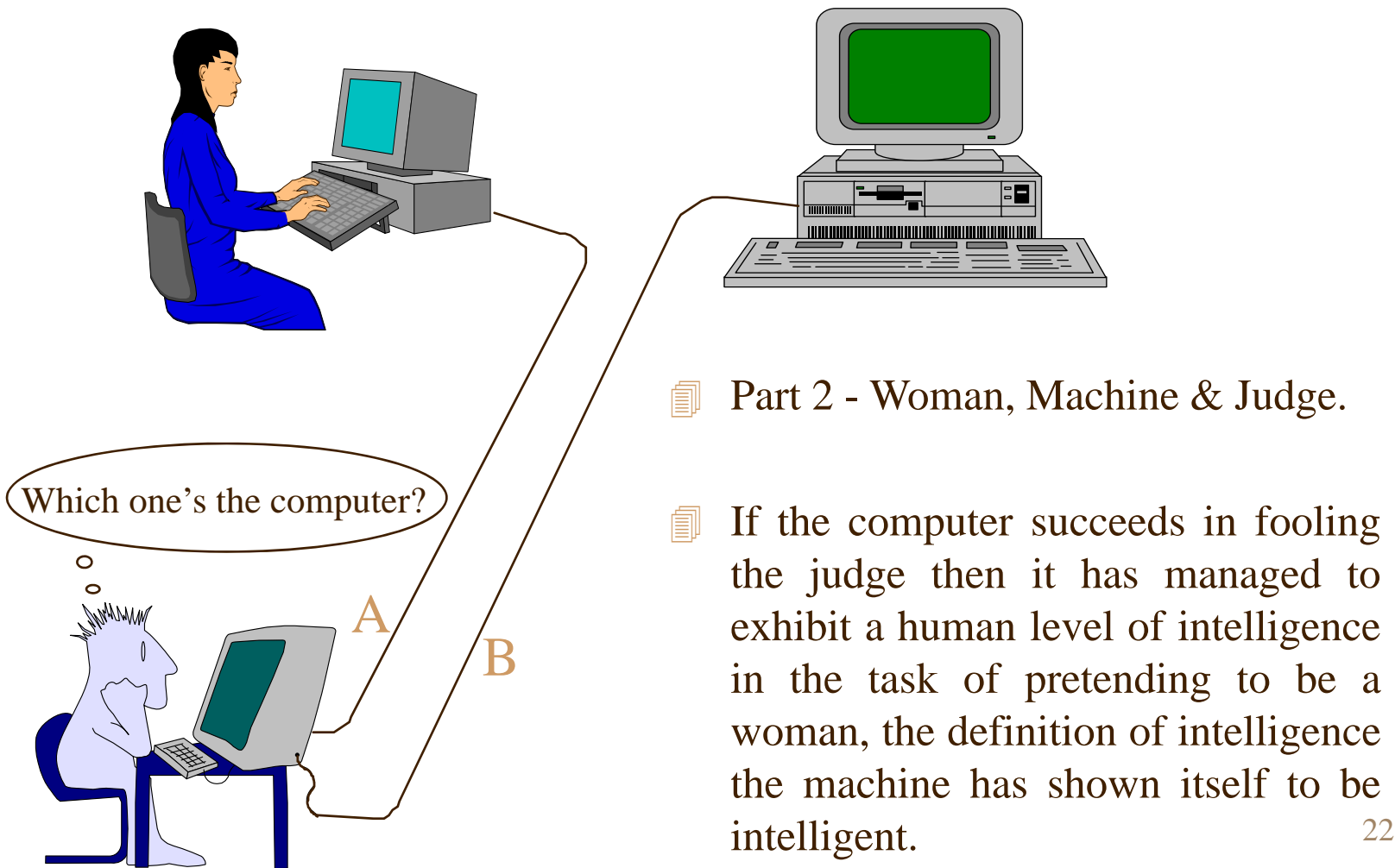


Introduction to AI: Turing's Test - Part 1



📄 Part 1 - Woman, Man & Judge.

Introduction to AI: Turing's Test - Part 2



Introduction to AI:

History of AI



Important research that laid the groundwork for AI:

- 📄 **1900-50s:** formal grammar & language theories
- 📄 **1920-30s:** formalisation of reasoning (predicate calculus and propositional logic)
- 📄 **1940-50s:** Cybernetics - communication in man and machine
- 📄 **1950s:** reality of digital computers (Mark I, ENIAC, EDVAC and UNIVAC)
- 📄 **Others: Information Theory, Neurological Theories, Boolean Algebra, etc.**

Introduction to AI:

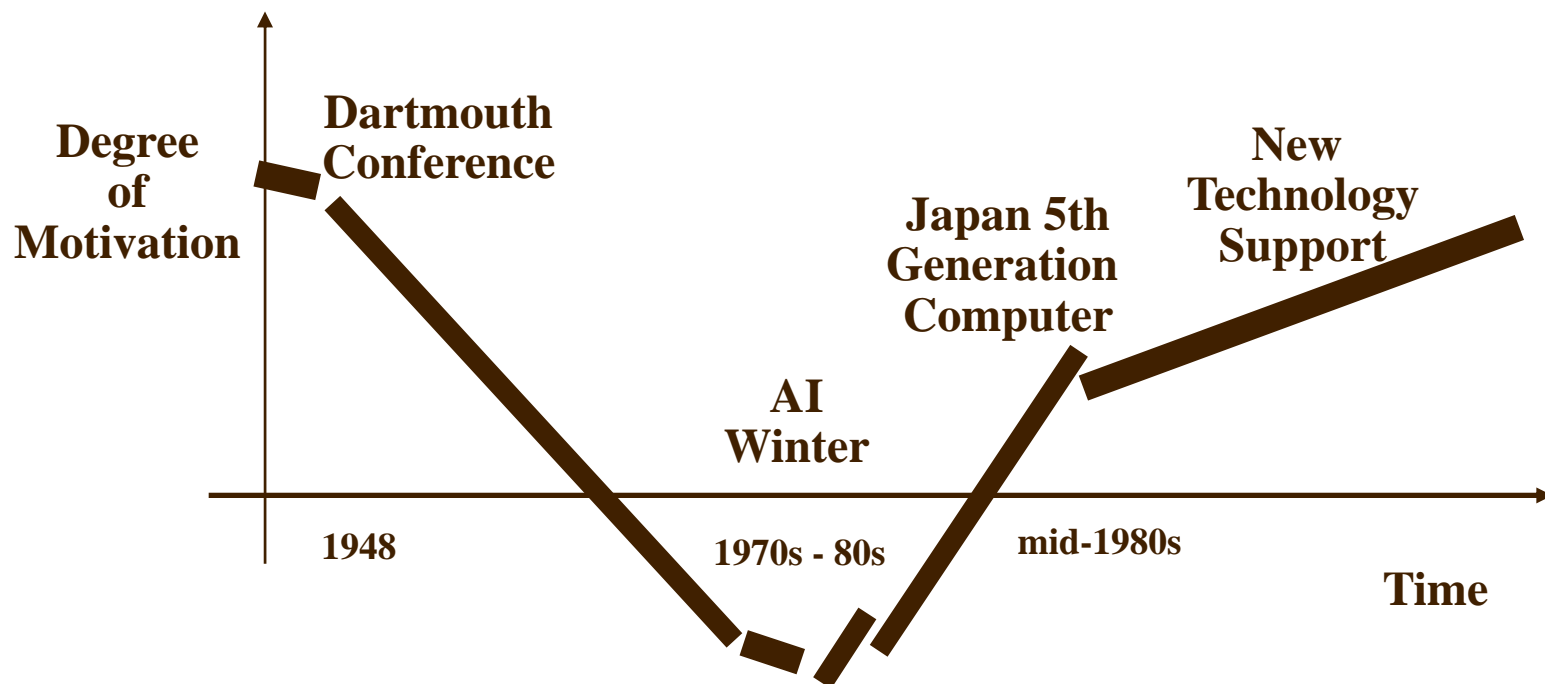
History of AI (cont'd)



- ☞ Basic philosophy is recorded since ancient Greece
- ☞ Early push after computer discovered (50's): Connectionist (neural net) vs. Symbolist/Logician (AI)
- ☞ **1956** - recognised as the official beginning of AI - The Dartmouth Summer Workshop
- ☞ The 1950s was also noted for chess playing programs, machine translation, automatic theorem provers, Chomsky generative grammars and LISP
- ☞ CMU, Stanford, and IBM
- ☞ Early successes and enthusiasm - neural learning, theorem provers, problem solvers (GPS), game players, etc.

Introduction to AI:

History of AI (cont'd)



Adapted from:
Joe Carter (Andersen Consulting, 1988)
Oliver Tian (Andersen Consulting, 1989)

Introduction to AI:

Examples of AI systems



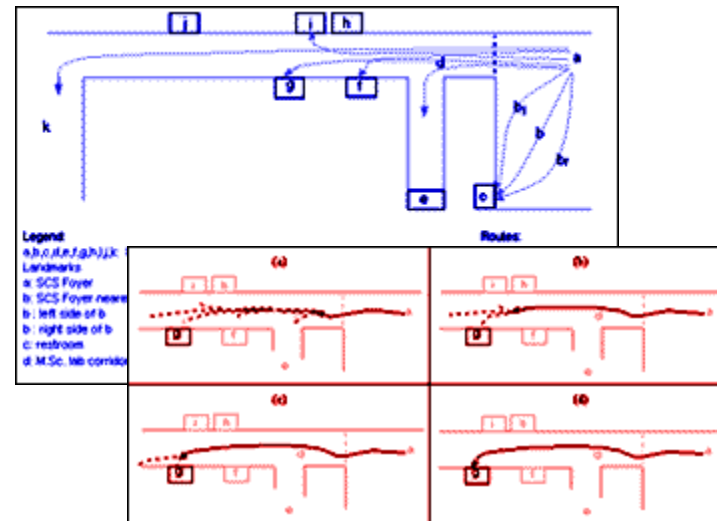
- 📄 Robots
- 📄 Chess-playing program
- 📄 Voice recognition system
- 📄 Speech recognition system
- 📄 Grammer checker
- 📄 Pattern recognition
- 📄 Medial diagnosis
- 📄 System malfunction rectifier
- 📄 Game Playing
- 📄 Machine Translation
- 📄 Resource Scheduling
- 📄 Expert systems (diagnosis, advisory, planning, etc)
- 📄 Machine learning
- 📄 Intelligent interfaces

AI Case Study

1. Radiosity for Virtual Reality Systems

My MSc thesis in University of Leeds, where I first introduced **neural network techniques** to aid speedy generation of photo-realistic virtual reality environments - in particular for walkthroughs and flybys.

<http://tralvex.com/rover>



AI Case Study

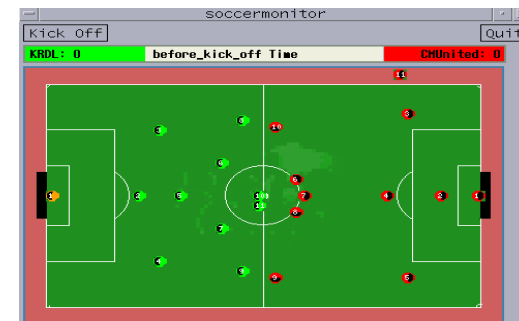
2. Robot World Cup - Robocup

☰ The Robocup Competition pits robots (real and virtual) against each other in a simulated soccer tournament. The aim of the RoboCup competition is to foster an interdisciplinary approach to **robotics** and **agent-based AI** by presenting a domain that requires large-scale co-operation and coordination in a **dynamic, noisy, complex environment**. Common AI methods used are variants of **neural networks** and **genetic algorithms**.

☰ Pacific Rim International Conference on AI 1998 and Robocup Pacific Rim Series 1998, 22-27 November 1998 NUS Multi-purpose Sports Hall.

☰ KRDL-Pilot Soccer Softbots by Neo Say Poh, Tralvex Yeap and Eldwin Tan.

<http://tralvex.com/robocup>



AI Case Study

3. Scrablet

- My award winning entry in National Software Competition 1991.
- Champion in Games Category.
- Xiang Qi - 2nd place. Checker - 3rd place.
- In short, it is a combination of Scrabble and Tetris - aspects of Natural Language Processing, Search and Game Theory.
- <http://tralvex.com/scrablet>



Class Activity:

AI and Us



To discuss in groups on any AI-ish system(s) that the members are familiar with, some examples:

- 📄 Robots
- 📄 Chess-playing program
- 📄 Voice recognition system
- 📄 Speech recognition system
- 📄 Grammer checker
- 📄 Pattern recognition
- 📄 Medial diagnosis
- 📄 System malfunction rectifier
- 📄 Mars pathfinder
- 📄 Machine Translation
- 📄 Resource Scheduling
- 📄 Expert systems
- 📄 Machine learning
- 📄 Intelligent interfaces

What's in Store for Lecture 2



📄 Intelligent Agents

📄 Students' Mini Research Presentation by Group A

📄 Class Activity: Either on AI or Assignment Discussion

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End of Lecture 1

Good Night.