



**UTM**  
UNIVERSITI TEKNOLOGI MALAYSIA

OPENCOURSEWARE

# AI TOOLS



# ARTIFICIAL INTELLIGENCE

- ***Artificial intelligence (AI)*** – the science of making machines imitate human thinking and behavior
  - ***Normally associated with Robot*** – a mechanical device equipped with simulated human senses and the ability to take action on its own
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# ARTIFICIAL INTELLIGENCE

- Some of AI systems/technologies
  - Expert systems
  - Neural networks
  - Genetic algorithms
  - Intelligent agents (hundred available)

## EXPERT SYSTEMS is an AI

- ***Expert (knowledge-based) system*** – an artificial intelligence system that applies reasoning capabilities to reach a conclusion
- Used for
  - Diagnostic problems (what's wrong?)
  - Prescriptive problems (what to do?)

# Traffic Light Expert System

Rule	Symptom or Fact	Yes	No	Explanation
1	Is the light green?	Go through the intersection.	Go to Rule 2.	Should be safe if light is green. If not, need more information.
2	Is the light red?	Go to Rule 4.	Go to Rule 3.	Should stop, may not be able to.
3	Is the light likely to change to red before you get through the intersection?	Go to Rule 4.	Go through the intersection.	Will only reach this point if light is yellow, then you'll have two choices.
4	Can you stop before entering the intersection?	Stop.	Go to Rule 5.	Should stop, but there may be a problem if you can't.
5	Is traffic approaching from either side?	Prepare to crash.	Go through the intersection.	Unless the intersection is clear of traffic, you're likely to crash.

# Developing and Using an Expert System

- Step 1: expert provide expertise to knowledge engineer
  - Step 2: knowledge engineer converts expertise to rules
  - Step 3: computer – expert systems
  - Step 4: user interface delivers facts to expert system and sends back the conclusions to the user
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# What Expert Systems Can and Can't Do

- An expert system can
  - Reduce errors
  - Improve customer service
  - Reduce cost
- An expert system can't
  - Use common sense like human
  - Automate all processes

# NEURAL NETWORKS

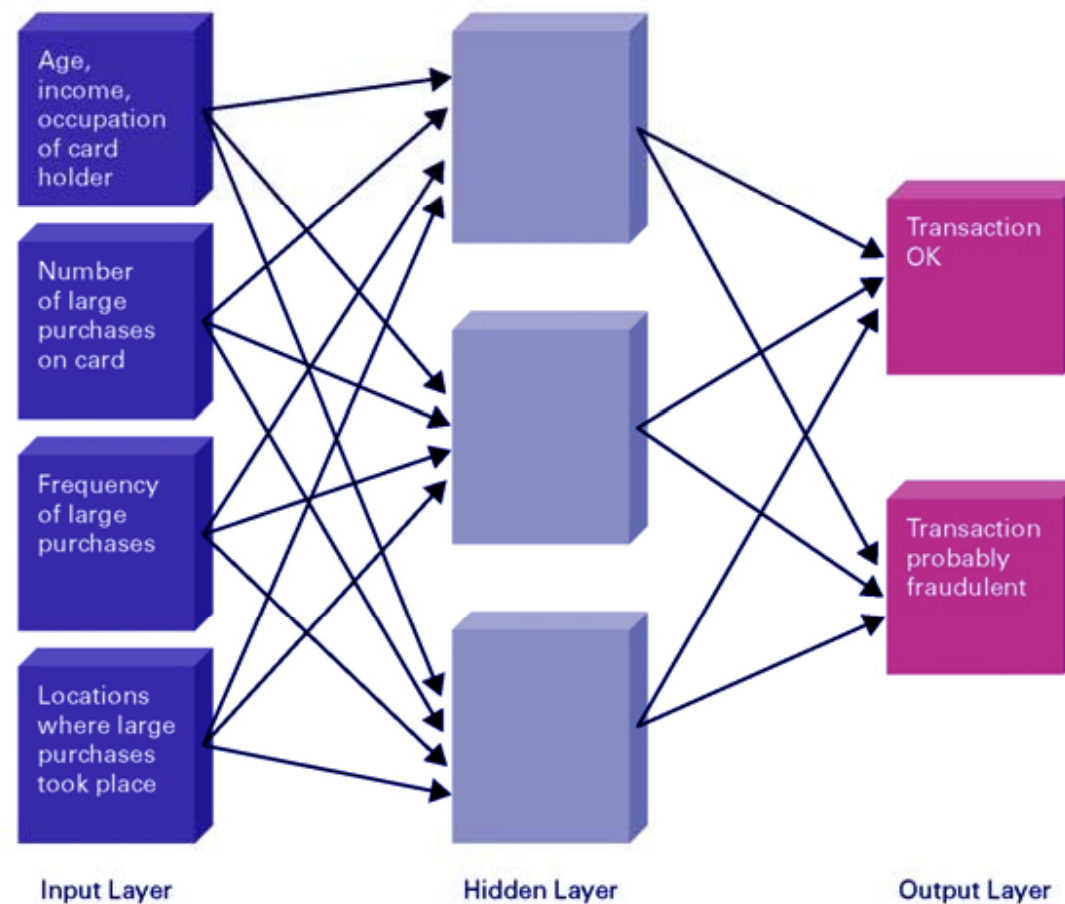
***Neural network (artificial neural network or ANN)*** – an artificial intelligence system that is capable of finding and differentiating patterns

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# Layers of a Neural Network

Figure 4.9  
The Layers of a Neural Network



# Neural Networks Can...

- Learn and adjust to new circumstances on their own
  - Take part in massive parallel processing
  - Function without complete information
  - Cope with huge volumes of information
  - Analyze nonlinear relationships
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# GENETIC ALGORITHMS

***Genetic algorithm*** – an artificial intelligence system that mimics the evolutionary, survival-of-the-fittest process to generate increasingly better solutions to a problem

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# Evolutionary Principles of Genetic Algorithms

- 1. *Selection*** – or survival of the fittest or giving preference to better outcomes
  - 2. *Crossover*** – combining portion of good outcomes to create even better outcomes
  - 3. *Mutation*** – randomly trying combinations and evaluating the success of each
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# Genetic Algorithms Can...

- Take thousands or even millions of possible solutions and combining and recombining them until it finds the optimal solution

# INTELLIGENT AGENTS

- ***Intelligent agent*** – software that assists you, or acts on your behalf, in performing repetitive computer-related tasks

Intelligent agent/software on a Web sites that helps you, the customer, find products and services you want –Amazon.com

# Intelligent agent that **takes action** on your behalf

- Examples:
  - Prioritize e-mail
  - Act as gaming partner (partner in game)
  - Assemble customized news reports
  - Fill out forms for you
  - “Discuss” topics with you



Intelligent agents that can *observe and report on equipment* such as a software that can evaluate the performance of your computer, scheduling antivirus scan etc.

Intelligent agent/software that can discover  
important information from a data warehouse  
– data mining(knowledge discovery)- google

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Reflection: state some keywords which can associate with words below

Expert systems

Neural networks

Genetic algorithms

Intelligent agents