Introduction to Artificial Intelligence

IICT Lecture 09

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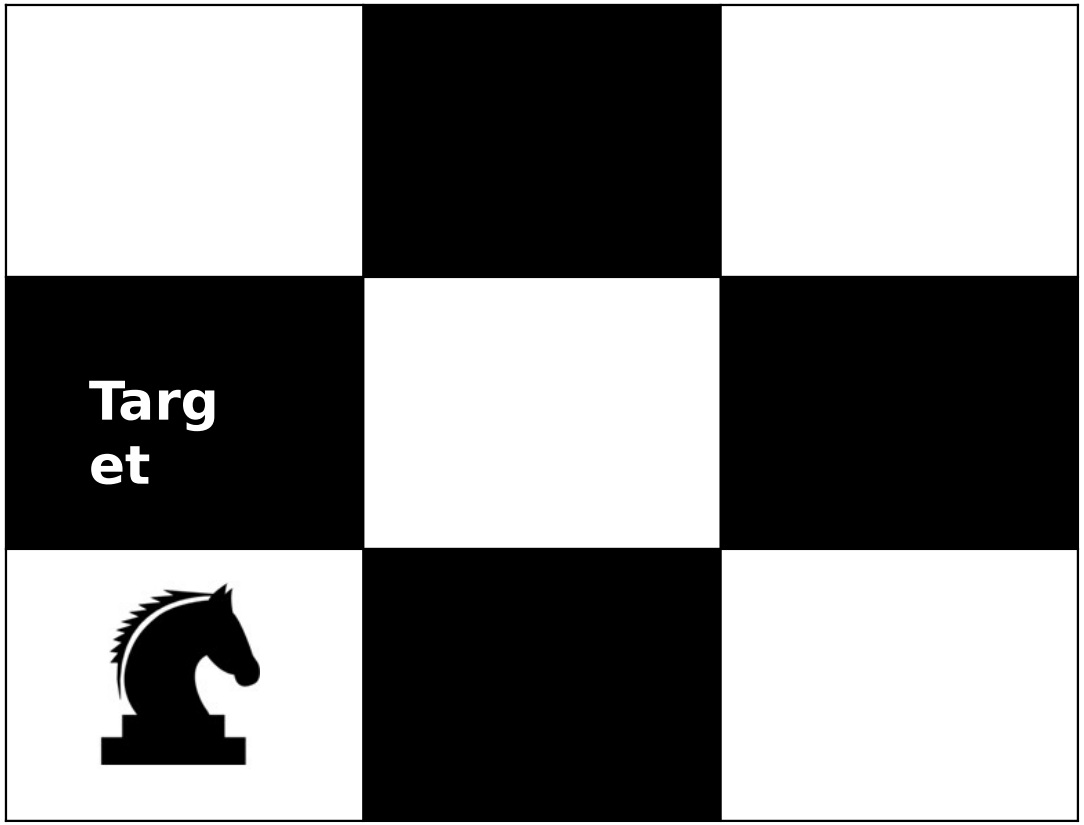
Intelligence

- A very general mental capability that involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience. [1]
- Measurement of Intelligence:
  - Intelligence Quotient (IQ)

[1] Mainstream Science on Intelligence reprinted in Gottfredson (1997). *Intelligence* p. 13

Planning: Knight's Plight

Can we move the given knight to the "Target" location?



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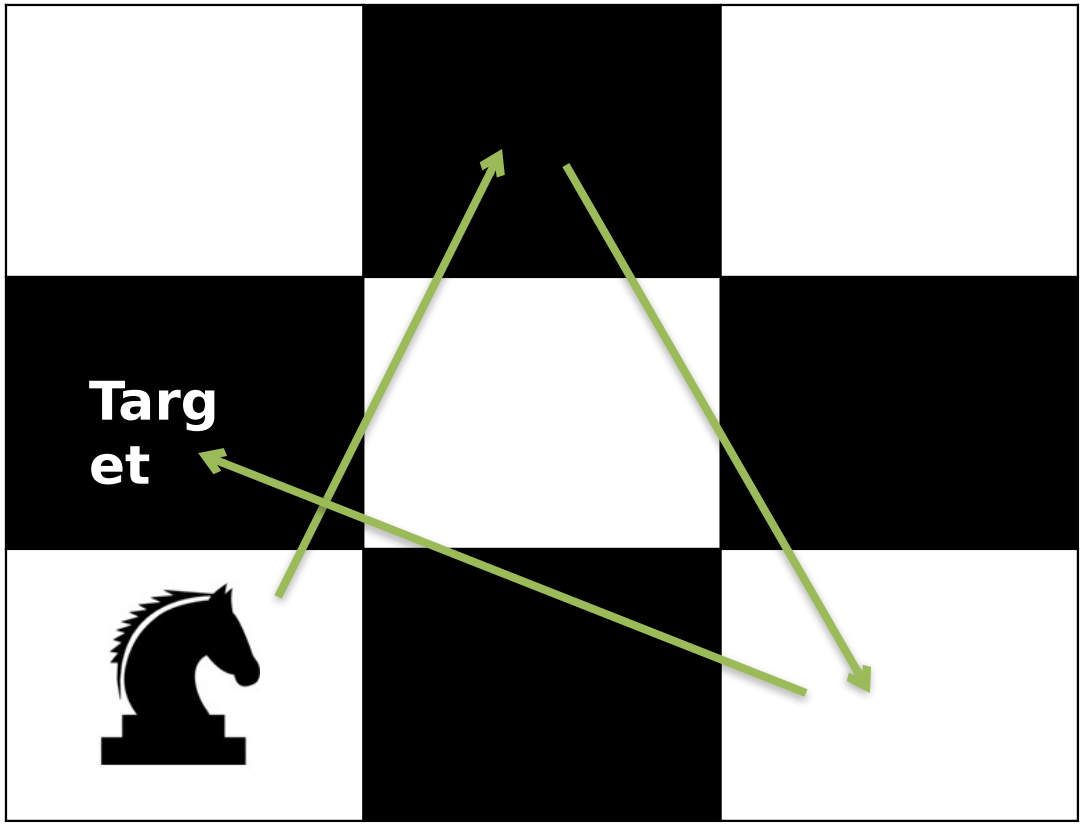


Calculative Puzzle:
Calculation, Computation, Reasoning

The number of times the digit 0 appears in this puzzle is ?.
The number of times the digit 1 appears in this puzzle is ?.
The number of times the digit 2 appears in this puzzle is ?.
The number of times the digit 3 appears in this puzzle is ?.
The number of times the digit 4 appears in this puzzle is ?.
The number of times the digit 5 appears in this puzzle is ?.
The number of times the digit 6 appears in this puzzle is ?.

Replace **?** Sign with count of numbers?

Calculative Puzzle:
Calculation, Computation, Reasoning

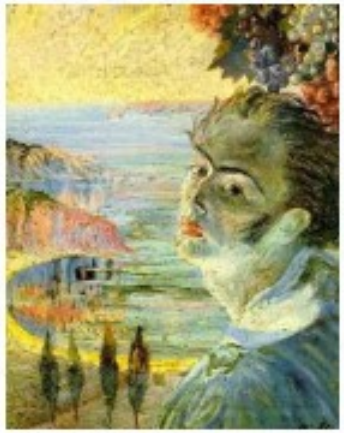
The number of times the digit 0 appears in this puzzle is 1.
The number of times the digit 1 appears in this puzzle is 11.
The number of times the digit 2 appears in this puzzle is 2.
The number of times the digit 3 appears in this puzzle is 1.
The number of times the digit 4 appears in this puzzle is 1.
The number of times the digit 5 appears in this puzzle is 1.
The number of times the digit 6 appears in this puzzle is 1.

Replace **?** Sign with count of numbers?

Painting by two different painters:
Supervised Learning



Painter A

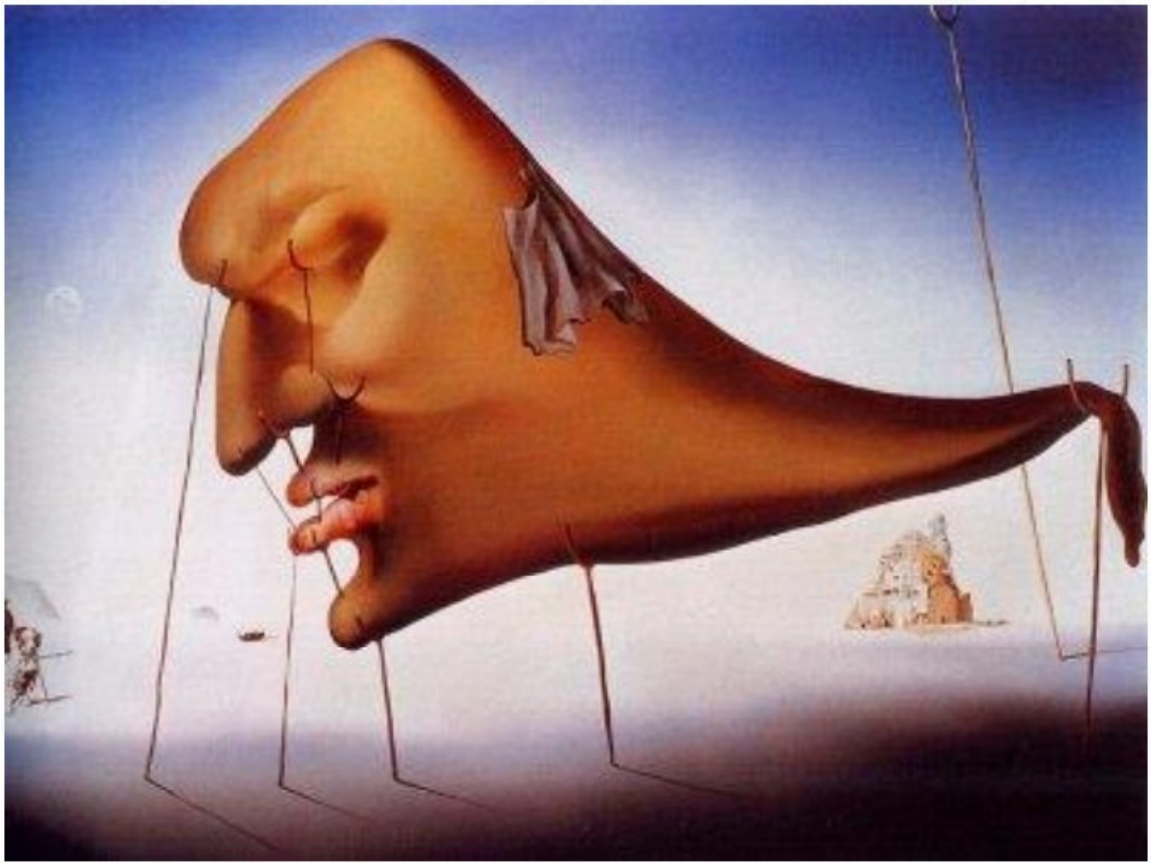




Painter B

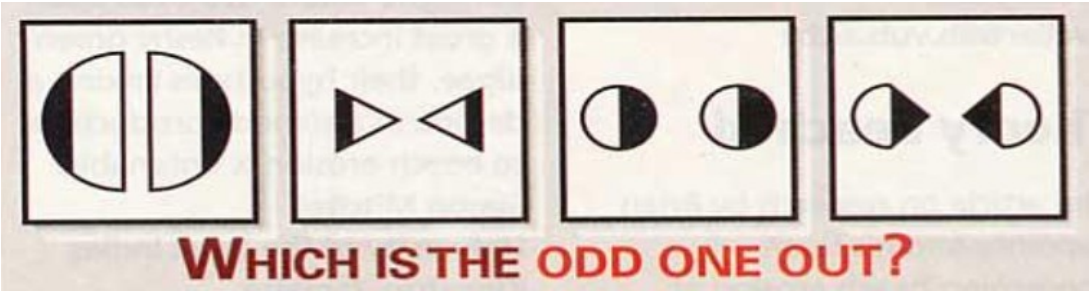
Now your turn...

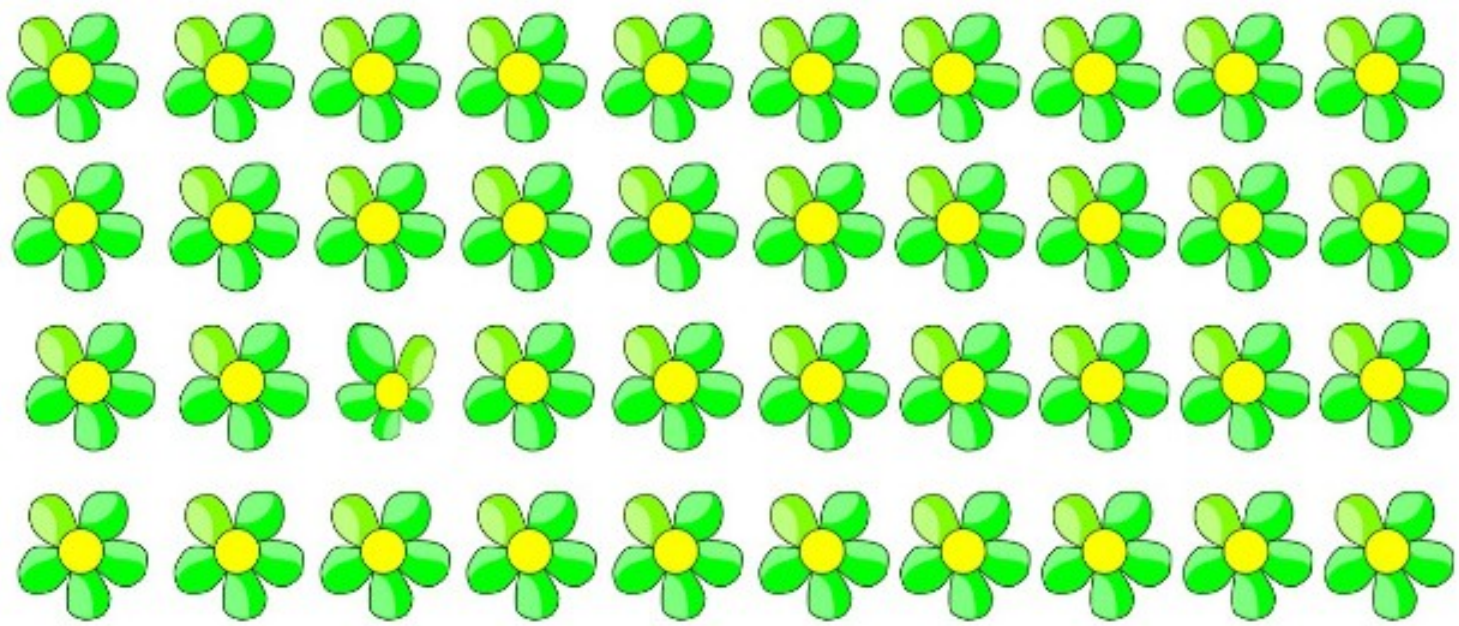
Who’s painting is this?

And this?



Finding the odd one out:
Unsupervised Learning



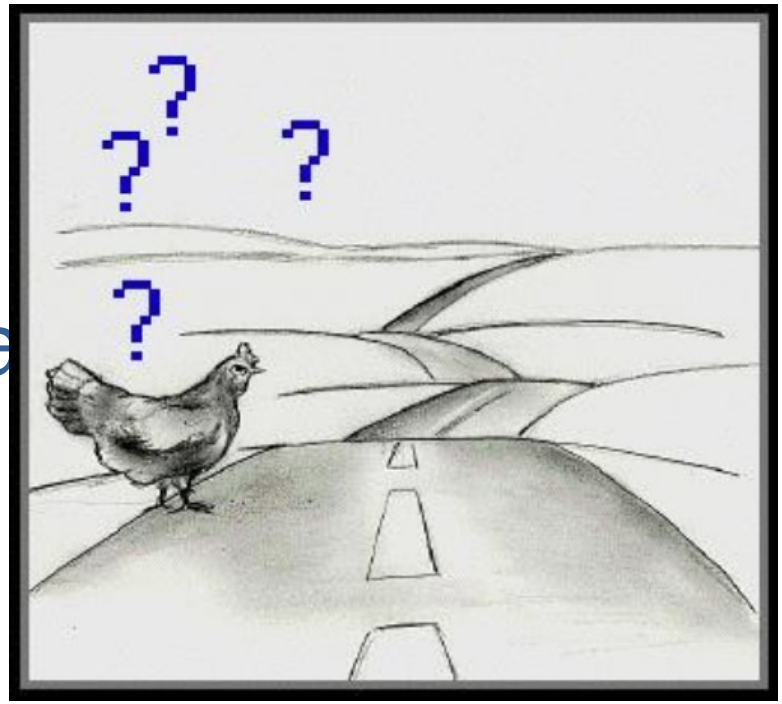


Some more...

What is the next number in this series?

- 1, 1, 2, 3, 5, ?

Would you cross a roa when a fast car is approaching?



These are the very characteristics of Intelligent beings!!

Conclusion

- Knight’s Plight
  - Planning
- Calculative Puzzle
  - Calculation, Computation, Reasc
- Finding the odd one out
  - Unsupervised Learning
- Painting by two different pair
  - Supervised Learning
- Series Completion
  - Prediction
- Road Crossing
  - Rational Actions
- Process of Writing this Conclusion
  - Summarizing, Abstraction

What is Artificial Intelligence?

- Computers are Dumb.
- Making a machine (computer) to perform the same tasks which you have just done is called _____.
  - Artificial Intelligence
- If you learn to do these tasks using existing data, then this is called _____.
  - Machine Learning

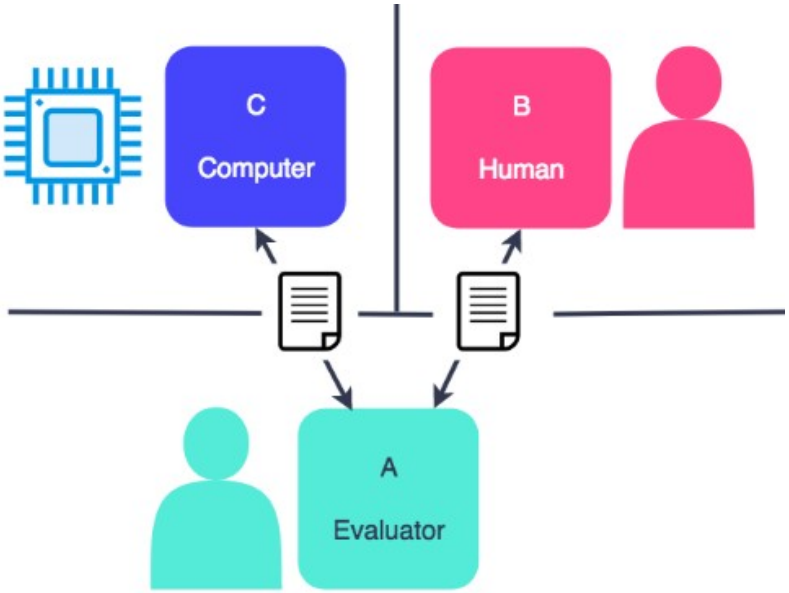
Artificial Intelligence

- Artificial Intelligence takes the problem of understanding *how we think* a step further
  - It attempts not just to understand it – but – also to build intelligent entities
- A more proper definition of Artificial Intelligence
  - *The art of creating machines that perform functions that require intelligence when performed by people [1]*
- Measurement of Artificial Intelligence
  - Turing Test

[1] Rich E., and Knight K., (1991). *Artificial Intelligence (2e),* McGraw-Hill, NewYork.

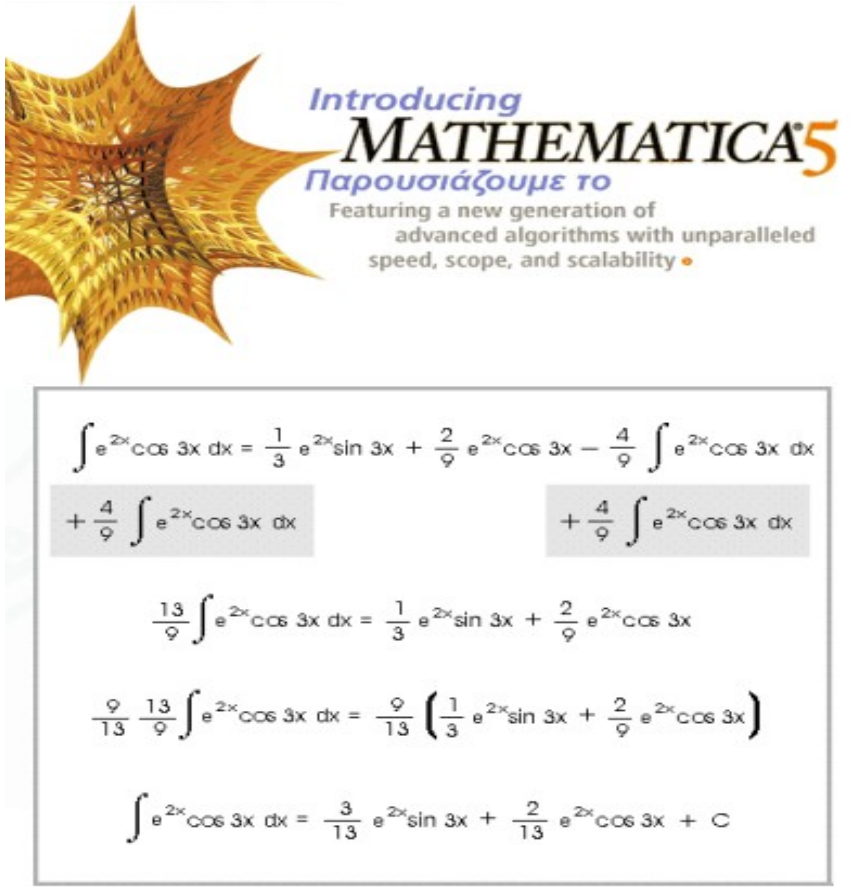
Turing Test

- Turing Test
  - Suggested major components of AI: knowledge, reasoning, language understanding, learning
- Application of the Turing Test
  - CAPTCHA: Completely Automated Public Turing test to tell Computers and Humans Apart



Is AI intelligent?

- Planning
  - Kasparov Vs. IBM Blue (1997)
- Calculation
  - Symbolic Integration Mathematica
  - Theorem Provers



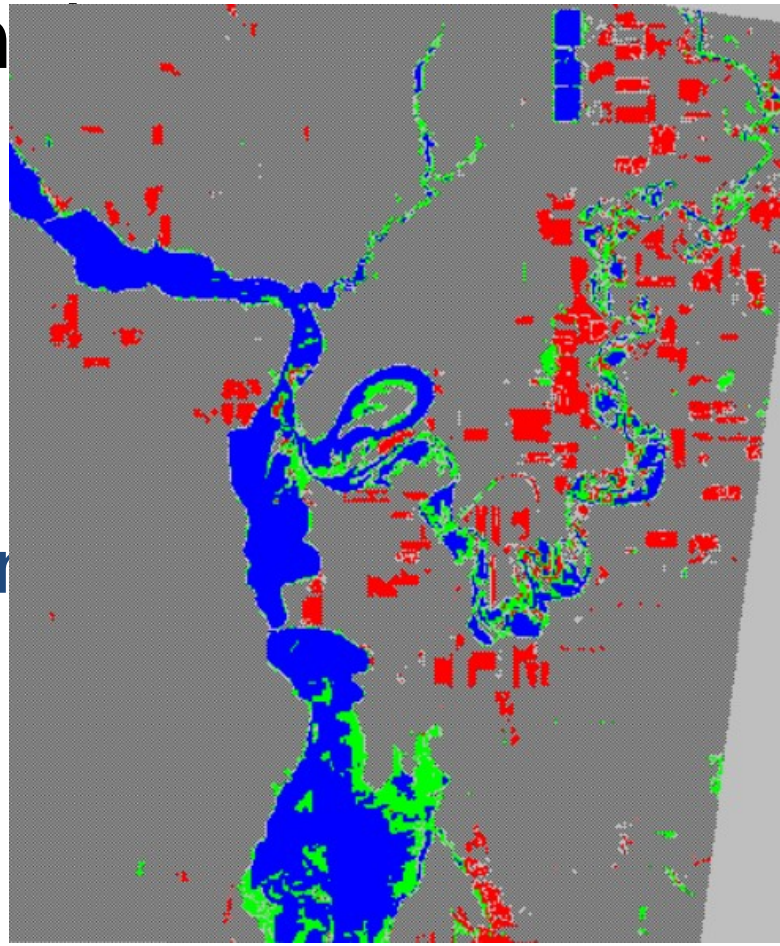
Is AI intelligent?

- Learning without a Tea
  - ERDAS Imagine
  - Classification of Land Use

ERDAS:

- World Class Remote Ser

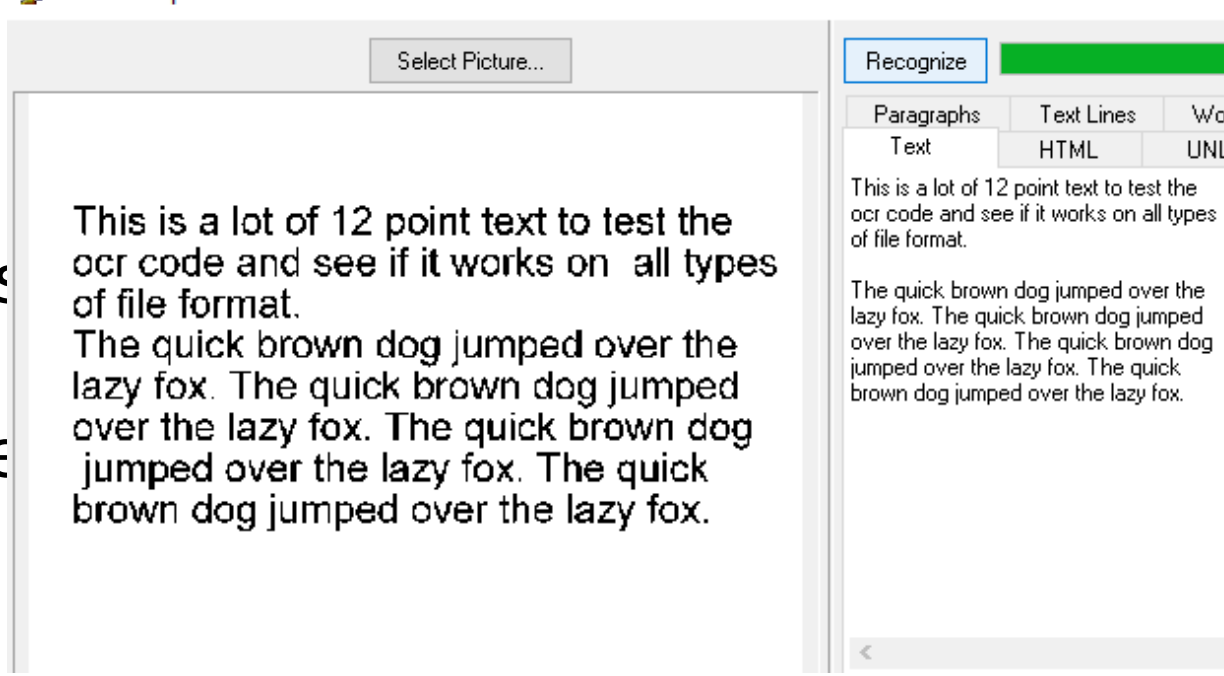
Software



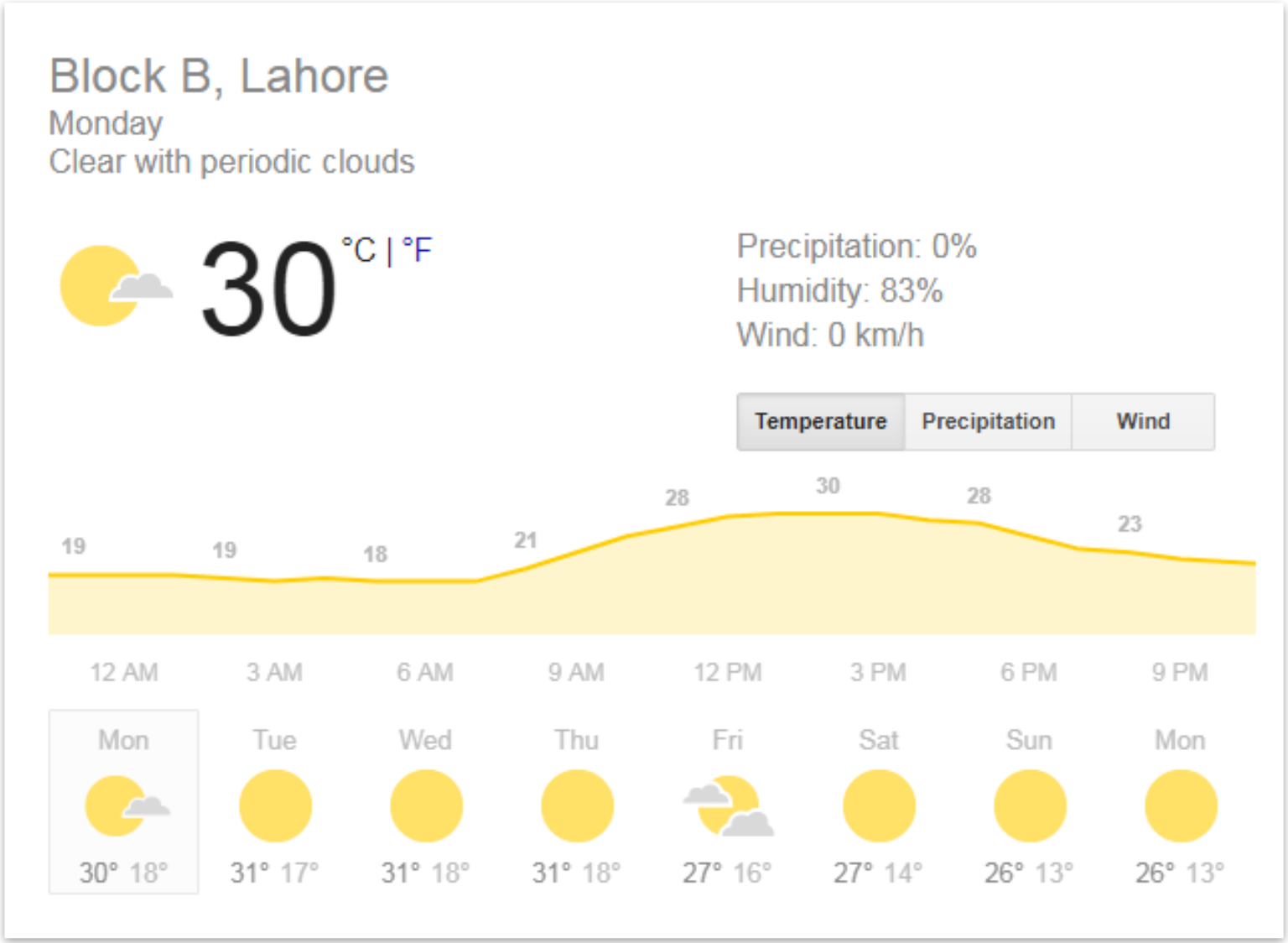
= water; = wetland; = marginal habitats; = upland (non-useable habitats).

Is AI intelligent?

- Learning with a teacher
  - No Hands Across America!
  - Optical Characte Recognition



Forecasting and Prediction

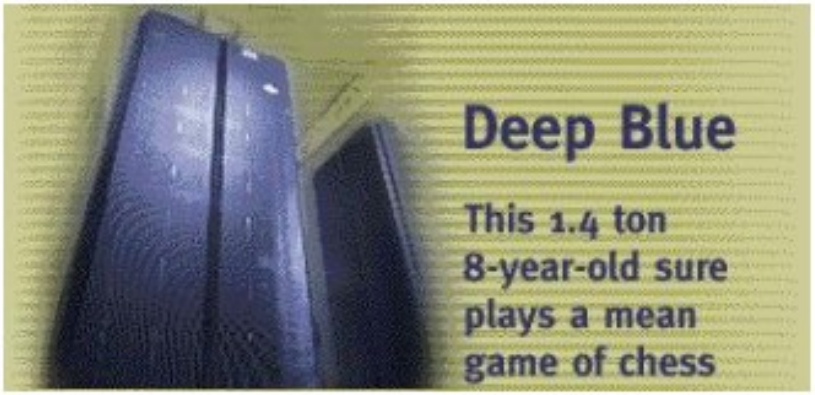


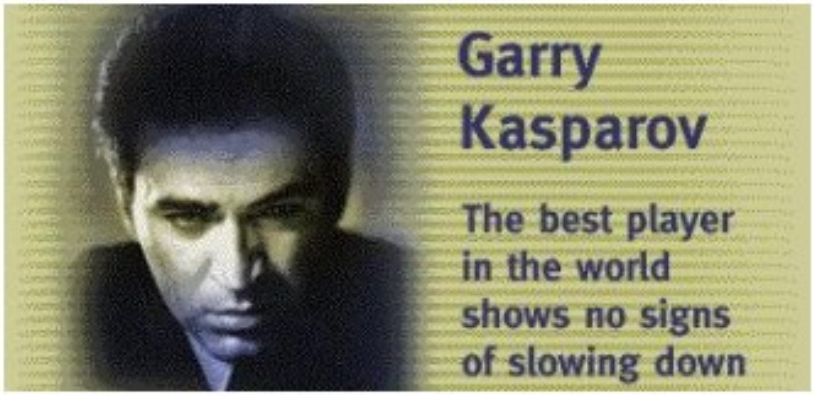
Is deep blue Intelligent?

Deep Blue defeated the world chess champion Garry Kasparov. Does this make Deep Blue **an intelligent machine**?

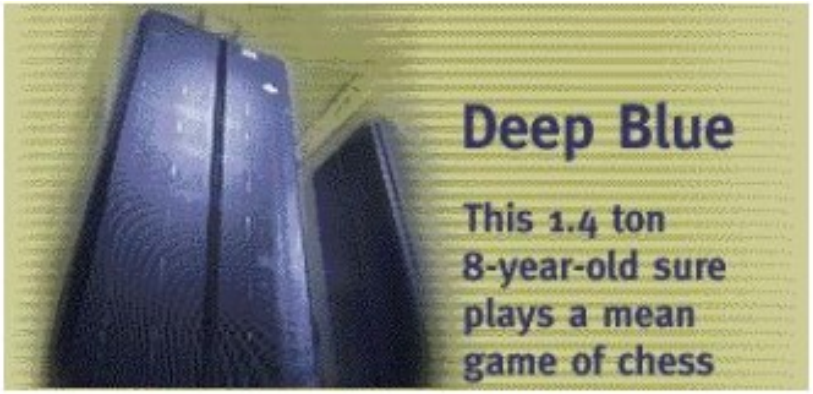
- Think about it for a few seconds and take a stance
- **Write down at least two items** that support your claim either way
- Pair up with your neighbor and Exchange opinions
- Try to argue for your stance
- Listen carefully to the arguments of your neighbor
- Try to reach an agreement, if possible
- Make your verdict: YES (machine is intelligent) or NO (machine is not intelligent) or X (no agreement)

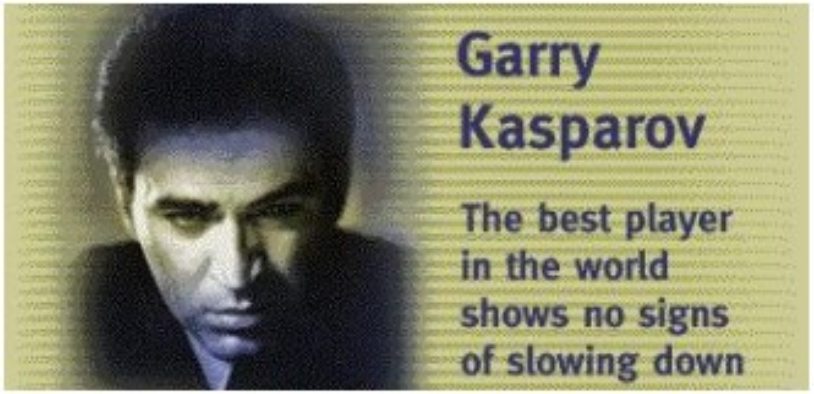
Deep Blue Vs Garry Kasparov





200,000,000 board configurations per second	**3 board configurations** per second
Has **small knowledge** about chess, but **a huge computational capacity**	Has **huge knowledge** about chess, but a considerably **smaller computational capacity**
A machine **has no emotions nor intuition**, it does not forget, cannot be confused or feel uncomfortable	Has feelings and **brilliant intuition**, but can experience **fatigue and boredom** and loss of concentration





Deep Blue **does not learn**, therefore it can't use artificial intelligence to learn from its opponent

Garry Kasparov can learn and **adapt quickly** based on his success or failure

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Deep Blue is incredibly efficient in **solving problems from the domain of chess** but is less "intelligent" even compared to a small child

Garry Kasparov is **generally very intelligent**: he authored several books and speaks many languages

Natural Language Understanding

- *The man tried to take a picture of a man with a turban.*
  - Did the man try to take a picture with a turban, or
  - take a picture of a man who is wearing a turban?
- *The man saw the boy with the telescope*
- Communicating in natural language assumes **world knowledge** and **the understanding of context**, both of which are required to resolve the ambiguities

Case Study: Self-driving Car

- Write two pages summary of Autonomous Car in YOUR OWN WORDS, take help from google.