Breaking the algorithmic paradigm

NSTC - Group 4
Outline

1. What is the algorithmic paradigm?
2. Breaking the algorithmic paradigm
3. Thinking outside the black box
1. Black Box
1. Deterministic
1. Terminating
Breaking the assumptions of the algorithmic paradigm

1. Black Box
   a. inputs over time
   b. adaptive to environment

1. Deterministic
   a. embracing randomness

1. Terminating
   a. continuous, unbounded process
Case study: Bio-inspired population based algorithms

Could we develop more powerful algorithms by ignoring the standard computation assumptions?

E.G. - Artificial Immune Systems (AIS): bio-inspired population-based algorithms:

i. What are they?

ii. Immune system properties:
    - pattern recognition, learning, memory, generation of diversity, noise tolerance, generalisation, distributed detection, optimisation [2] and inherent distributed parallel processing [1]

i. Break the algorithmic paradigm:
   1. Non-Deterministic - Identical inputs may lead to different outputs
   2. Non-Terminating

iii. Implementation?
Implementation of NSTC

1. We can only approximate on a classical computer.

1. Natural systems provide often efficient heuristic methods.

1. How can we model something that doesn’t follow our existing patterns?
Summary

1. What is an algorithmic paradigm
2. Breaking the algorithmic paradigm
3. Thinking outside the black box
References


Questions?