UiO : Department of Informatics
University of Oslo

INF3490 - Biologically inspired computing

Lecture 16th November 2016

Questions and Answers

Kai Olav Ellefsen

Q: What is roulette wheel selection?

- A: It is a way to illustrate/implement fitness-based selection.
- Nice explanation: http://www.edc.ncl.ac.uk/highlight/rhjanuary2007g02.php

# Q: What is the difference between absolute and relative fitness?

- Absolute fitness: The fitness value as returned by the fitness function

- Relative fitness: The fitness value compared to others in the population
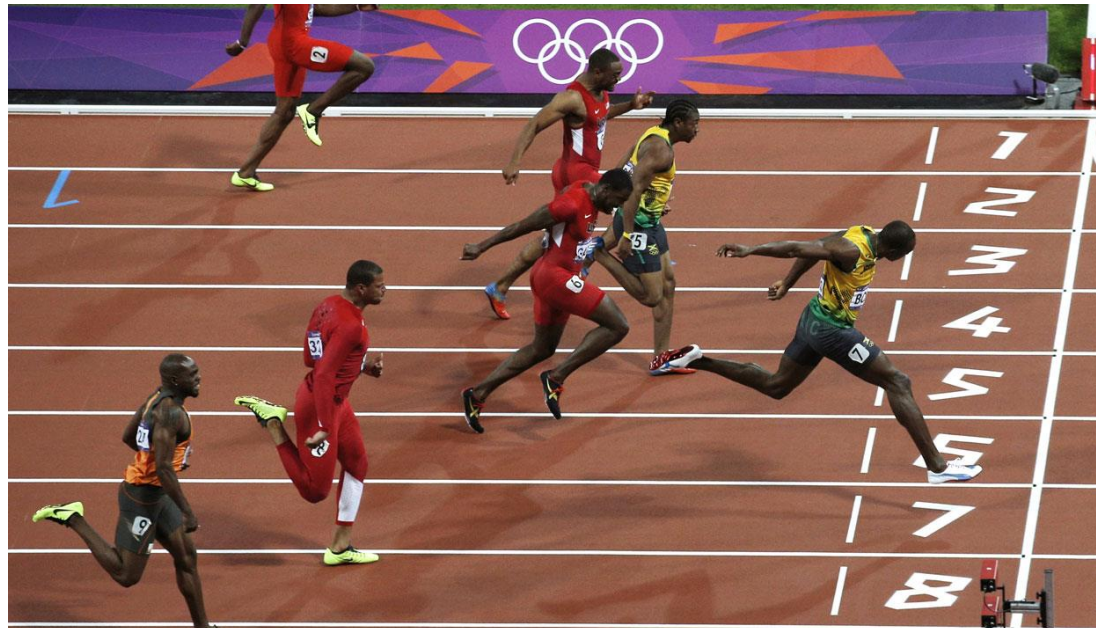
Q: What is the difference between absolute and relative fitness?

- Example: Rank-based selection:

http://www.obitko.com/tutorials/genetic-algorithms/selection.php
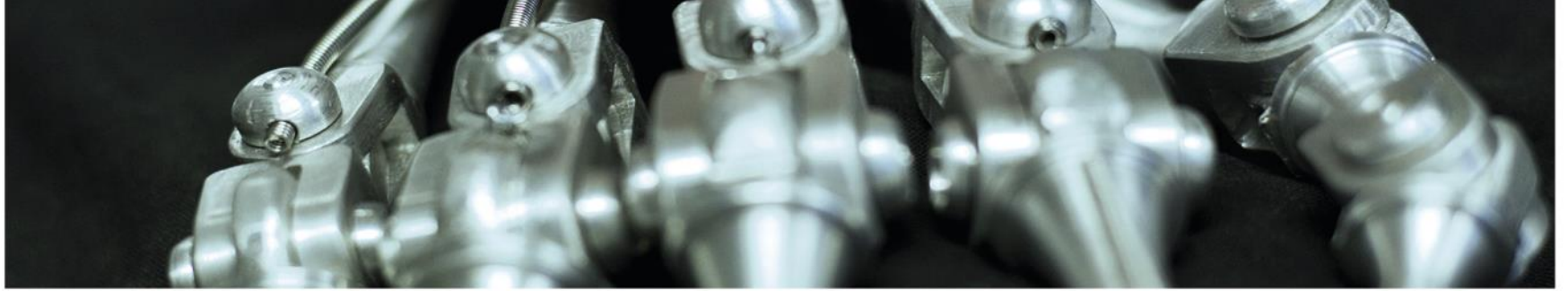
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Questions and Answers

Jim Tørresen

Problem 6

What *controls* the search in simulated annealing?	A	Time	
	B	Temperature	
	C	Initial solution	
	D	Final solution	

Annealing

A thermal process for obtaining low energy states of a solid in a heat bath:

- – Increase the temperature of the heat bath to a the point at which the solid melts
- – Decrease the temperature slowly
- – If done slowly enough, the particles arrange themselves in the minimum energy state

4. Simulated annealing

- Set an initial temperature T
- Pick an initial solution
- Repeat:
  - Pick a solution neighboring the current solution
  - If the new one is better, keep it
  - Otherwise, keep the new one with a probability
    Depend on the temp. (high temp => high prop.)
  - Decrease T

Q: Explain Principal Components analysis (PCA)

- Used for dimension reduction and feature transformation (both useful for machine learning).

- Principal component analysis creates variables that are **linear combinations** of the original variables.

- The new variables have the property that the variables are all orthogonal.

- Overview: https://www.youtube.com/watch?v=BfTMmoDFXyE

- Application example: www.mdpi.com/1424-8220/12/9/12489/pdf

- Paper: Algorithm example: http://faculty.iiit.ac.in/~mkrishna/PrincipalComponents.pdf

- Video: Image proc: https://www.youtube.com/watch?v=SaEmG4wcFfg

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Q: Is Euronet Roboethics Atelier question on exam 2015 part of the syllabus?

- A: YES

- See lecture 9 November
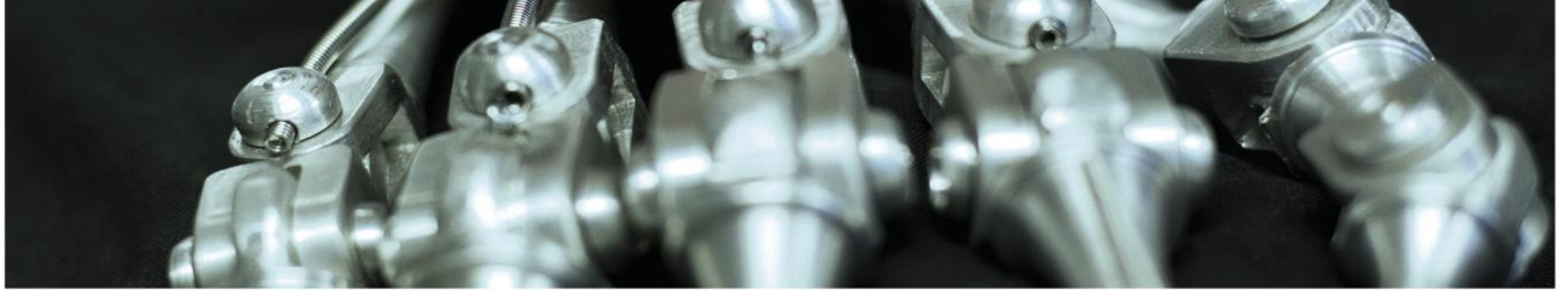
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INF3490/INF4490 Biologically inspired computing

Future Perspectives on Artificial Intelligence

- What to expect and should we worry?

Ethical Recommendations for Commercial Robots (Euronet Roboethics Atelier)

- *Safety:* There must be mechanisms (or opportunities for an operator) to control and limit a robot's autonomy.

- *Security:* There must be a password or other keys to avoid inappropriate and illegal use of a robot.

- *Traceability:* Similarly as aircraft, robots should have a "black box" to record and document their own behavior.

- *Identifiability:* Robots should have serial numbers and registration number similar cars.

- *Privacy policy:* Software and hardware should be used to encrypt and password protect sensitive data that the robot needs to save.