Natural Computation Methods in Machine Learning (NCML)

Olle Gällmo

(olle.gallmo@it.uu.se)

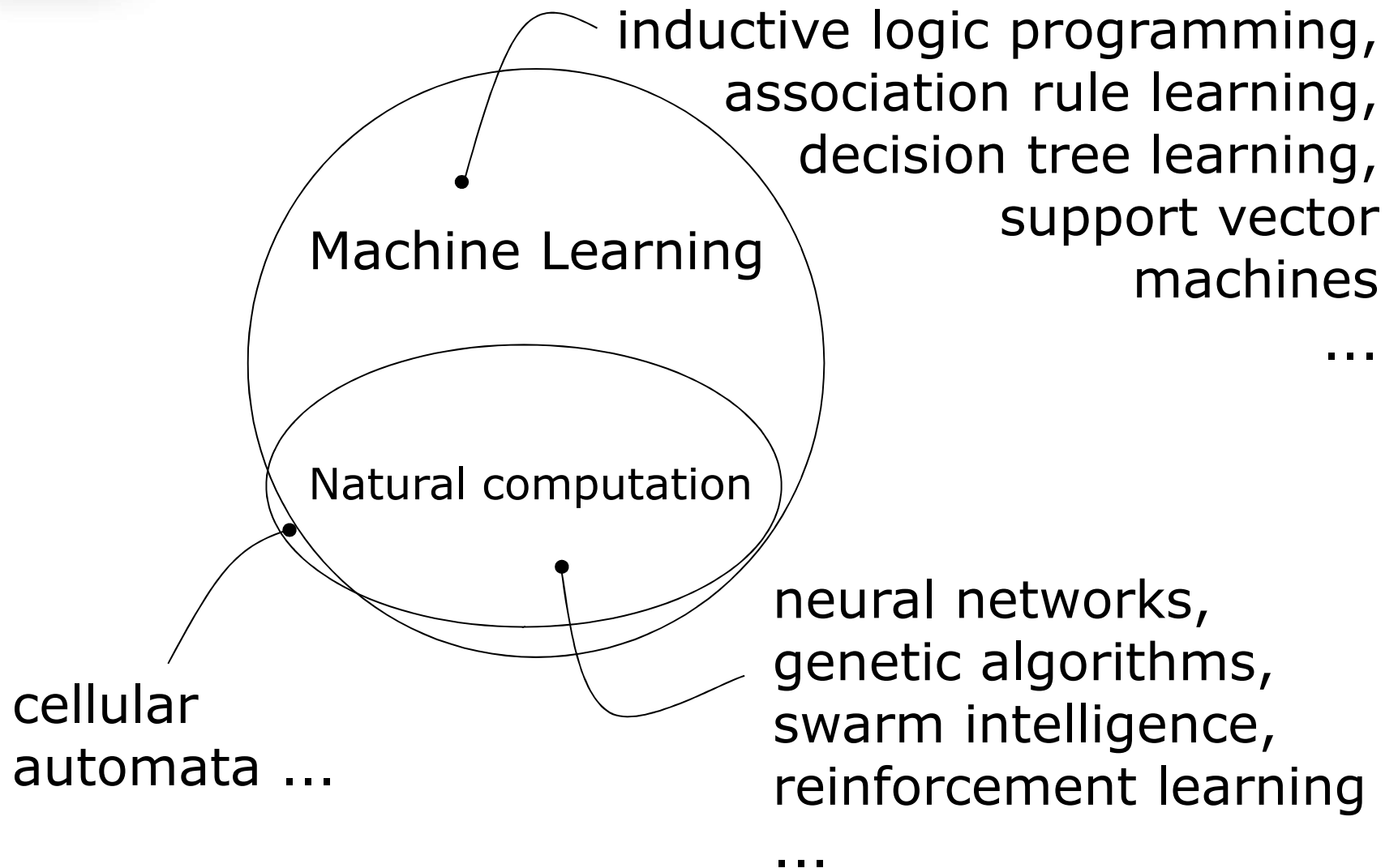Olle Gällmo

Chencheng Liang

Shenghui Li

+ Riccardo De Masellis, as extra supervisor for course projects

Natural Computation, in context

inductive logic programming,
association rule learning,
decision tree learning,
support vector
machines

...

Machine Learning

Natural computation

neural networks,
genetic algorithms,
swarm intelligence,
reinforcement learning

...

cellular
automata ...

Course contents

Background

Supervised neural networks

Extensions and variants

Reinforcement learning

Unsupervised learning

Evolutionary methods

Swarm intelligence

Natural Computation!

Administration

- If you are admitted but have not registered yet
    - Please do as soon as possible (registration closes soon)
- If you are retaking the course from a previous year
    - Send an email to it-kansli@it.uu.se, for re-registration
- If you have applied to the course but were rejected
    - Talk to me and I will look into it
- If you did not apply
    - Sorry, too late to fix now
- Please read full course information in Studium!
- Course evaluations from last year
   - Very happy students (4.5), despite the pandemic

Course changes

- Not many changes from last year
  - Most lectures were remade for last year, to suite online teaching better. Some parts will be revised for this year
  - Studium was new last year. I'm still learning ...
- This year the course was planned for campus teaching but we must start it online (Zoom)
  - Lecture halls still booked, though, if you want to sit there
- Labs should be done on your own computers
  - Requires installed software, in particular Matlab
  - Lab halls are booked on campus for those who want to sit there, but doing the labs there should be avoided, for now
- The written exam will be a hall exam

Course outline

- 18 lectures, January 17 – March 31
- 5 labs (1 voluntary, 4 mandatory), 3 credits
  - Workload varies a bit between labs
- Self defined student project, 3 credits
  - Kickoff lecture March 28
- Written exam, April 8 (8.00-13.00), 4 credits
- Project presentations May 30-31
- Re-exams June 11 and one in August
  - date for August exam to be decided

Course material

- The book should be available as an ebook through the university library
  - Reading instructions in Studium
  - Do I need it?
- Lecture slides, in Studium
- Handouts, in Studium
  - Scientific papers, previous exams etc.
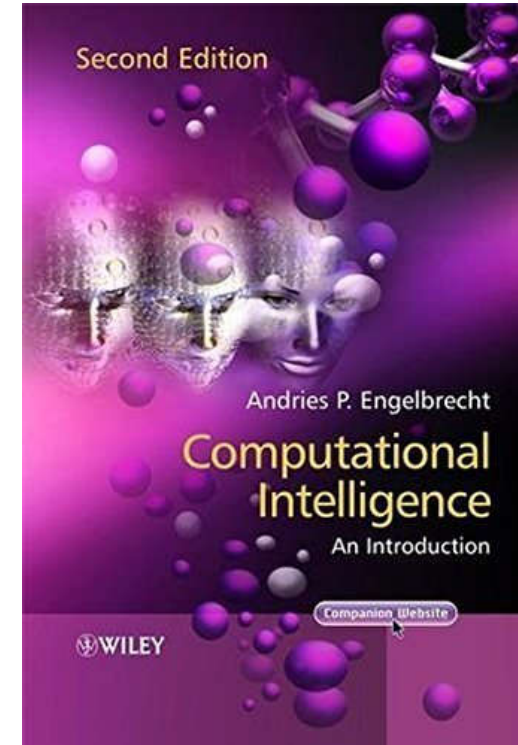
Voluntary introduction lab

- An overview of methods taught on the course

- Nothing to hand in (it's just an appetizer)

- You are not supposed to understand everything that happens today!

- The lab may raise interesting questions which you should write down and return to later

- Assistants available on Zoom:

  - https://uu-se.zoom.us/j/67962879988

  - If you can't do it today, do it as soon as possible

  - The lectures will refer to it on several occasions