Lectures on

Advanced Machine Learning

Administrative information

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M.Sc. in Computer Science or in Data Science

Advanced Machine Learning (252-0535-00L, 3V + 2U + 2A) is a core focus course in the focus areas “Visual Computing”, “Information Systems” and “Theoretical Computer Science” of the M.Sc. in Computer Science

http://www.inf.ethz.ch/education/master/master_CS/CSmasterstracks/VisCom.pdf
https://www.inf.ethz.ch/studies/master/master-ds.html

Computer science tracks:

Open all + Close all −

General Computer Science	Open +
Theoretical Computer Science	Open +
Information Security	Open +
Software Engineering	Open +
Information Systems	Open +
Distributed Systems	Open +
Visual Computing	Close −

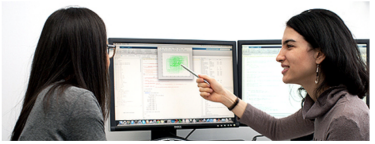
Visual computing connects the areas of computer graphics, computer vision, and geometry processing to classical disciplines such as optics, robotics, human-machine and interaction as well as many more fields in computer science, physics, mathematics, and engineering.

Visual computing is an exciting and dynamic discipline that has applications in everyday life and has great impact on scenarios in robotics, mobile communication, medical imaging, driver assistance, physical simulation, film and game industries, and much more.

Visual Computing (PDF, 52 KB)

Computational Science	Open +

Master in Data Science



Data science is a driving force of today's information age. The specialized ETH Master's program in data science, offered in collaboration with the Department of Mathematics as well as the Department of Information Technology and Electrical Engineering, provides a high quality education geared towards nurturing the next generation of data scientists. It is a two-year program fully taught in English.

Computers have fundamentally changed the way the world produces, manages, processes and analyzes data. In light of the continuous growth of data all around the globe, the question of how we can use data to gain valuable insights is more important than ever. How can we extract relevant information from massive amounts of data? In which way can computers learn from experience to make intelligent decisions? These questions are key to the specialized Master’s program in data science.

Literature

- **Kevin P. Murphy**, *Machine Learning: A Probabilistic Perspective*. MIT Press (2012)
- Christopher M. Bishop, *Pattern Recognition and Machine Learning*. Springer (2006)
- Richard O. Duda, Peter E. Hart & David G. Stork, *Pattern Classification*. Wiley (2001) **Trevor Hastie, Robert Tibshirani & Jerome Friedman**, *The Elements of Statistical Learning: Data Mining, Inference and Prediction*. 2nd ed. Springer Verlag (2009)

Theoretical Pattern Recognition:

- Luc Devroye, Laslo Györfi & Gabor Lugosi, *A Probabilistic Theory of Pattern Recognition*. Springer Verlag (1996)
- **Vladimir N. Vapnik**, *Estimation of Dependences Based on Empirical Data*. Springer Verlag (1983)
- Ulf Grenander & Michael Miller, *Pattern Theory* - From Representations to Inference. Oxford UP (2007); Ulf Grenander, General Pattern Theory: A Mathematical Study of Regular Structures. Oxford University Press (1993)

Literature (cont.)

Introduction to Pattern Recognition:

- Andrew Webb, *Statistical Pattern Recognition*. Wiley & Sons, (2002)
- Keinosuke Fukunaga, *Statistical Pattern Recognition*. Academic Press (1990)
- Brian D. Ripley, *Pattern Recognition and Neural Networks*. Cambridge University Press (1996)

Statistics:

- **Larry Wasserman**, *All of Statistics*. (1st ed. 2004. Corr. 2nd printing, ISBN: 0-387-40272-1) Springer Verlag (2004)
- Larry Wasserman, *All of Non-Parametric Statistics*. (1st ed. 2006. ISBN 978-0-387-30623-0) Springer Verlag (2006)

Teaching staff

Head TA

Dr. Luis Haug

Practical projects

Alina Dubatovka
Robin Geyer
Fabian Laumer
Djordje Miladinovic
Olga Mineeva
Aytunc Sahin

Tutorials

Dr. Carlos Cotrini
Joanna Ficek
Maysam Haghdan
Mikhail Karasikov
Francesco Locatello
Xinrui Lyu
Clara Meister
Stefan Stark

Contacting us

Piazza: `piazza.com/ethz.ch/fall2019/2520535001`

- Use this as the preferred way of getting your questions answered
- Always check if your question is already answered
- Sign up as a student

Website: `https://ml2.inf.ethz.ch/courses/aml/`

- Contains plenty of course-related information

Email: `aml@inf.ethz.ch`

- Use email only as a last resort

Tutorials

Wed 13-15	CAB G 61	Surnames A – E
Wed 15-17	CAB G 61	Surnames F – Le
Thu 15-17	CAB G 51	Surnames Li – Sch
Fri 13-15	CAB G 61	Surnames Sd – Z

- Tutorials start in the second week of the semester
- Four identical weekly sessions with same TA
- Assignment to session based on first letter of surname
- Attendance is highly recommended

Homework

- Weekly homework assignments or projects
- No requirement to submit solutions (no *Testat*)
- If you choose to submit, email a soft copy to the responsible TA (typed or scan of a handwritten solution)
- Solving the assignments is **highly recommended**
- One exam question will be very similar to one of the homework problems

Practical projects

Organization

- **Four practical projects** (2-3 weeks each) hosted on *aml.ise.inf.ethz.ch*
- Participation and a passing score for the project component of the course is **mandatory** to complete the course

Grading

Passing requirements: In order to earn the course credits, you have to

- participate in at least **three** out of four practical projects **AND**
- surpass the easy baseline on the **public** leaderboard in at least **three** out of four practical projects.

Final grade:

- The final grade is **70% exam grade + 30% avg. project grade** (on private leaderboard)

PhD students: Conditions are the same as for Master students

Dishonest Project Solutions

"Honest" solutions ...

- ... use only the provided data;
- ... do not use models pretrained with additional data;
- ... have to be developed by using common libraries (sklearn, tensorflow, etc.);
- ... do not make use of task-specific code tailored by third parties (this is clearly fraudulent!).

How to test?

- We are aware that dishonest solutions are possible for some tasks.
- We monitor submission to detect fraudulent solution!
- You may be asked to provide implementation details or code to reproduce your solution.

Dishonest solutions are not accepted and may trigger a fraud notification to the rector's office!

Institute for Machine Learning

Where can you find us?

South corner of CAB on E, F and G floors