

UNIVERSITY OF BERGEN

INFO 284 – Machine Learning

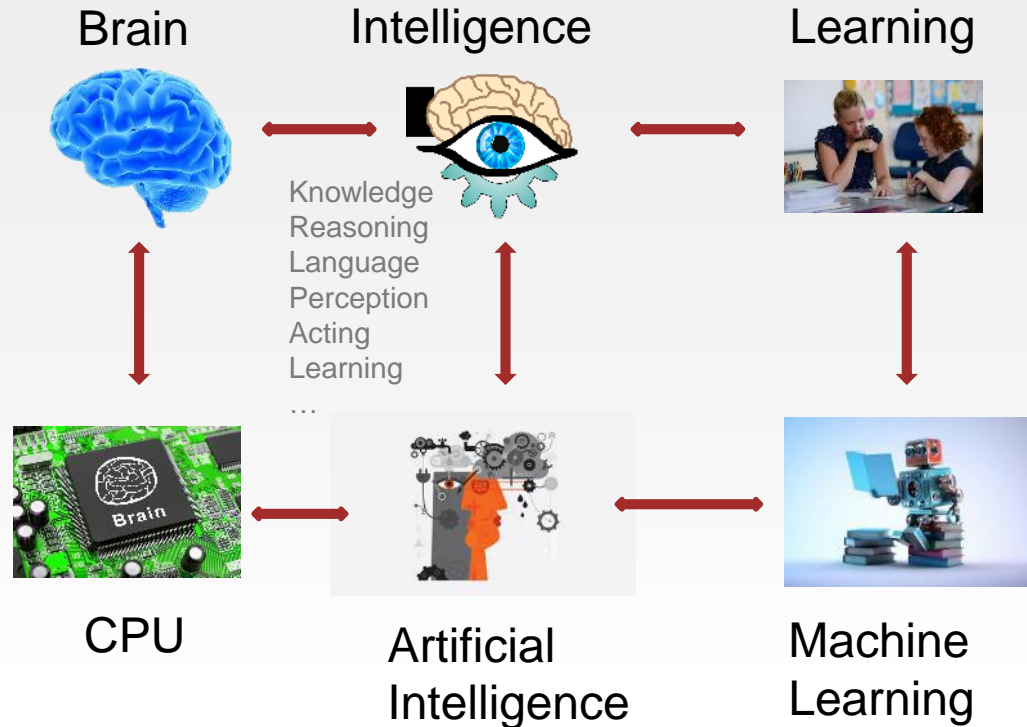
Introduction to Course

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The Mind Analogy

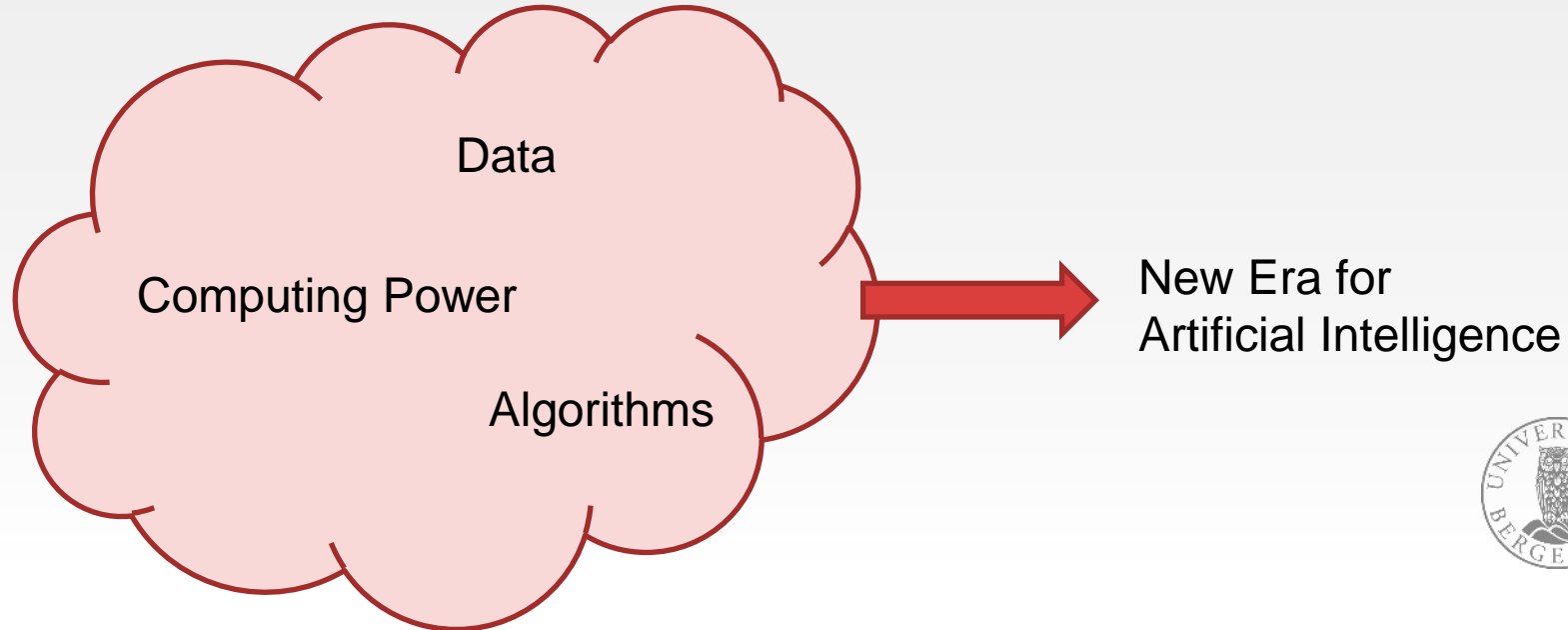


What is learned:

- Categorizing
- Predicting
- Creating
- Behaving
- Reasoning
- Understanding
- ...

Machine Learning

= Using data to build skills for the artificial intelligence system



The course

Goal and content

The course introduces Machine Learning, with a view towards data analysis applications. Topics covered are supervised learning (classification and regression), unsupervised learning including clustering, decision tree learning, Bayesian learning, and working with textual data.

Learning outcomes

Knowledge

The candidate

- has theoretical knowledge about the principles of machine learning
- has a basic understanding of the contemporary machine learning algorithms
- has a broad knowledge about the use of machine learning in data analysis, its advantages and limitations

Skills

The candidate

- can analyze and design machine learning solutions for data analysis applications



The Lectures

1. 18.jan Course Information
2. 25.jan Introduction to machine learning, kNN,
3. 1.feb Supervised learning – naïve Bayes
4. 8.feb Supervised learning – linear regression
5. 15.feb Supervised learning – linear classifiers, support vector machines
6. 22.feb Supervised learning – Decision trees
7. 1.mar Neural networks I - foundations
8. 8.mar Neural networks II – convolutional networks
9. 15.mar Neural networks III – recurrent neural networks and more
10. 22.mar Machine learning practice
11. 29. mar Unsupervised learning - Dimensionality reduction
12. 5.apr Unsupervised learning - Clustering
13. 19.apr Reinforcement learning
14. 26. apr Open



The Labs

- Two hours every week
- Programming assignments
- Supervision for group exam
- Starting January 24th
- No mandatory assignments



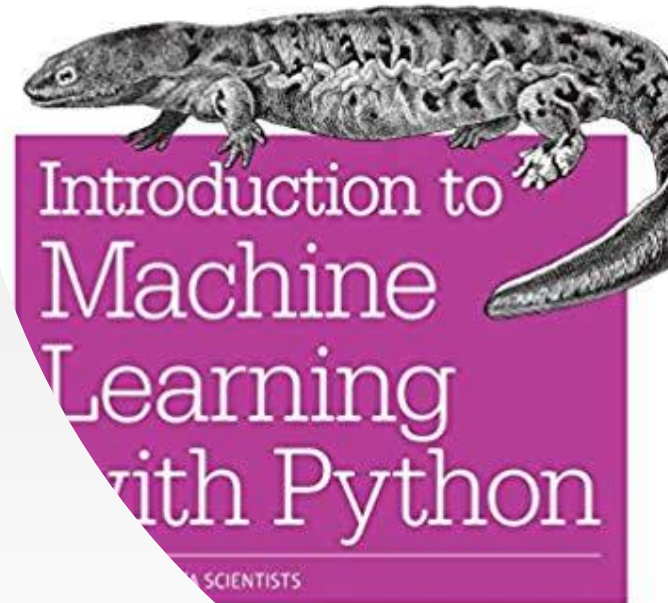
The Exam

- Group exam
 - Assignment coming in February
 - 1-4 students in each group
 - Counts 30%
- Digital home exam
 - Multiple choice
 - Counts 70%



Textbooks and articles

- **Introduction to Machine Learning with Python: A Guide for Data Scientists** by Andreas C. Müller and Sarah Guido
- **Artificial Intelligence. Foundations of Computational Agents, 2e** by David Poole and Alan Mackworth, Chapters 7, 10, 12. available online: <http://artint.info/>
- **Mathematics for Machine Learning** by Garrett Thomas Available online: <https://gwthomas.github.io/docs/math4ml.pdf>
- **A Few Useful Things to Know About Machine Learning**, P. Domingos. Communications of the ACM, Vol. 55, No 10, October 2012, pp. 78-87



Videos and web resources

- Videos
 - A friendly introduction to convolutional neural networks and image recognition by Luis Serrano
 - Sequence Modeling with Neural Networks by Harini Suresh
- Web sites
 - Deep Learning Tutorial by Yann LeCun
 - Convolutional Neural Networks (CNNs / ConvNets)
 - Fashion MIST Zalando
 - Convolutional Neural Network Tutorial by Avijet Biswal
 - A Comprehensive Tutorial to learn Convolutional Neural Networks from Scratch by Pulkit Sharma



The lecturer

- Bjørnar Tessem
 - AI researcher and teacher since 1980-ies
 - Topics
 - Analogical reasoning
 - Bayesian networks
 - Natural Language Processing
 - Applied AI
 - ...





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