
Applied Machine Learning in Health Sciences

January 2023

- Lecture Plan

Teaching Material

1. **ISL:** Introduction to Statistical Learning, second edition.
Freely available as pdf: https://hastie.su.domains/ISLR2/ISLRv2_website.pdf
2. **Lecture slides/notes, links to video clips, and exercise material:** Will be available on Brightspace.

Please prepare before lectures by self-studying textbook material, watch video clips, etc.

Location

Location: Loftsalen (1266-316), Victor Albeck Bygningen, Vennelyst Boulevard 4, 8000 Aarhus C.

- Monday 9th January, 08:00-16:00
- Wednesday 11th January, 08:00-16:00
- Friday 13th January, 08:00-16:00
- Monday 16th January, 08:00-16:00
- Wednesday 18th January, 08:00-16:00

Scheduled lunch break: 11:45-12:30.

Laptop and programming software

Please bring your own laptop (remember charger) with e.g. Matlab or R installed in advance.
Please see the welcome letter for more information on programming software.

9 Jan 2023 Morning	Introduction, model training and test, supervised learning: linear regression, bias-variance decomposition, cross validation
Prepare in advance	Read ISL: 1, 2 (intro), 2.1, 2.1.1-2.1.5, 2.2, 2.2.1-2.2.3, 3 (intro), 3.1, 3.1.1, 3.2, 3.2.1, 3.3.1, 3.3.2, 5 (intro), 5.1, 5.1.1, 5.1.2, 5.1.3, 5.1.4, 6.4, 6.4.1-6.4.4. Optional: Video material (see Brightspace).
In class activities 08:00-11:45	Lectures & exercises (conceptual, theoretical, computer).
9 Jan 2023 Afternoon	Introduction, model training and test, supervised learning: linear regression, bias-variance decomposition, cross validation (continued)
Prepare in advance	Same material as for the morning session.
In class activities 12:30-16:00	Lectures & exercises (conceptual, theoretical, computer).

11 Jan 2023 Morning	Supervised learning: Logistic regression. Model regularization (shrinkage methods)
Prepare in advance	Read ISL: 4 (intro), 4.1, 4.2, 4.3, 4.3.1-4.3.5, 5.1.5, 6 (intro), 6.2, 6.2.1-6.2.3. Optional: Video material (see Brightspace).
In class activities 08:00-11:45	Lectures & exercises (conceptual, theoretical, computer).
11 Jan 2023 Afternoon	Supervised learning: Support vector machines
Prepare in advance	Read ISL: 9, 9.1.1-9.1.5, 9.2.1, 9.2.2, 9.3.1, 9.3.2. Optional: Video material (see Brightspace).
In class activities 12:30-16:00	Lectures & exercises (conceptual, theoretical, computer).

13 Jan 2023 Morning	Neural networks
Prepare in advance	Read ISL: 10 (intro), 10.1, 10.2, 10.3, 10.3.1-10.3.5, 10.6, (10.7, 10.7.1-10.7.4). Optional: Video material and Neural Networks notes. (see Brightspace).
In class activities 08:00-11:45	Lectures & exercises (conceptual, theoretical, computer).
13 Jan 2023 Afternoon	Group work – Supervised learning
Prepare in advance	Curriculum from 1 st -3 rd course day.
In class activities 12:30-16:00	Group work and group presentations.

16 Jan 2023 Morning	Unsupervised learning: Dimension reduction techniques, principal component analysis
Prepare in advance	Read ISL: 2.1.4, 12 (intro), 12.1, 12.2, 12.2.1-12.2.5. Optional: Video material (see Brightspace).
In class activities 08:00-11:45	Lectures & exercises (conceptual, theoretical, computer).
16 Jan 2023 Afternoon	Unsupervised learning: K- means clustering, Hierarchical clustering
Prepare in advance	Read ISL 12.1, 12.4, 12.4.1, 12.4.2, 12.4.3. Optional: Video material (see Brightspace).
In class activities 12:30-16:00	Lectures & exercises (conceptual, theoretical, computer).

18 Jan 2023 Morning	Group work – Unsupervised learning
Prepare in advance	Material from the 4 th course day.
In class activities 08:00-11:45	Group work and group presentations
16 Jan 2022 Afternoon	Q&A and Machine learning project
Prepare in advance	Curriculum from 1 st – 4 th course day. Start thinking about the machine learning project: Data set, research question, machine learning methods, etc.
In class activities 12:30-16:00	Q&A session. Start working on machine learning projects, discuss/get feedback on project ideas.

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