SIRCSS Advanced Winter School in Computational Social Science

December 1 – December 12, 2025, Linköpings Universitet, Campus Norrköping

Director of the Research School

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Course description

The Advanced Winter School (AWS) in Computational Social Science at the Swedish Interdisciplinary Research School in Computational Social Science (SIRCSS) is a two-week intensive course designed to familiarize the participants with advanced methods in machine learning and network science for usage in CSS settings.

The first week is primarily dedicated to various state-of-the-art machine learning methods from supervised and parametric learning methods to the analysis of image data. In a mixture of lectures and laboratories, the participants will learn about one group of methods each day and then proceed to apply these methods directly.

In a second part, the participants will learn about advanced network science methods and apply the learned knowledge from the morning lectures in afternoon laboratories. Both the machine learning and network analysis parts are rounded off with one deep-dive seminar each.

The second week then shifts gears, with the participants finishing the network science part of the AWS, before moving on to group projects on Tuesday and Wednesday. Thursday and Friday are reserved for final project presentations.

Prerequisites

To prepare for the AWS, please review the following reading lists. This literature is intended as preparation for the two seminars, which will focus on a deep reading and analysis of the methods in practical applications. Please read the six papers for the seminars.

Reading List 1: Machine Learning

- Salganik, M. J., Lundberg, I., Kindel, A. T., Ahearn, C. E., Al-Ghoneim, K., Almaatouq, A., ... & McLanahan, S. (2020). Measuring the predictability of life outcomes with a scientific mass collaboration. *Proceedings of the National Academy of Sciences, 117*(15), 8398–8403.

- Torres, M., & Cant, F. (2022). Learning to see: Convolutional neural networks for the analysis of social science data. *Political Analysis, 30*(1), 113–131.

- Brand, J. E., Xu, J., Koch, B., & Geraldo, P. (2021). Uncovering sociological effect heterogeneity using tree-based machine learning. *Sociological Methodology, 51*(2), 189–223.

Reading List 2: Social Networks

- Gerbrands, P., Unger, B., Getzner, M., & Ferwerda, J. (2022). The effect of anti-money laundering policies: an empirical network analysis. EPJ Data Science , 11 (1), 15. Https://doi.org/10.1140/epjds/s13688-022-00328-8

- Thiemann, C., Theis, F., Grady, D., Brune, R., & Brockmann, D. (2010). The structure of borders in a small world. PloS One , 5 (11), e15422. Https://doi.org/10.1371/journal.pone.0015422

- Yang, Y., Chawla, N. V., & Uzzi, B. (2019). A network's gender composition and communication pattern predict women's leadership success. Proceedings of the National Academy of Sciences of the United States of America , 116 (6), 2033–2038. https://doi.org/10.1073/pnas.1721438116
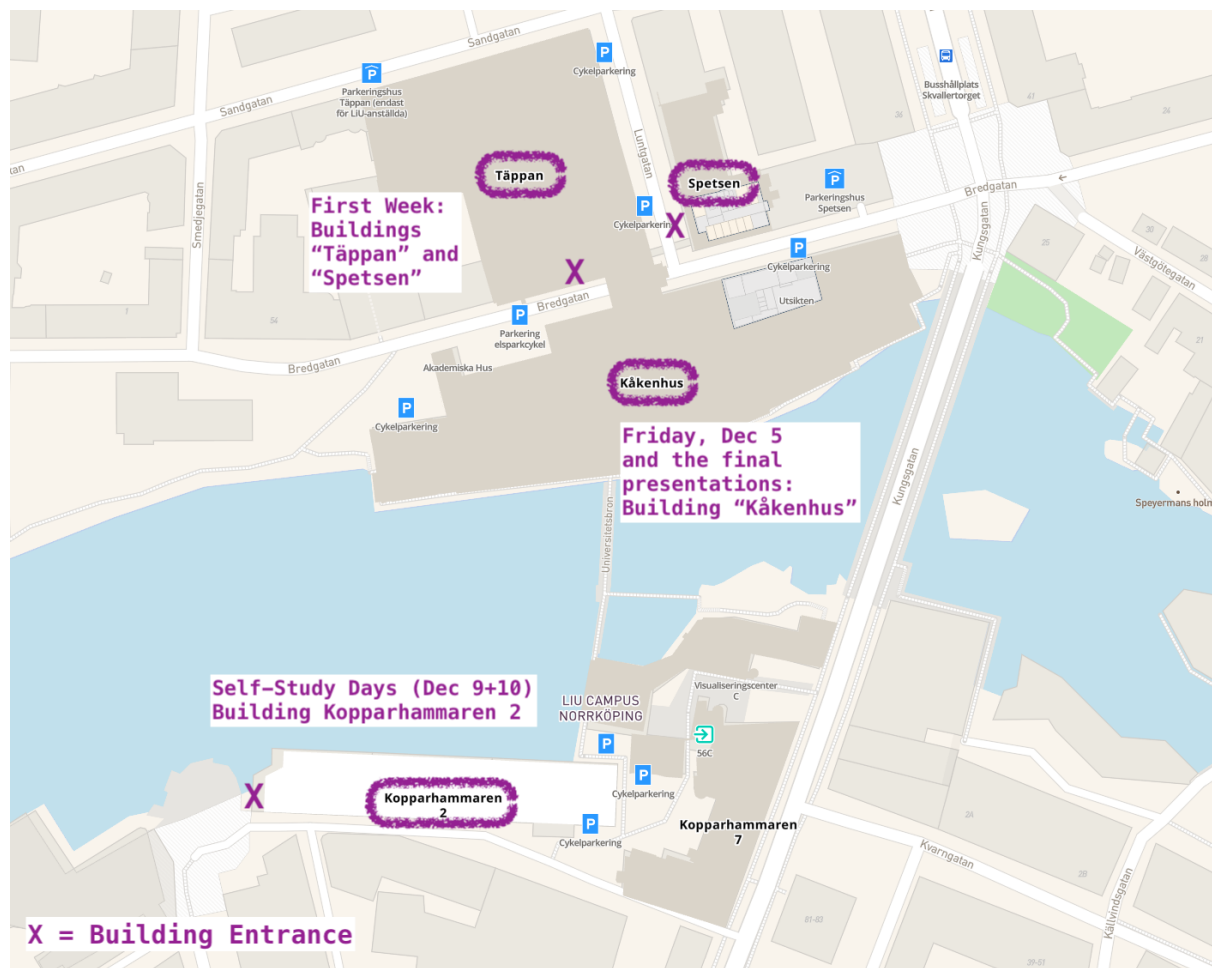
AWS Schedule

The AWS is built around four types of instruction: Lectures, Laboratories, Seminars, and self-study. There will be five lectures in total on machine learning and network science, four laboratories, two seminars, and two self-study days.

Every day, there will be coffee at around 10am. On most days, there will be an afternoon-Fika at 2pm.

Since Linköping University is in the middle of a busy semester schedule, we will be switching rooms, so please make sure to be on site a few minutes before the start of each session. [Click this link for an interactive map where you can search the rooms](#).

Room List

1. Building Täppan: TP45 & TP53
2. Building Spetsen: SP35
3. Kåkenhus: K22, K1, K4
4. Kopparhammaren 2: KO22, KO24, KO25

Sunday   **Hotel Check-In & Welcome on November 30**

    16–18   Check-In: Hotel Scandic Strömmen
            (Slottsgatan 99, 602 22 Norrköping; close to the central station)

          Welcome from 18.00 onwards at Ölstugan Tullen
          (Sankt Persgatan 80, 602 33 Norrköping)

AWS Week One (December 1–5)

Monday   **Supervised Machine Learning** (TP 53)

  10–10.15   Introduction (Jacob Habinek)
  10.15–12   Lecture: Introduction to Supervised Learning (Martin Arvidsson)
     12–13   Lunch
     13–14   Lecture (cont'd)
     14–17   Laboratory: Parametric & Non-Parametric Supervised Learning
            (Martin Arvidsson & Maël Lecoursonnais)

Tuesday   **Deep Learning and Image Classification** (SP 35)

     10–12   Lecture: Deep Learning and Image Classification (Martin Arvidsson)
     12–13   Lunch
     13–16   Laboratory: Deep Learning and Image Classification
            (Martin Arvidsson & Kazuki Sakamoto)

Wednesday   **Machine Learning for Causal Influence** (SP 35)

     10–12   Lecture: Machine Learning for Causal Influence (Martin Arvidsson)
     12–13   Lunch
     13–16   Laboratory: Machine Learning for Causal Inference
            (Martin Arvidsson & Kazuki Sakamoto)

Thursday   **Machine Learning for Social Science** (TP 53)

     10–12   Seminar: Machine Learning for Social Science (Maël Lecoursonnais)
     12–13   Lunch
  14.30–16   IAS Seminar Series: Jackelyn Hwang
            Radicalized Reshuffling: Gentrification and the Persistence of Segregation in the Twenty-First Century.

Friday   **Network Subgroups and Communities** (K 22)

     10–12   Lecture: Lecture: Network Subgroups and Communities (Carl Nordlund)
     12–13   Lunch
     13–16   Laboratory: Network Subgroups and Communities (Maël Lecoursonnais)

Weekend   **Free**

AWS Week Two (December 8–12)

Monday   **Social Network Null Models and Simulations** (TP 45)

    10–12 Lecture: Social Network Null Models and Simulations (Carl Nordlund)
    12–13 Lunch
    13–16 Seminar: Social Networks (Kazuki Sakamoto)

Tuesday   **Self-Study Time** (KO 22 & KO 25)

    9–12 Self-Study Time (room KO 22)
    12–13 Lunch
    13–17 Self-Study Time (room KO 25)

Wednesday   **Self-Study Time** (KO 24)

    9–12 Self-Study Time
    12–13 Lunch
    13–17 Self-Study Time

Thursday   **Presentations** (K 4)

    10–13 Student Presentations I
    13–14 Lunch
    14.30–16 IAS Seminar Series: Per Engzell (room KO 301)
              Patrons, Protégés, and Peers: Workplace Mechanisms of
              Intergenerational Inequality

Friday   **Presentations** (K 1)

    10–13 Student Presentations II
    13–14 Lunch
    14–17 Student Presentations III