TU-E2231 Machine Learning in Financial Risk Management
Spring 2026
Ruth Kaila and Eljas Toepfer

Instructions for Exercise 1

- This exercise is graded passed/failed. The early-bird deadline is Saturday, **31.1.2026**. The final deadline is **16.4.2026**.
  To pass the course, the student must complete 6 weekly exercises. However, if the student returns each exercise within 10 days of the date the exercise was given, 5 exercises are sufficient to pass the course.
- Return 2 files:
  1. A PDF file with
     - A: Individual work (approximately one page)
     - B: answers to the questions in the Python files
     - C: screenshot of the final image generated in Python file 1B related to trading signals
  2. A PDF file of the whole Python scripts 1B on trading signals. (see the instructions at the end for guidance on converting Python files to PDF)
- This week, you must code only very little. You will be mostly explaining the code and **analyzing** the results.

A: Individual work

Write a total of one page (400-500 words) on Q1 and Q2.

Q1. Machine Learning methods

If you are not very familiar with machine learning, choose question A. If question A is trivial for you, choose question B. Try to think for yourself. *Using ChatGPT just to copy and paste answers won't help you learn anything.*

A. Explain, what are regression methods and classification methods in supervised learning? What are KNN and random forest methods? You will use these methods in the Python exercise.

B. Choose 5 examples of estimation or forecasting problems related to finance and risk management. Suggest one or more machine learning methods that can be applied to these problems. Justify your answer.

Q2. Type 1 and Type 2 errors in classification, examples in finance

What are Type 1 and Type 2 errors in classification?

Provide an example in finance where making a Type 1 error (a false positive) is more desirable than a Type 2 error (a false negative). Then, describe a scenario where the reverse is true—where a Type 2 error is preferable to a Type 1 error.

B. Python exercises 1

1. Exercise 1A focuses on oil price and oil companies. Your task is to review the code, answer the accompanying questions, and analyze the results. Remember that in Machine Learning, coding is just an intermediary step. We are interested in the results and beautiful illustration.
2. Exercise 1B focuses on trading signals. Your task is to review the code, answer the accompanying questions, and complete straightforward code segments. Images illustrating some of the correct intermediate steps are provided at the end of this document.

IMPORTANT: The students in this course come from diverse backgrounds, so it's important to tailor your responses accordingly. **Focus on what aligns with your current level of expertise. Avoid spending time on concepts you already understand**. If you're new to Python, take your time answering the technical questions carefully, as mastering these functions will be crucial for success later in the course. For more experienced participants, emphasize data analysis and consider enriching your answers with insights from the literature. **You can skip detailed explanations of the functions** and instead focus on what feels most relevant to you

If you have any questions, please contact Ruth, ruth.kailaATaalto.fi for general questions and Eljas, eljas.toepferATaalto.fi for technical questions.

How to save the notebook as a pdf file: