WIM: MTL for across-asset price prediction

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Office Hours: Appointment by Email
Term: Winter 2026
Meeting Time: TDB (January, 2026 – April, 2026)

1 Project Description & Learning Objectives

Mentees will gain hands-on experience applying machine learning to real financial data, learning how to build models that predict multiple asset prices using multitask learning. They'll also develop skills in data analysis, model evaluation, and understanding the practical challenges of forecasting. The project will begin with basic goals like exploring financial time series and training simple models, then move toward building multitask neural networks. For advanced learners, there will be optional goals like incorporating economic indicators or experimenting with model improvements. This flexible structure supports varied skill levels while ensuring meaningful progress.

2 Required Materials

- Géron, A. (2022). *Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow: Concepts, tools, and techniques to build intelligent systems* (3rd ed.). O'Reilly.
- James, G. (2023). *An introduction to statistical learning: With applications in Python.* Springer.
- Caruana, R. (1997). *Multitask learning.* Machine Learning, 28(1), 41–75.
- Brownlee, J. (2018). *Deep learning for time series forecasting.* Machine Learning Mastery.
- Mentor's writing note
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3 Course Schedule (Tentative)

Weeks 1–3

Reading: Géron, A. (2022). *Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow* (Ch. 1–2).
Assignments: Use `yfinance` or `pandas_datareader` to fetch historical data for one stock and visualize it using `matplotlib`.

Weeks 4–7

Reading:

- James, G. (2023). *An introduction to statistical learning: With applications in Python* (Ch. 10).
- Brownlee, J. (2018). *Deep learning for time series forecasting* (Ch. 1–5).

Assignments: Load and clean time series data for stocks, gold, and currency. Plot and compare trends, moving averages, and correlations. Build a simple neural network using `PyTorch` to predict stock prices.

Weeks 8–10

Reading: Caruana, R. (1997). *Multitask learning.* Machine Learning.
Assignments: Build a MTL model and prepare for the final presentation