# Artificial Intelligence Techniques for Traders

Abstract: This is a 6-hour workshop introducing the use of artificial intelligence techniques for identifying useful predictive variables and trading rules for returns prediction. It makes extensive use of Matlab's Statistics and Machine Learning Toolbox as well as the Neural Network Toolbox.

**Course outline:**

*A.* Overview of AI techniques
- a. General paradigm of machine learning.
  - i. Features selection.
  - ii. Training vs test sets.
  - iii. Cross validation.
  - iv. Boot-strapping.
  - v. Data snooping bias.
- b. MATLAB tutorial (available as pre-recorded session)
- c. Setting up the problem with multiple linear regression as the learning model.
  - i. Exercise: predict 1-day SPY return using simple technical indicators.

*B.* Learning algorithms: extended exercise on predicting SPY returns using various learning algorithms
- a. Stepwise linear regression.
- b. Classification and regression trees (CART)
  - i. Stopping criteria for tree growing.
  - ii. Using the whole tree or selecting certain nodes for prediction?
  - iii. Reducing overfitting by cross-validation.
  - iv. Increasing training sample size by bootstrapping/bagging.
  - v. Learning from past erros: boosting.
  - vi. Which technique gives most accurate predictions?
- c. Support vector machine (SVM)
  - i. Predicting sign of returns.
- d. Neural networks (NN)
  - i. Neural network as nonlinear function fitting.
  - ii. What network architecture to pick?
  - iii. Drawback of using NN for financial predictions.

*C.* An extended exercise on features selection.
- a. Building a multifactor stock selection model using fundamental factors.
- b. Techniques: multiple regression, stepwise regression, and CART.
- c. What fundamental factors are most useful for predicting stock portfolio returns?