Special one-week intensive course

``Basic probability models and optimization''

at Hino Campus, Tokyo Metropolitan University
for April 4 – April 7, 2023.

Instructor: 國立台灣科技大學助教授 水谷英二 先生 (Prof. Eiji Mizutani)

Course Description:

For modeling an actual phenomenon, the *possibility of randomness* must be often taken into account. The resulting model is naturally referred to as a *probability model*. Certainly, such a model-building procedure requires some familiarity with the probability theory. We thus begin with a brief review of the basic probability concepts using well-known probability models and applications. We then consider pattern recognition and decision-making problems under uncertainty in a stochastic environment. This lecture would be a good preparation for understanding *temporal-difference reinforcement learning* and *randomized algorithms* in machine learning.

We plan to proceed as follows:

Day 1 (April 4) Basic concepts of probability theory (equally-likely events, Bayes' rule).
Expectation by method of conditioning, method of indicators, tail sum formula, etc.
Day 2 (April 5) Discrete-Markov chains.
Day 3 (April 6) Dynamic programming principle and a hidden Markov model.
Day 4 (April 7) Stochastic dynamic models and Markov decision processes.

During the week, several in-class exercises and quizzes will be given. Before the first lecture, the students are encouraged to read the handout (to be distributed via email).