Special three-day intensive course

``Introduction to Stochastic Dynamic Programming''

at Hino Campus, Tokyo Metropolitan University
for July 3 – 5, 2023.

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

Course Description:

In this short course, we illustrate the practicality of stochastic dynamic programming for controlling a stochastic process. We begin with a quick review of the basic concepts of probability theory and stochastic processes using well-known models and applications. We then consider decision-making problems under uncertainty (including stochastic game playing) and some issues of maximizing a target event occurring and of finding an optimal policy (e.g., for maintaining a stochastically failing machine). We also describe optimal *state-action Q-value formulations* in relation to temporal-difference reinforcement learning. This lecture would serve as a good preparation for understanding advanced *machine learning* methods based on randomness and simulation.

We plan to proceed as follows:

Day 1 (July 3) Introduction to stochastic dynamic programming.
Day 2 (July 4) Formulations for cases where random events precede decisions.
Day 3 (July 5) Optimal state-action Q-value formulations and related issues.

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).