Faculty of Science and Technology
Tokushima University

Mathematical Optimization with Randomness and Fuzziness

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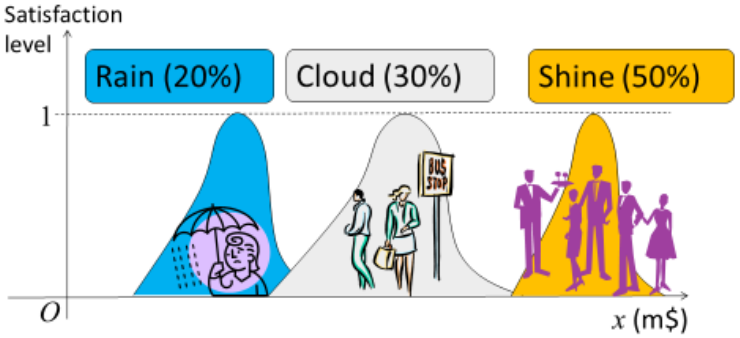
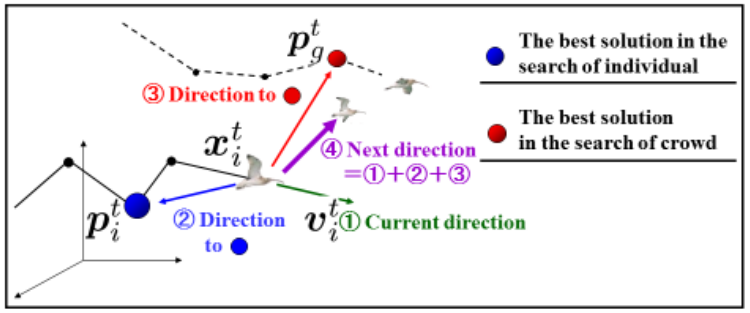
Fuzzy random variable

Example: sales of an amusement park



Particle Swarm Optimization (PSO)



$$v_i^{t+1} = \omega^t v_i^t + c_1 R_1^t (p_i^t - x_i^t) + c_2 R_2^t (p_g^t - x_i^t)$$

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$$x_i^{t+1} = x_i^t + v_i^{t+1}$$

Content:

Mathematical optimization is defined as finding the best solution for mathematical problems formulating real world problems, e.g. production planning, location, etc.

An important issue for applying mathematical optimization is “uncertainty”, which can divided into the following two types: one is “randomness”, which is included in random factors, e.g. weather, economic conditions, etc. The other is “fuzziness”, which is included in evaluation or judgment of human beings. Because real world problems include both randomness and fuzziness, I study modeling for mathematical optimization by applying “fuzzy random variables”, representing them simultaneously.

Formulated mathematical problems often have enormous decision variables and conditions with complex characteristics. Because of difficulty of solving them strictly, we study evolutional computing, e.g. GA and PSO, for finding their good solutions efficiently.

Keywords: Operations Research (OR), Soft Computing

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