Name	Akiko Takeda	Research Fields	Mathematical Optimization, OR

Operations research (OR) is one of the scientific techniques for constructing a mathematical model and finding its solution by using a computer for real-world problems. In particular, we are conducting research focusing on model construction as a mathematical optimization problem and development of algorithms (numerical methods) for solving the problem.

The mathematical optimization problem is a mathematical model to achieve a better objective value under given constraints. Mathematical optimization problems arising from real-world problems are usually large in scale and can not be solved without designing efficient algorithms based on the mathematical structure of the problem. We focus on optimization algorithms and software development based on mathematical optimization theory, and are conducting research so as to apply them to application problems in different fields such as machine learning.

Research Topics

●Global optimization for non-convex problems

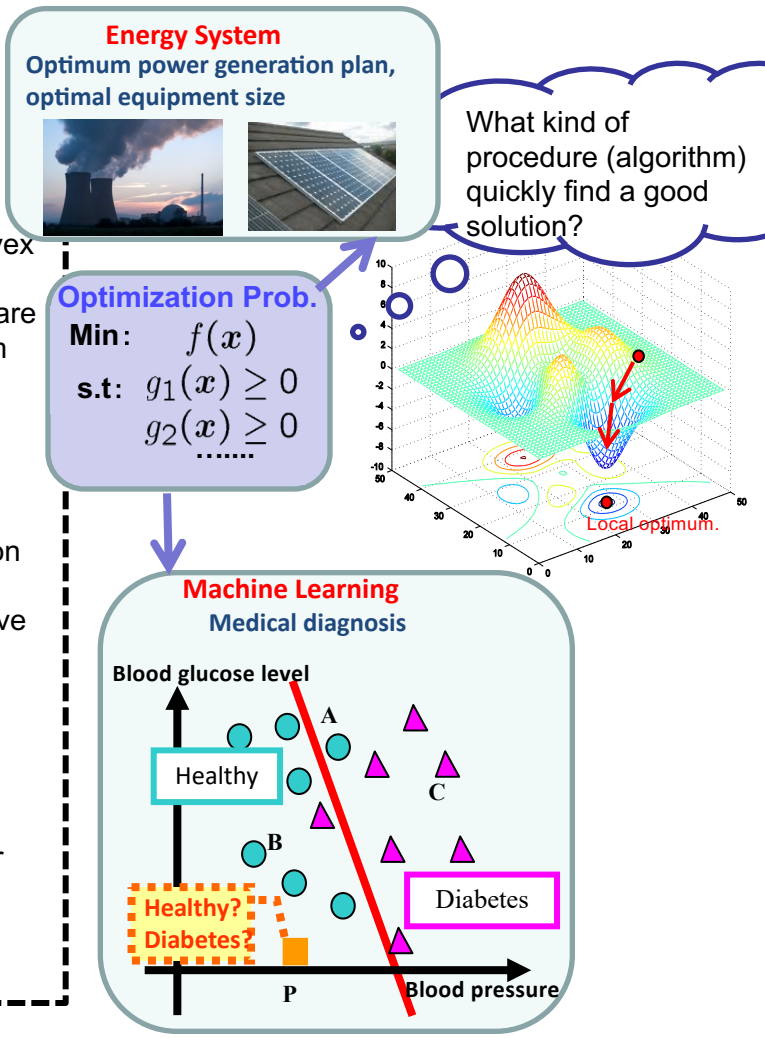
Problems in the real world often result in nonconvex continuous optimization problems. Algorithms for efficiently finding almost global optimal solutions are required. We are developing an efficient algorithm that exploits the features of the problem well.

●Decision-making method under uncertainty

When constructing a mathematical optimization model using uncertain data, robustness against uncertainty of data is required. Robust optimization models and stochastic programming models are useful in such situations. We aim to efficiently solve such optimization problems and contribute to real world problem solving.

●Applying optimization methods to other fields

The application range of the mathematical optimization method is diverse. Especially in machine learning, large-scale, non-convex and/or non-smooth optimization problems are often discussed. We propose efficient algorithms with some theoretical guarantee for such problems.



Knowledge and ability necessary for conducting research

Linear algebra is indispensable for conducting research in our field. More abstract mathematics is rarely necessary and we often use elementary mathematics to develop optimization algorithms. In addition, basic knowledge of programming is required when implementing optimization algorithms in the process of research.

What to expect from students

In order to create something new as a research, a very steady effort is necessary. The range of activities will not be confined to our research group. I expect that students will participate in research meetings, domestic and overseas conferences, etc. We will gladly cooperate.