Continuous Optimization

Examples and Applications

Formulate some practical problems in an optimization problem, **classify** it (convex or nonconvex or possible ways to make it convex) and **solve** it (analytically or numerically).

Minimal distance to discrete points (Least Square)

Sum of squared distance:

$$\min_{x} \quad \sum_{i=1}^{n} \|x - x_i\|^2$$

Minimal distance to a subspace (Projection)

Find the minimal distance from a point x_0 to the intersection of the space spanned by the vectors $v_1, v_2, \cdots, v_m$.

Minimal covering disk

Given points $x_1, x_2, \cdots, x_N$, find a disk with minimal radius (centered at x_0 with radius R) such that $\|x_0 - x_i\| \leq R$.

Heron's problem

Find C on the line ℓ, such that $|AC| + |BC|$ is minimal.