

Lecture 1.1

Wednesday, 6 September 2023 10:16

optimization problems: multiple valid solutions, want to compute optimal solution

many are NP-hard

heuristic gives a good solution, most of the time (but difficult to prove anything)

approximation algorithm has guarantee on quality

$ALG(I)$: value of solution computed by ALG on I

$OPT(I)$: value of optimal solution for I

for minimization problems ALG is a ρ -approximation algorithm, for some $\rho \geq 1$, if

$$ALG(I) \leq \rho \cdot OPT(I) \quad \text{for all inputs } I$$

↑
approximation ratio

for maximization problems ALG is a ρ -approximation algorithm, for some $\rho < 1$, if

$$ALG(I) \geq \rho \cdot OPT(I) \quad \text{for all inputs } I$$

↑
approximation ratio