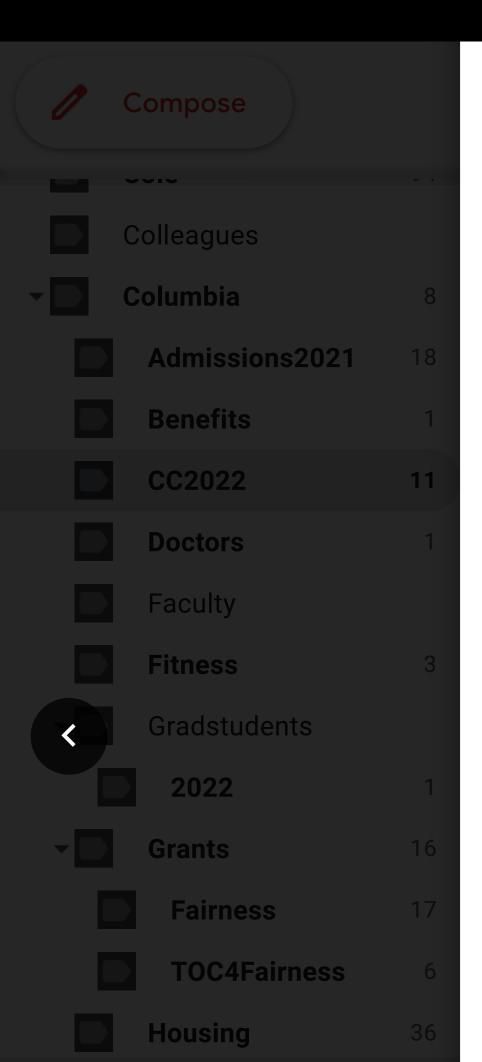
Lecture #13: Spring, 2022



Communication and Extension Complexity

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Lecturer: Chengyue He

1 Extended Formulations and Extension Complexity

Consider a discrete optimization problem, which usually has the formula

$$\max_{x} c^{T} x$$

$$s.t. \quad x \in V$$

$$(1)$$

where $V \subseteq \mathbb{R}^d$ is a finite set. Linear programming (LP) is a powerful technique solving (1). Define a polytope as the convex hull of V:

$$P = conv(V) = \{x \in \mathbb{R}^d : x = \sum_{i=1}^l a_i v_i, \ s.t. \ v_i \in V, 0 \le a_i \le 1, \sum_{i=1}^l v_i = 1\}.$$
 (2)

One can solve (1) by an LP:

