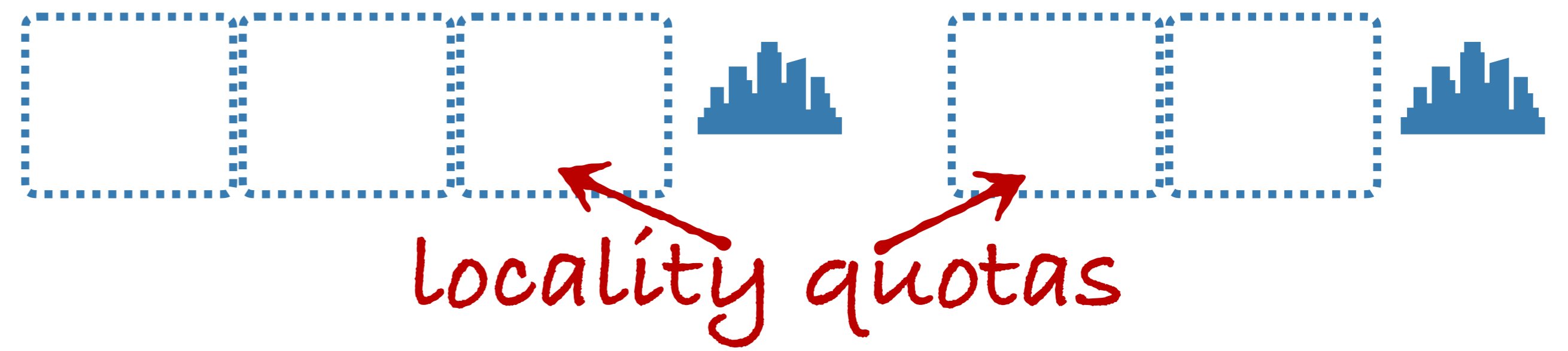


Migration as Submodular Optimization

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Task: Match agents to localities, maximize expected employment.



[Bansak et al. 2018]: For each agent i and locality ℓ , estimate probability of employment $p_{i\ell}$. Find matching with maximum $\sum p_{i\ell}$. Can lead to overly homogeneous matching, competition.

independence assumption

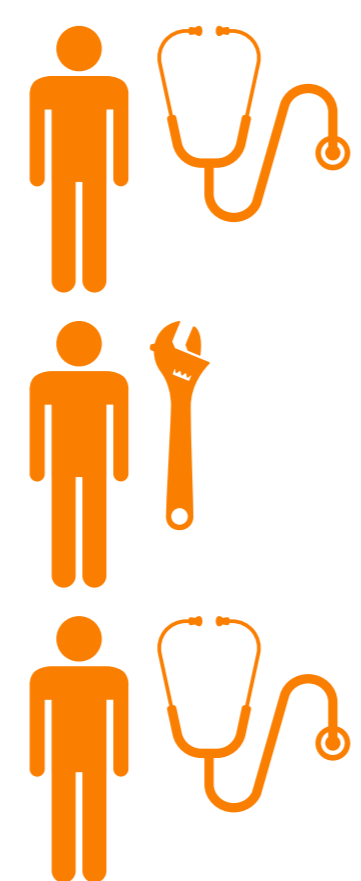
Our Model: f an ε -approximate submodular monotone function from subsets of (Agents \times Localities) to real-valued expected employment, i.e., there is a submodular monotone F such that $(1 - \varepsilon) F(S) \leq f(S) \leq (1 + \varepsilon) F(S)$. Captures competition effects; inexact access to function.

Theorem: Greedy heuristic maximizes f with approximation factor $\left(3 + \frac{4\varepsilon}{1-\varepsilon} |\text{Agents}|\right)^{-1} \approx \frac{1}{3}$.
(Generalizes to intersection of matroids.)

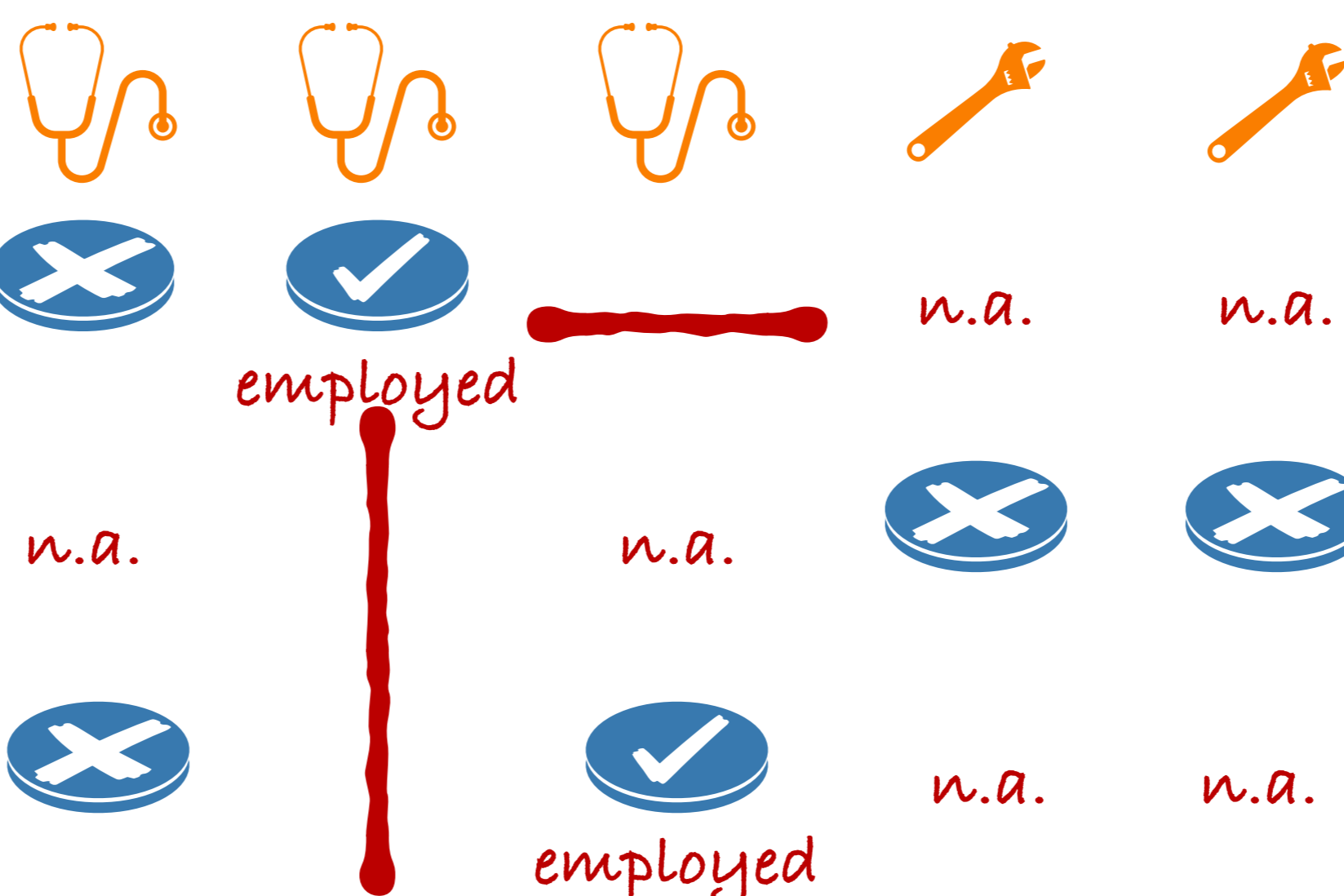
3 Models for Competition:

Correction Model

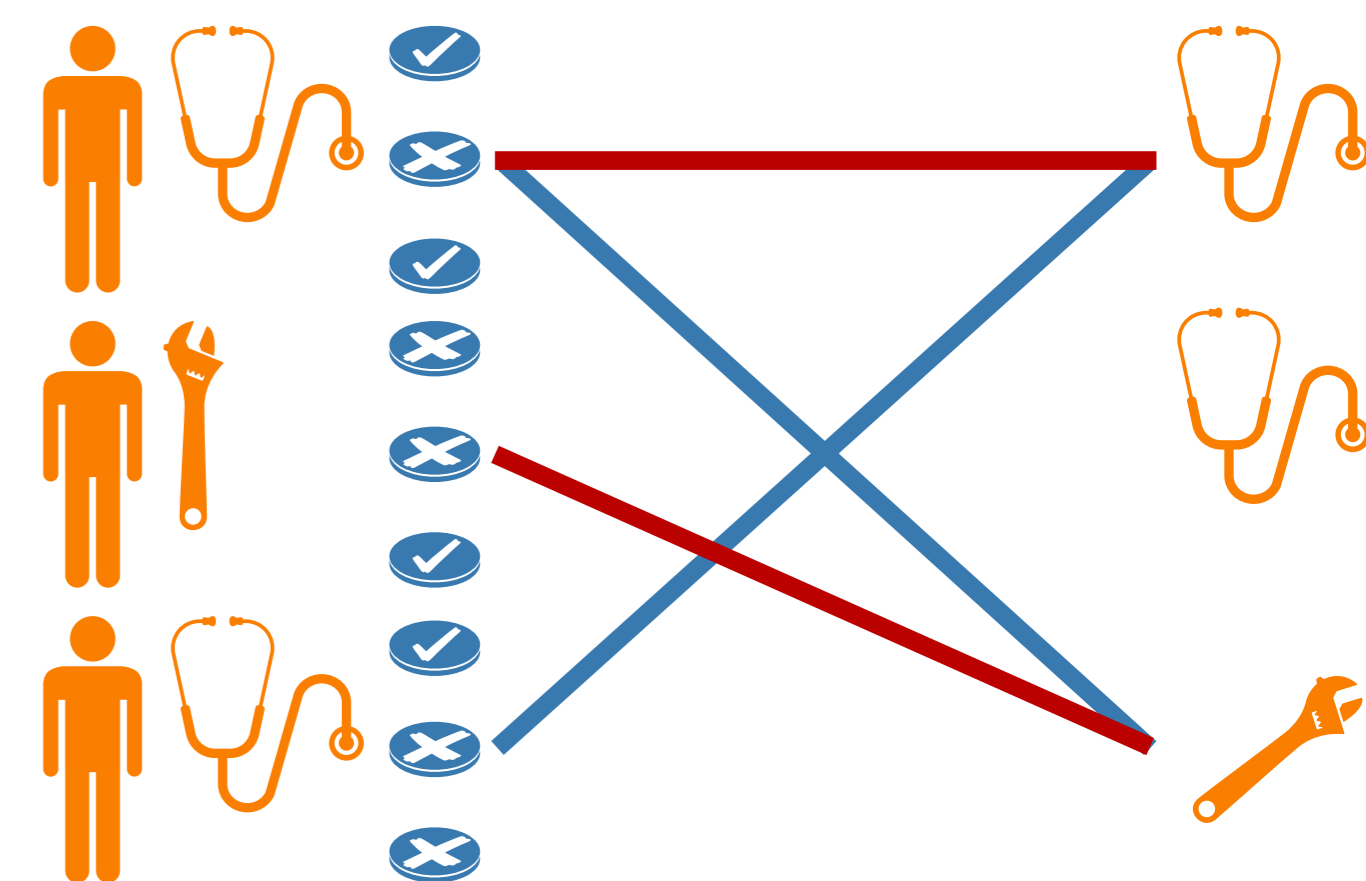
$$\sum_{\ell, \pi} C_{\ell\pi} \left(\#\left\{ \text{checkmark} \right\} \right)$$



Interview Model



Coordination Model



Loss through Approximation vs. Modeling:

