

# FaiRank: An Interactive System to Explore Fairness of Ranking in Online Job Marketplaces

Ahmad Ghizzawi<sup>1\*</sup> Julien Marinescu<sup>2</sup> Shady Elbassuoni<sup>1</sup> Sihem Amer-Yahia<sup>2</sup> Gilles Bisson<sup>2</sup>

<sup>1</sup>American University of Beirut, Lebanon

<sup>2</sup>CNRS, Univ. Grenoble Alpes, France

## Motivation

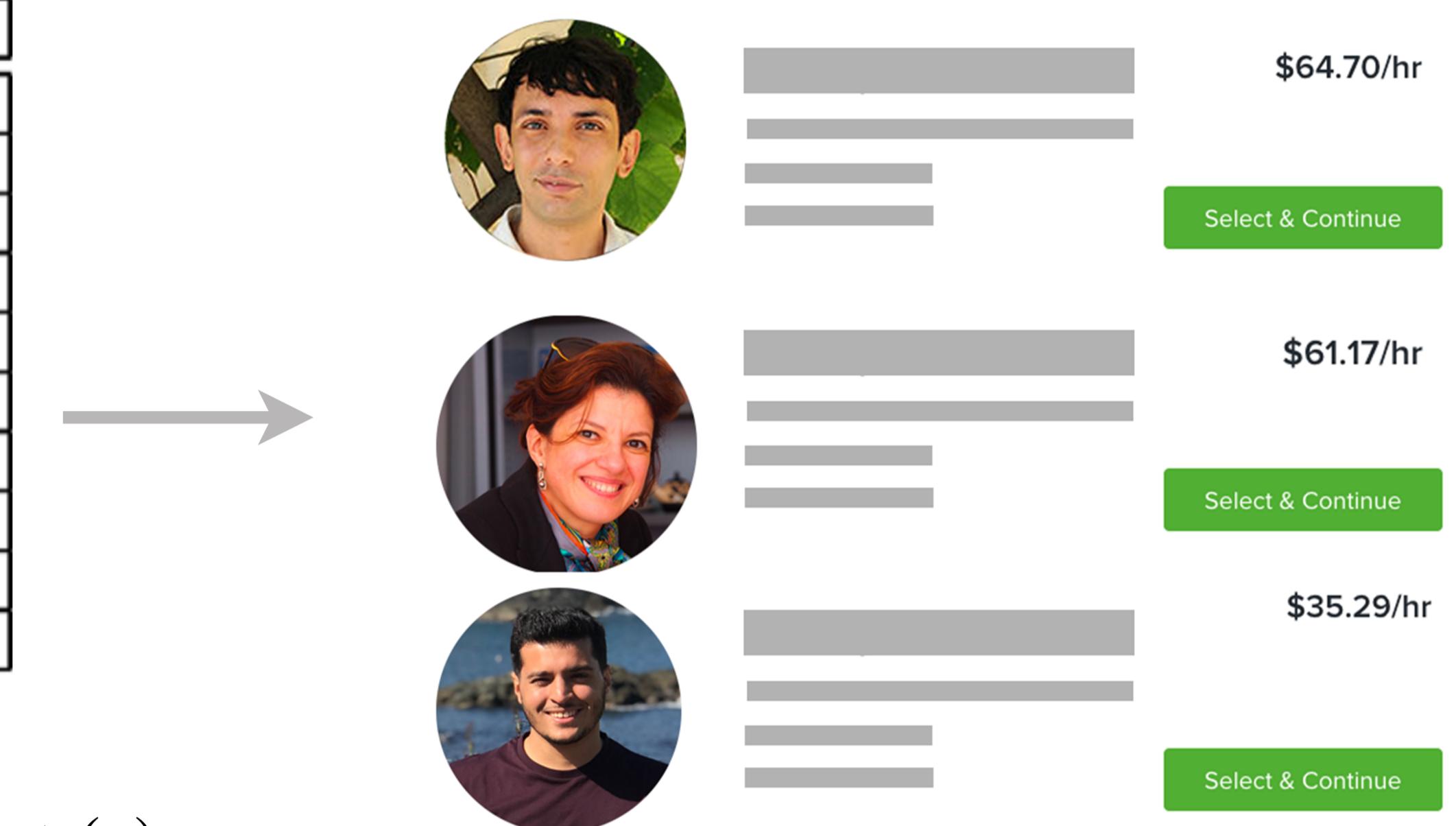
Online job marketplaces are more popular than ever..



People are being ranked by an algorithm

User	Gender	Country	Test	Approval	f(u)
U1	Female	America	0.76	0.56	0.620
U2	Female	India	0.50	0.20	0.290
U3	Male	America	0.89	0.92	0.911
U4	Male	India	0.65	0.65	0.650
U5	Male	Other	0.64	0.76	0.724
U6	Female	India	0.85	0.90	0.885
U7	Male	America	0.42	0.20	0.266
U8	Female	America	0.95	0.98	0.971
U9	Male	Other	0.30	0.15	0.195
U10	Male	Other	0.32	0.25	0.271

$$f(u) = 0.3 \times \text{LanguageTest}(u) + 0.7 \times \text{ApprovalRate}(u)$$

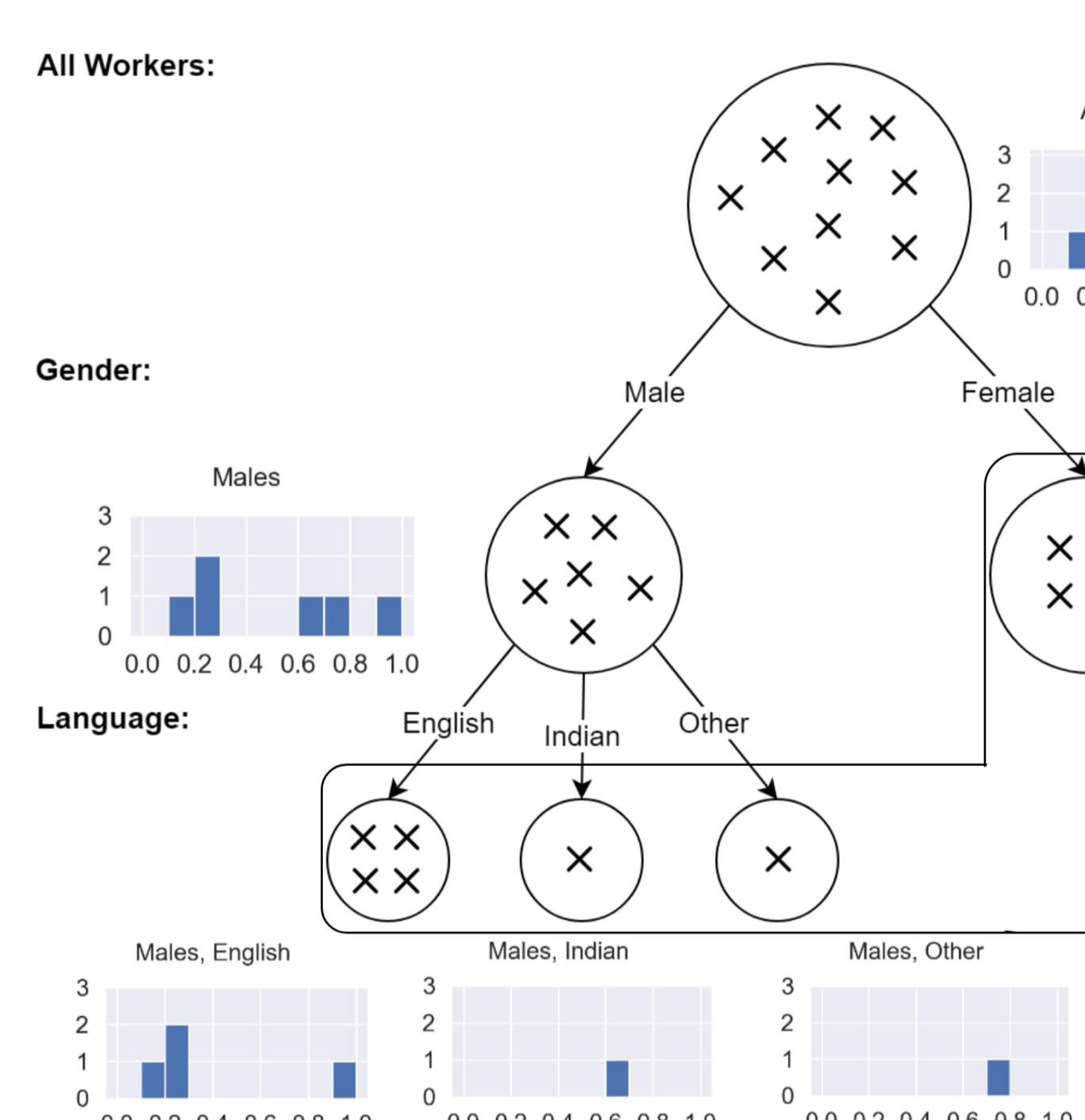


## Problem Definition

### Unfairness in Online Job Marketplaces

Unequal treatment of people by a scoring function based on their **protected** attributes (gender, ethnicity, etc..)

Inline with **group unfairness**<sup>3</sup>



### Most Unfair Partitioning Problem

Given  $W$  and  $f$ , find partitioning  $P = \{p_1, p_2, \dots, p_k\}$  such that:

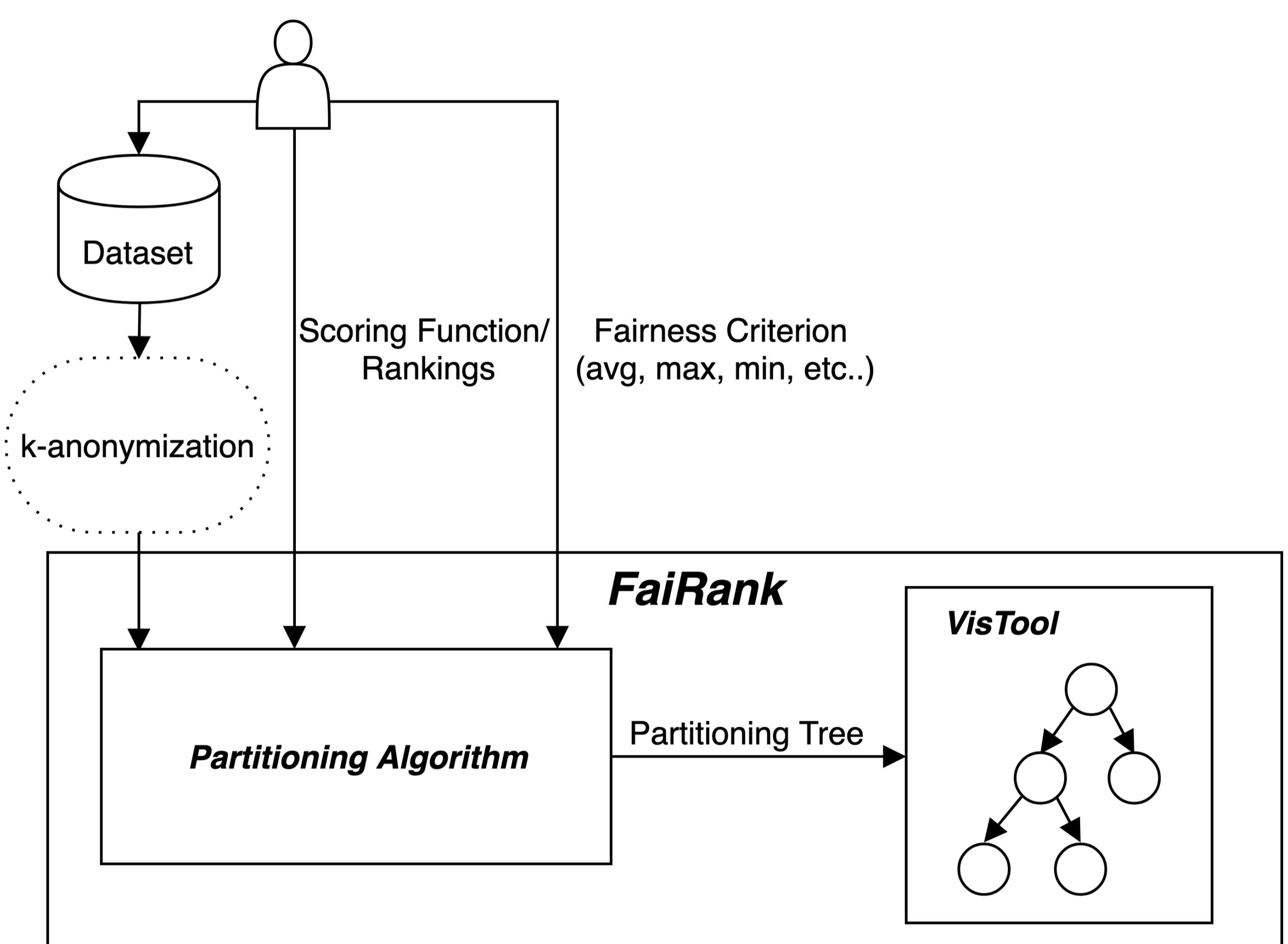
$$\underset{P}{\operatorname{argmax}} \quad \text{unfairness}(P, f)$$

$$\text{subject to} \quad \forall i, j \quad p_i \cap p_j = \emptyset \\ \bigcup_{i=1}^k p_i = W$$

$$\text{unfairness}(P, f) = \underset{i,j}{\operatorname{avg}} \text{EMD}(h(p_i, f), h(p_j, f))$$

where  $h(p_i, f)$  is a histogram of the scores of the individuals in  $p_i$  using  $f$ .

## FaiRank Architecture



## Scenarios

### Auditor

Ability to monitor multiple jobs in marketplace each with its own scoring function

Quantify fairness for each job offered on a platform

Identify demographics least favored on the platform per job



### Job Owner

Ability to define multiple scoring functions and examine their effect on individuals

Allows Job Owners to choose the best scoring function that induces the least unfairness for their job



### End-user

Ability to examine how other workers in the subgroup they belong to are ranked in a particular platform and job

Allows users to select platforms that are more suitable for them

