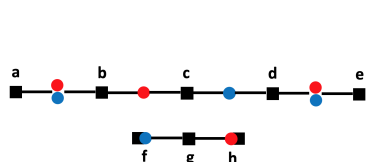


1 We thank all the reviewers for their very useful comments on our paper. To recall, our paper gives a simple theoretical  
 2 framework for converting vanilla clustering algorithms into fair algorithms with a slight loss in performance, for any  
 3 norm. Empirically, our algorithm outperforms known results and theoretical guarantees.

4 A common criticism across the reviews is on the experimental analysis. While we broadly agree on some of the points  
 5 raised, we take this opportunity to address some of the comments. Reviewer 1 rightly points out that 4 UCI datasets  
 6 is too low. Indeed, it is; however, it is not easy to find datasets where certain features are sensitive. We mostly used  
 7 datasets that previous authors have been using. As the reviewer mentions, we didn't report the diabetes dataset. We are  
 8 sorry for this oversight, and present the results below (table and the two figures on the right). The second issue was on  
 9 benchmarks (Reviewer 2 brought this up); we would like to point out that we do compare our algorithm's performance  
 10 with (a) previous algorithm's (Table 1), and also (b) with very stringent benchmarks ( Fig 4 in the supplemental  
 11 material): finding the true optimum for the fair problem is hard; we actually compare ourselves with a *lower bound* (the  
 12 LP solution) on the optimal fair solution, and show we are comparable on various datasets. Reviewer 3 asks why  $k = 4$   
 13 was chosen, and why we only show three bar-charts. For these data-sets, the elbow-method does not quite indicate  
 14 which  $k$  to use. At some level, the choice of  $k = 4$  is therefore arbitrary; we used one which illustrated our point the  
 15 best. The reason we show three clusters is two-fold: (a) aesthetics, 12 bar charts seemed clunky, and (b) the fourth  
 16 cluster was too small. Reviewer 3 also asks why we compared with the Backurs et al. [ICML 2019] paper for only  
 17  $k = 20$ . At the time of submission, the code of Backurs et al. was not available. Their paper only reported  $k = 20$ .  
 18 Since then, their code has been made available, and in the table below we show a comparison for varying  $k$  with the  
 19 Chierichetti et. al. results drawn from the plot in their NeurIPS 2017 paper.

20 We now clarify some other reviewer questions. Reviewer 1 asks a very pertinent question about tightness/hardness. We  
 21 give two answers. (a) Our algorithm is tight, in that running on the example shown in the figure below for  $k$ -center  
 22 objective, our approximation factor is indeed 5. (b) The Fair- $p$ -assignment problem, without additive violation, is also  
 23 NP-hard. This follows from a simple reduction from 3D matching. However, we *do not know* of any hardness for the  
 24 instances of Fair- $p$ -assignment which arise from our reduction. So we cannot claim a general hardness. If accepted, we  
 25 will definitely add a para discussing this. Reviewer 2 points out the recent related KDD 2019 paper by Ahmadian et. al.  
 26 This paper became public (May 29th, on arXiv) only after the NeurIPS deadline. Indeed, their paper also studies the  
 27 *restricted dominance*, but work for only  $k$ -center objective. Ours, at price of the additive violation, works for all norms.  
 28 We will definitely add a comparison in the final version of our paper. Reviewer 3 has trouble understanding why the  
 29 additive violation was needed, and whether simply fiddling with alpha's and beta's would work. In practice, maybe.  
 30 But, imagine the following scenario – we wish to run for beta = 0.2 and alpha = 0.8; but keeping the violation in mind,  
 31 we run with beta = 0.25 and alpha = 0.75. The issue is that our guarantee will compare with the optimal solution for this  
 32 new (0.25,0.75) setting, which could be *larger*. Reviewer 3 also points out a picture would have been useful for Claim  
 33 5. We all had a smile on our face, because we had added a picture, but the page-limit forced to take it out. Perhaps, we  
 34 should have added it to the supplementary material. The same reason holds for the "Conclusion" section. If accepted,  
 35 we will take a hard look at how to save space so as to incorporate these comments above.

	k-median	3	4	5	6	7	8	9	10
census , cost $\times 10^6$	Ours	19.55	16.63	14.35	11.75	9.86	8.87	7.75	7.32
	Backurs et.al.	28.29	28.57	26.31	22.21	24.81	26.94	20.80	23.60
	Chierichetti et.al.	40	39	38.5	38	37.8	37.75	37.6	37.5
bank , cost $\times 10^5$	Ours	6.81	5.64	4.95	4.49	4.05	3.79	3.53	3.44
	Backurs et.al.	8.05	7.78	7.65	6.63	6.33	6.68	5.42	6.70
	Chierichetti et.al.	5.9	5.8	5.77	5.75	5.7	5.65	5.62	5.6
diabetes	Ours	6675	5491	3890	3371	3194	2939	2700	2380
	Backurs et.al.	7756	6412	5526	4746	4850	4765	4203	4337
	Chierichetti et.al.	11500	10300	10250	10200	10175	10150	10125	10100



37 Squares: facilities. Circles: clients (red or blue). All distances 1.  $k = 4$ . Optimum fair solution with perfect balance opens  $\{a, c, e, g\}$  with cost 1. Our algorithm may open  $\{a, e, f, h\}$  leading to cost 5.

