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CORRECTION

Correction to: A Connection Between Sports and Matroids: How Many Teams Can We Beat?

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1 Background

Our article "A connection between sports and matroids: How many teams can we beat?" [4] deals with a problem we called MINSTANDING(S). The motivation behind this problem comes from the following situation. Given an ongoing sports competition among a set T of teams, with each team having a current score and some matches left to be played, we ask whether it is possible for our distinguished team $t \in T$ to obtain a final standing with at most r teams finishing before t.

For a general model that can be applied to various sports competitions, we denoted by S the set of all possible outcomes of a match, where each *outcome* is a pair (p_1, p_2) of non-negative reals corresponding to the situation where the match ends with the home team obtaining p_1 points and the away team obtaining p_2 points. If S contains pairs $(\alpha, 0)$ and $(0, \beta)$ for some positive α and β, then we say that S is *well based*.

Given a set S of outcomes with $|S| = k + 1$, the above question boils down to the following graph labelling problem:

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MINSTANDING(S):
Instance: A triple (G, c, r) where $G = (V, A)$ is a directed multigraph, $c : V \to \mathbb{R}$ describes vertex capacities, and r is an integer.
Question: Does there exist an assignment $p : A \to \{0, \ldots, k\}$ such that the number of vertices in V violating the inequality

$$\sum_{a=(v,u)\in A} \alpha_{p(a)} + \sum_{a=(u,v)\in A} \beta_{p(a)} \leq c(v) \quad (1)$$

is at most r?

2 The Error and its Correction

In Theorem 3 of our article [4], we incorrectly stated that "MINSTANDING(S) is W[1]-hard with parameter $|V(G)| - r$ for any well-based set S of outcomes, even if the (undirected version of the) input graph G is claw-free".

The presented (erroneous) proof gave an FPT reduction from the W[1]-hard INDEPENDENT SET problem. Although the reduction itself is correct, we erroneously claimed that INDEPENDENT SET is W[1]-hard on *claw-free* graphs. However, this is not true, since INDEPENDENT SET can be solved in polynomial time on claw-free graphs [2,3]. What holds true is that INDEPENDENT SET is W[1]-hard on $K_{1,4}$-*free* graphs, as proved by Hermelin, Mnich, and Van Leeuwen [1]. So the term "claw-free" in the above statement (Theorem 3 of our article [4]) should be replaced by "$K_{1,4}$-free".

The correct statement of the theorem is thus the following.

Theorem 1 MINSTANDING*(S) is* W[1]*-hard with parameter* $|V(G)| - r$ *for any well-based set* S *of outcomes, even if the (undirected version of the) input graph* G *is* $K_{1,4}$*-free.*

Proof We give a simple FPT reduction from the W[1]-hard INDEPENDENT SET problem, which is known to be W[1]-hard even on $K_{1,4}$-free graphs [1]. Let G be the input graph and ℓ the parameter given. The constructed instance of MINSTANDING(S) will be $(\overrightarrow{G}, c, |V(G)| - \ell)$ where $\overrightarrow{G}$ is an arbitrarily oriented version of G, and c is the constant zero function.

Now, it is easy to see that a set X of vertices in G is independent if and only if there is a score assignment on $\overrightarrow{G}$ in which vertices of X are not violating. Note that here we make use of the fact that S is well based. □

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References

1. Hermelin, D., van Leeuwen, E.J.: Parameterized complexity of induced graph matching on claw-free graphs. Algorithmica **70**(3), 513–530 (2014)
2. Minty, G.J.: On maximal independent sets of vertices in claw-free graphs. J. Comb. Theory Ser. B **28**(3), 284–304 (1980)

3. Sbihi, N.: Algorithme de recherche d'un stable de cardinalité maximum dans un graphe sans étoile. Discrete Math. **29**(1), 53–76 (1980)
4. Schlotter, I., Cechlárová, K.: A connection between sports and matroids: How many teams can we beat? Algorithmica (to appear). doi:10.1007/s00453-016-0256-2