# Correction to "Using the pseudo-dimension to analyze approximation algorithms for integer programming" 

Philip M. Long<br>Sentient Technologies


#### Abstract

This note corrects a mistake in the WADS'01 paper titled "Using the pseudo-dimension to analyze approximation algorithms for integer programming".


Section 3 of [1] is about integer programs of the form

$$
\min c^{T} x, \text { s.t. } A x \geq b \text { and } x \geq(0,0, \ldots, 0)^{T}
$$

where all components of $b$ and $c$, and all entries of $A$, are non-negative. It includes the claim that, without further loss of generality, all components of $c$ are in fact strictly positive. This is correct: if any $c_{j}=0$, whenever $A_{i j}>0$ the $i$ th constraint can be satisfied at zero cost by using a large value of $x_{j}$, so we arrive at an equivalent problem by removing $x_{j}$ and all such constraints.
Section 4 is about the class of integer programs obtained from the above by allowing negative entries in $A$. It includes the claim that, also in this case, w.l.o.g. all components of $c$ are strictly positive, for the same reason. This is not correct. A counterexample is

$$
\min x_{1} \text {, s.t. } x_{1}-x_{2} \geq 0, x_{1} \geq 0, x_{2} \geq 1
$$

The optimum is 1 , and, if we remove $x_{2}$ and the constraint $x_{2} \geq 1$, the optimum becomes 0 .
Theorem 2 from Section 4 is applied to the minimum majority problem in Section 6.2. For this problem, all components of $c$ are strictly positive.

Fortunately, it appears that the mistake in Section 4 has not misled anyone to try to apply Theorem 2 to show that 3 -colorable graphs can be colored with $O(\log n)$ colors in polynomial time.

## References

1. Philip M Long. Using the pseudo-dimension to analyze approximation algorithms for integer programming. In Workshop on Algorithms and Data Structures, pages 26-37. Springer, 2001.
