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Erratum

Erratum to "Inapproximability and Polynomial-Time Approximation Algorithm for UET Tasks on Structured Processor Networks"

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1. Related Works

This erratum is devoted to give some precisions on the related works in stand of view complexity and approximation given in [1].

1.1. Complexity Results

Table 1 gives the previous complexity results.

1.2. Approximation Results

If the network is a ring, there are two approximation results for Rayward-Smith's [2] algorithm as follows.

(i) In the general case, the performance ratio is upper bounded by $m/2 + 3/2 - 1/m$, and there exists an instance for which the performance ratio is equal to $m/8 + 1/2$ [3].

(ii) If the number of processors is even, the upper-bound can be improved to $1 + (3/8)m - 1/2m$, and there exists an instance such that the performance ratio is equal to $\lceil\sqrt{m}\rceil$ [4].

The first two corollaries of the paper must be replaced by the two following corollaries.

Table 1: Previous complexity results on the processors network model.

Topology	Precedence graph	Complexity	Reference
Unbounded chain	tree	$\mathcal{NP}$-complete	[5]
	anti-tree	$\mathcal{NP}$-complete	
Star	tree	$\mathcal{NP}$-complete	[5]
Cycle/chain	prec/bipartite of depth two	$\rho \geq 4/3$	[3]
Star	prec	$\rho \geq 6/5$	[6]

Corollary 1.1. *The problem of deciding whether an instance of* $(P, G^*) \mid \beta$*;* $c_{ij} = d(\pi^\ell, \pi^k)$*;* $p_i = 1$, dup $\mid C_{\max}$ *with* $G^* \in \mathcal{G}$ *has a schedule of length at most three is* $\mathcal{NP}$*-complete with* $\beta \in \{\text{prec}, \textit{bipartite of depth two}\}$.

Proof. See [3]. □

Moreover, nonapproximability results can be deduced.

Corollary 1.2. *No polynomial-time algorithm exists with a performance bound less than* $4/3$ *unless* $\mathcal{P} = \mathcal{NP}$ *for the problems* $(P, G^*) \mid \beta$*;* $c_{ij} = d(\pi^l, \pi^k)$*;* $p_i = 1 \mid C_{\max}$ *and* $(P, G^*) \mid \beta$*;* $c_{ij} = d(\pi^\ell, \pi^k)$*;* $p_i = 1$, dup $\mid C_{\max}$ $\beta \in \{\text{prec}, \textit{bipartite of depth two}\}$ *with* $G^* \in \mathcal{G}$.

Proof. See [3]. □

The rest of the paper is devoted to extend the result to the bipartite of depth one and the main complexity result is given in the following theorem and two corollaries.

Theorem 1.3. *The problem of deciding whether an instance of* $(P, G^*) \mid$ *bipartite of depth one,* $c_{ij} = d(\pi^\ell, \pi^k) = 1$, $p_i = 1 \mid C_{\max}$ *has a schedule of length at most three is* $\mathcal{NP}$*-complete.*

Corollary 1.4. *The problem of deciding whether an instance of* $(P, G^*) \mid$ *bipartite of depth one;* $c_{ij} = d(\pi^\ell, \pi^k)$*;* $p_i = 1$, dup $\mid C_{\max}$ *with* $G^* \in \mathcal{G}$ *has a schedule of length at most three is* $\mathcal{NP}$*-complete.*

Corollary 1.5. *No polynomial-time algorithm exists with a performance bound less than* $4/3$ *unless* $\mathcal{P} = \mathcal{NP}$ *for the problems* $(P, G^*) \mid$ *bipartite of depth one;* $c_{ij} = d(\pi^\ell, \pi^k)$*;* $p_i = 1 \mid C_{\max}$ *and* $(P, G^*) \mid$ *bipartite of depth one;* $c_{ij} = d(\pi^\ell, \pi^k)$*;* $p_i = 1$, dup $\mid C_{\max}$ *with* $G^* \in \mathcal{G}$.

References

[1] M. Bouznif and R. Giroudeau, "Inapproximability and polynomial-time approximation algorithm for UET tasks on structured processor networks," *Advances in Operations Research*, vol. 2011, Article ID 476939, 20 pages, 2011.

[2] V. J. Rayward-Smith, "UET scheduling with unit interprocessor communication delays," *Discrete Applied Mathematics*, vol. 18, no. 1, pp. 55–71, 1987.

[3] C. Lahlou, *Ordonnancement dans les rseaux de processeurs : complexit et approximation*, Ph.D. thesis, Universit Paris VI, 1998.

[4] C. Lahlou, "Scheduling with unit processing and communication times on a ring network: approximation results," in *Proceedings of the Europar*, pp. 539–542, Springer, 1996.

[5] C. Picouleau, "UET-UCT schedules on arbitrary networks," Tech. Rep., LITP, Blaise Pascal, Universit Paris VI, 1994.

[6] R. Giroudeau, J. C. König, and B. Valery, "Scheduling *UET*-tasks on a star network: complexity and approximation," *4OR. A Quarterly Journal of Operations Research*, vol. 9, no. 1, pp. 29–48, 2011.