Erratum for the article "A Matheuristic for the Liner Shipping Network Design Problem" by Brouer, Desaulniers and Pisinger

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1 Corrected results

LINER-LIB is being used by peer researchers and their work has pointed to implementation errors in the matheuristic. This erratum contains corrected and updated results according to their findings. There are currently three known sources of errors in the results from Brouer et al. [2014b]:

- Parsing demands above 1000 TEU in the *WorldSmall* instance has been interpreted differently in Brouer et al. [2014a] than in Brouer et al. [2014b] as a thousand separator has been interpreted as a comma in Brouer et al. [2014b] resulting in a lower total demand volume.
- When scaling the weekly objective value to the planning horizon of 180 days an error results in only scaling by 175 days (25 weeks) instead of 180 days as in Brouer et al. [2014a] due to integer division of 180 instead of division in **R**.
- In the original results the construction heuristic allows services with a longer port stay than 24 hours in order to maintain the weekly frequency requirement. It means that the vessel is allowed more idle time at port and unfortunately, the fuel cost during this idling time has not been accounted for.

In Brouer et al. [2014b] new best results where found for ten instances. We have fixed the above mentioned issues in the source code and performed new tests for instances, where one or more services in the best solution included extra idling time. For instances where the solution using Brouer et al. [2014b] does not outperform the best known solution from Brouer et al. [2014a] the cost of extra idling in ports over the planning horizon was added to the objective value where relevant. Likewise, we have made runs with corrected input for *WorldSmall* containing the demand quantity used in *WorldSmall* of Brouer et al. [2014a] - the instance denoted *WorldSmall**. Table 1 states the corrected results for all instances and show that the performance of the algorithm is not greatly influenced by the errors. Results improve for most instances except *AsiaEurope*.

We are grateful for our peer researchers drawing our attention to issues and errors, and apologize for any inconvenience caused. The best solution from Brouer et al. [2014b] for each instance along with an errata sheet can be found on the LINERLIB git hub repository, which is available to the public at *https://github.com/BBrouer/Linerlib*.

			Brouer et al. [2014a]	Brouer et al. [2014b] Corrected results			
Instance			**(Bi)weekly Z**	**Weekly Z**	**Depl%**	**Trans%**	**Time**
Baltic	Low	Best	$-6.04 \cdot 10^6$	$3.59 \cdot 10^6$	100.0	84.0	27
	Base	Best	$-8.37 \cdot 10^6$	$-6.29 \cdot 10^6$	100.0	92.1	105
	High	Best	$-1.57 \cdot 10^7$	$-1.11 \cdot 10^7$	100.0	94.7	33
WAF	Low	Best	$-1.15 \cdot 10^8$	$-1.14 \cdot 10^8$	97.0	91.7	95
	Base	Best	$-1.43 \cdot 10^8$	$\mathbf{-1.44 \cdot 10^8}$	90.5	97.0	93
	High	Best	$-1.60 \cdot 10^8$	$\mathbf{-1.61 \cdot 10^8}$	80.4	97.2	98
Mediterranean	Low	Best	$2.95 \cdot 10^7$	$5.52 \cdot 10^7$	100.0	80.2	219
	Base	Best	$1.22 \cdot 10^7$	$3.31 \cdot 10^7$	100.0	93.8	319
	High	Best	$6.60 \cdot 10^6$	$2.42 \cdot 10^7$	88.0	98.6	377
Pacific	Low	Best	$8.46 \cdot 10^7$	$\mathbf{6.67 \cdot 10^7}$	100.0	90.3	3602
	Base	Best	$-5.41 \cdot 10^7$	$\mathbf{-7.88 \cdot 10^7}$	100.0	95.7	3603
	High	Best	$-1.02 \cdot 10^8$	$\mathbf{-1.61 \cdot 10^8}$	90.8	100.0	3605
WorldSmall	Low	Best		$-9.39 \cdot 10^8$	100.0	87.7	10828
	Base	Best		$-1.44 \cdot 10^9$	98.5	94.2	10885
	High	Best		$-1.65 \cdot 10^9$	90.2	95.0	10825
WorldSmall*	Low	Best	$-5.52 \cdot 10^8$	$\mathbf{-9.72 \cdot 10^8}$	100.00	88.75	10818
		Average		$-7.48 \cdot 10^8$	99.80	86.61	10817
	Base	Best	$-1.15 \cdot 10^9$	$\mathbf{-1.52 \cdot 10^9}$	100	93.28	10800
		Average		$-1.37 \cdot 10^9$	98.85	93.72	10800
	High	Best	$-1.29 \cdot 10^9$	$\mathbf{-1.71 \cdot 10^9}$	94.63	94.53	10816
		Average		$-1.60 \cdot 10^9$	94.32	94.44	10827
AsiaEurope	Low	Best	$-3.61 \cdot 10^8$	$\mathbf{-3.84 \cdot 10^8}$	97.9	85.0	14550
	Base	Best	$-6.58 \cdot 10^8$	$\mathbf{-7.80 \cdot 10^8}$	95.5	93.8	14517
	High	Best	$-7.66 \cdot 10^8$	$\mathbf{-9.64 \cdot 10^8}$	93.4	99.1	14628

Table 1: Overview of the corrected results obtained for the benchmark suite *LINER-LIB 2012* using the matheuristic with all errors corrected and a new WorldSmall instance *WorldSmall**, where demand quantity is equal to that of Brouer et al. [2014a]. The tests are based on ten runs with different random seeds. **Instance** is the name of the instance including **Low**, **Base** and **High** to indicate the low-, medium, and high-capacitated cases; **Best** refers to the best solution found; **Average** is the average over all ten runs (only given for the new instance); **Brouer et al. [2014a]** specifies the objective value obtained in Brouer et al. [2014a] allowing biweekly frequencies for vessel classes below 1200 FFE - for WorldSmall demand quantities are not comparable and the comparison is omitted; **Weekly Z** is the objective value obtained by the proposed matheuristic allowing weekly frequencies for all vessel classes; **Depl%** is the percentage of the total number of available vessels deployed; **Trans%** is the percentage of demand transported; **Time** is the CPU time in seconds. Numbers in bold highlight the solutions with a lower objective value than in Brouer et al. [2014a].

References

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