Preface

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This issue of the Journal of Scheduling contains 8 selected papers from the 2015 Multidisciplinary International Scheduling Conference: Theory and Applications (MISTA) that was held in Prague, Czech Republic (25–28 August 2015).

The 2015 conference was the seventh in the series. Previous conferences have been held in Nottingham (2003), New York (2005), Paris (2007), Dublin (2009), Phoenix (2011), and Gent (2013). The eighth conference will be held in Kuala Lumpur, Malaysia (5–8 Dec 2017).

The MISTA conference series aims to bring together scheduling researchers and practitioners from the many disciplines that engage in scheduling. The conferences attract submissions from areas such as Operations Research, Computer Science, Engineering, Manufacturing, Mathematics and Artificial Intelligence. The scope of the conferences covers a wide range of techniques and applications including (but by no means limited to) Project Scheduling, Job/Flow Shop Scheduling, Rostering, Timetabling, Sports Scheduling, Delivery Scheduling, Mathematical Programming, Heuristic Search, Meta-/Hyper-heuristics, Evolutionary Algorithms, Local Search. MISTA is the only conference with broad coverage of the problems, algorithms and applications of scheduling across distinct research fields. The MISTA website (<http://www.schedulingconference.org>) contains much more information as well as access to all previous papers that the conference has published.

MISTA 2015 was attended by about 140 people, who presented 123 oral presentations. These consisted of both full papers and abstracts. Both abstracts and papers appeared in the conference proceedings, and they are all available from

the conference website (<http://www.schedulingconference.org/proceedings/>).

Following the conference, authors were invited to submit revised versions of their papers to a special issue of the Journal of Scheduling. The 8 accepted papers are those that received supportive reviews after undergoing a review process in keeping with the expectations of an internationally recognised journal.

Three of the papers in this special issue consider staff scheduling problems. In “A list-scheduling heuristic for the short-term planning of assessment centers” (Zimmermann and Trautmann 2017), the authors investigate a novel planning problem that utilises a multi-pass list-scheduling heuristic for scheduling candidates to undertake a set of tasks so that they can be evaluated. The paper “The impact of overtime as a time-based proactive scheduling and reactive allocation strategy on the robustness of a personnel shift roster” (Ingels and Maenhout 2017) investigates the trade-off between a hiring budget and an overtime budget and the way overtime should be allocated in the personnel management process. The authors apply a three-step methodology, resulting in the formulation of managerial guidelines for hiring and overtime policy. “Staff assignment with lexicographically ordered acceptance levels” (Rihm and Baumann 2017) introduces a real-world staff assignment problem, where current approaches from the scientific literature are not suitable. The matheuristic that is utilised scales well and outperforms commercial employee scheduling software.

The next four papers focus on different aspects of shop scheduling problems. In “Approaches to modeling train scheduling problems as job-shop problems with blocking constraints” (Lange and Werner 2017), the focus is on train scheduling, specifically trains travelling through railway networks comprising single tracks, sidings and stations. The problem is modelled as a job-shop problem, with blocking constraints. Four mixed integer programming (MIP) formulations are developed, followed by a computational study. “A hybrid scheduling approach for a two-stage flexible flow shop with batch processing machines” (Tan et al. 2017) considers problems of the type which might, for example, be

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found in semiconductor wafer fabrication facilities. Similar to the previous paper, a MIP formulation is presented which is addressed using an iterative stage-based decomposition approach, hybridised with a local search. The third shop scheduling problem, “Exact exponential algorithms for 3-machine flowshop scheduling problems” (Shang et al. 2017), designs an exact exponential time algorithm for a 3-machine flowshop problem. The algorithm can be easily generalised to other, similar, problems. The final shop scheduling problem, “Family scheduling with batch availability in flow shops to minimize makespan” (Shen and Gupta 2017), considers batch scheduling problems, where job families are formed based on set-up similarities. A tabu search, with multiple neighbourhood functions, is utilised with the proposed approach out-performing other approaches.

In the final paper, “Multi-stage resource-aware scheduling for data centers with heterogeneous servers” (Tran et al. 2017), a three-stage algorithm is presented which addresses resource-aware scheduling of computational jobs in a large-scale heterogeneous data centre. The algorithm is tested on Google workload trace data, as well as generated data, showing that it outperforms existing schedulers.

We would like to thank all those who carried out reviews for both the MISTA conference and for the special issue. We recognise the time and effort involved in providing high-quality reviews, and we are extremely grateful for all their help. Without this support from the international scientific community, neither the conference, nor the special issue would have been possible.

We would also like to thank the local organisation team in Prague, with a special thank you to Debbie Pitchfork

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References

- Ingels, J., & Maenhout, B. (2017). The impact of overtime as a time-based proactive scheduling and reactive allocation strategy on the robustness of a personnel shift roster. *Journal of Scheduling*. <https://doi.org/10.1007/s10951-017-0512-6>.
- Lange, J., & Werner, F. (2017). Approaches to modeling train scheduling problems as job-shop problems with blocking constraints. *Journal of Scheduling*. <https://doi.org/10.1007/s10951-017-0526-0>.
- Rihm, T., & Baumann, P. (2017). Staff assignment with lexicographically ordered acceptance levels. *Journal of Scheduling*. <https://doi.org/10.1007/s10951-017-0525-1>.
- Shang, L., Lenté, C., Liedloff, M., et al. (2017). Exact exponential algorithms for 3-machine flowshop scheduling problems. *Journal of Scheduling*. <https://doi.org/10.1007/s10951-017-0524-2>.
- Shen, L., & Gupta, J. N. D. (2017). Family scheduling with batch availability in flow shops to minimize makespan. *Journal of Scheduling*. <https://doi.org/10.1007/s10951-017-0529-x>.
- Tan, Y., Mönch, L., & Fowler, J. W. (2017). A hybrid scheduling approach for a two-stage flexible flow shop with batch processing machines. *Journal of Scheduling*. <https://doi.org/10.1007/s10951-017-0530-4>.
- Tran, T. T., Padmanabhan, M., Zhang, P. Y., et al. (2017). Multi-stage resource-aware scheduling for data centers with heterogeneous servers. *Journal of Scheduling*. <https://doi.org/10.1007/s10951-017-0537-x>.
- Zimmermann, A., & Trautmann, N. (2017). A list-scheduling heuristic for the short-term planning of assessment centers. *Journal of Scheduling*. <https://doi.org/10.1007/s10951-017-0521-5>.