

VORträge zum Operations Research

Kolloquium des Instituts für Operations Research

Zeit: Donnerstag, 23. Februar 2023, 13:30 Uhr - 14:30 Uhr

Ort: Gebäude 05.20, Raum 4A-21

Es spricht: Prof. Roberto Aringhieri, Università di Torino, Italien

Zum Thema: **OR4OSGEO (Operations Research for Open GIS)**

Abstract: During the Italian lock-down, between an online exam and a [zoom | webex | teams | bbb | meet] call, we started to study a problem arising in the everyday management of the Covid pandemic, that is the daily swab test collection problem (DSTCP) [1]. The idea stems from the paper [2] in which the Digital Contact Tracing was suggested as containment measure against the Covid pandemic. Almost at the same time, we were working on the Ambulance Routing Problem (ARP) [3]. The ARP consists in finding the best ambulance tours to transport the patients in relief operations after a disaster [4]. Both the DSTCP and the ARP can be modeled as a variant of the classical Team Orienteering Problem (TOP) [5] that we called TOP with Service Time and Mandatory and Incompatible Nodes (TOP-STMIN) [6]. In this talk, we briefly introduce the DSTCP and the ARP to highlight the three characteristics (service times, mandatory and incompatible nodes) that jointly determine the new variant of the TOP. Then we describe our ongoing work on the TOP-ST-MIN (formulations, algorithms, preliminary results. After discussing the so called price of fairness [7,8], we report some numerical results obtained considering three alternative and general approaches to model the fairness in the case of the ARP. Concluding remarks closes the talk [9].

[1] R. Aringhieri, S. Bigharaz, A. Druetto, D. Duma, A. Grosso, and A. Guastalla. The daily swab test collection problem. *Annals of Operations Research*, 2022. Advance online publication 27 October 2022.

[2] Ferretti, L., Wymant, C., Kendall, M., Zhao, L., Nurtay, A., Abeler-Dörner, L., Parker, M., Bonsall, D., and Fraser, C. (2020). Quantifying sars-cov-2 transmission suggests epidemic control with digital contact tracing. *Science*. <https://doi.org/10.1126/science.abb6936>

[3] Talarico L, Meisel F, Sorensen K (2015) Ambulance routing for disaster response with patient groups. *Comput Oper Res* 56:120–133

[4] R. Aringhieri, S. Bigharaz, D. Duma, and A. Guastalla. Fairness in ambulance routing for post disaster management. *Central European Journal of Operations Research*, 30:189–211, 2022.

[5] Vansteenwegen P, Gunawan A (2019) Orienteering problems: models and algorithms for vehicle routing problems with profits. Springer Nature Switzerland AG

[6] Aringhieri, R., Bigharaz, S., Duma, D., Guastalla, A. (2022). Novel Applications of the Team Orienteering Problem in Health Care Logistics. In: Amorosi, L., Dell’Olmo, P., Lari, I. (eds) *Optimization in Artificial Intelligence and Data Sciences*. AIRO Springer Series, vol 8. Springer, Cham. https://doi.org/10.1007/978-3-030-95380-5_21

[7] Dimitris Bertsimas, Vivek F. Farias, Nikolaos Trichakis, (2011) The Price of Fairness. *Operations Research* 59(1):17-31

[8] Nicosia G, Pacifici A, Pferschy U (2017) Price of fairness for allocating a bounded resource. *Eur J Oper Res*

257(3):933–943

[9] Andrea Lodi (2022) Fairness over time and dynamic resource allocation. Plenary, EURO 2022, Espoo.

Die Vorträge zum Operations Research wenden sich an alle Interessierten!

Bei Rückfragen wenden Sie sich bitte an:

Prof. Dr. Stefan Nickel, Institut für Operations Research.