Data in Brief 8 (2016) 972–977

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data Article

Benchmark dataset for undirected and Mixed Capacitated Arc Routing Problems under Time restrictions with Intermediate Facilities

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ARTICLE INFO

Article history:
Received 14 June 2016
Received in revised form
27 June 2016
Accepted 30 June 2016
Available online 6 July 2016

Keywords:
Optimisation
Waste management
Operations Research
Capacitated Arc Routing Problems

ABSTRACT

In this article we present benchmark datasets for the Mixed Capacitated Arc Routing Problem under Time restrictions with Intermediate Facilities (MCARPTIF). The problem is a generalisation of the Capacitated Arc Routing Problem (CARP), and closely represents waste collection routing. Four different test sets are presented, each consisting of multiple instance files, and which can be used to benchmark different solution approaches for the MCARPTIF. An in-depth description of the datasets can be found in "Constructive heuristics for the Mixed Capacity Arc Routing Problem under Time Restrictions with Intermediate Facilities" (Willemseand Joubert, 2016) [2] and "Splitting procedures for the Mixed Capacitated Arc Routing Problem under Time restrictions with Intermediate Facilities" (Willemseand Joubert, in press) [4]. The datasets are publicly available from "Library of benchmark test sets for variants of the Capacitated Arc Routing Problem under Time restrictions with Intermediate Facilities" (Willemse and Joubert, 2016) [3].

DOI of original article: http://dx.doi.org/10.1016/j.orl.2016.06.001
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http://dx.doi.org/10.1016/j.dib.2016.06.067

Specifications Table

Subject area	*Optimisation, Waste Management*
More specific subject area	*Operations Research, Capacitated Arc Routing Problems*
Type of data	*Table, figures, text files*
How data was acquired	*A Geospatial Information System (GIS) data set, courtesy of Business Connexion, was used to generate the Cen-Full-IF, Cen-IF and Cen-Part instances. The Act-IF instances were generated using OpenStreetMap data and information supplied by the Metropolitan municipality responsible for servicing the area. All other instances were generated by modifying publicly available datasets.*
Data format	*Raw*
Experimental factors	*The Cen-IF instance files were generated by transforming a GIS dataset data into a connected road-segment network, and calculating waste and traversal data for the network using road segment attributes. Thereafter the network data was converted into a standard instance file format. An illustration of the file preparation can be found in Fig. 1. The Lpr-IF instances were generated by modifying existing raw instance files, and transforming them into the standard instance file format.*
Experimental features	*The datasets are used to evaluate solution techniques for the CARPTIF and MCARPTIF.*
Data source location	*Centurion (25.860°S 28.189°E), South Africa. Actonville (26.214°S 28.304°E) and Wattville (26.222°S 28.303°E), Benoni, South Africa.*
Data accessibility	*The datasets are available in this article and at* http://dx.doi.org/10.17632/9x4vd92rcj.2

Value of the data

- The benchmark sets include realistic instances that are based on actual road networks and that are consistent in size with waste collection instances found in practice. They can therefore be used to evaluate the performance of solution methods intended for practical applications.
- The instances can be used to benchmark and compare existing and new solution approaches for the CARPTIF and MCARPTIF, including lower-bound procedures, as well as exact and heuristic solution methods.
- Characteristics of the realistic benchmark sets can be compared against other practical waste collection instances to identify common instance characteristics that may influence the performance of solution methods.
- The large instances can be used to evaluate solution methods for tactical and strategic waste collection problems, such as waste collection sectoring, intermediate facility placements, and vehicle fleet composition problems.
- The instances can be reduced to and solved as the Capacitated Arc Routing Problem (CARP) and Mixed Capacitated Arc Routing Problem (MCARP), thus extending their use to other variants.

1. Data

The data accompanying this paper consist of benchmark test instances for the Capacitated Arc Routing Problem under Time duration restrictions with Intermediate Facilities (CARPTIF), as well as files for the Mixed CARPTIF (MCARPTIF) on a mixed road-network with one- and two-way streets. The problems are generalisations of the Capacitated Arc Routing Problem (CARP), and closely represents waste collection routing. All datasets are freely available from [3].