Path Relinking for a Team Scheduling Problem Arising in Hydroinformatics

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• What is a contamination event?
• Problem modellization (feasible region + objective function)
• State of the art

• Path relinking strategies
  • Route based PR
  • Hybrid PR

• Results
• Conclusions and future work
Injection of contaminant into the hydraulic network. Contaminant is spreading...

Hydraulic simulations

- No reaction
- 3h after the injection
- Device activation

Injection of contaminant into the hydraulic network. Contaminant is spreading...
Optimizing the schedule

<table>
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<th>Device</th>
<th>Time</th>
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<td>H2</td>
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Hydraulic Simulator
5 seconds

Multiple Travelling Salesman Problem

Technician: A, B
Solving architecture:
- Parallel GAs, plus a
- Intensification step by “Path Relinking”
Path Relinking
by Glover et al. 2000

Legend
- reference solution
- initial solution
- possible move
- selected move
- guiding solution

Path Relinking: intro
Path Relinking
by Glover et al. 2000

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Path Relinking
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Path Relinking
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Legend
● reference solution
⊗ initial solution
□ possible move
■ selected move
⊕ guiding solution
Path Relinking: solution representations

Route based

\[ \text{PRr} \]

Time based

\[ \text{PRh} \]
Experimental framework

- Ferrara’s hydraulic network (about 120’000 users)
- 20 contamination scenarios
- Reference set is built up from 10 final population of the GA
- GA, PRr and PRh were limited to 500 simulations

Results

PRh + 1 GA

x 10 times

10 GAs + 1 GA
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**Ave:** 0 3 | 3 38 | 7 76
Conclusions

• 2 new Path Relinking neighbourood structures for the response to contamination problem (and for the mTSP)
• Common PRs are effective as intensification strategies

Current work:
• intensificating GAs
• Design of a new concurrent PR algorithm
• Preliminary results show this novel strategy overcomes GA
Journals


Proceedings of international conferences
