Institute of Cartography and Geoinformation, D-BAUG

Network Design and Evaluation for the E-bike City Vision

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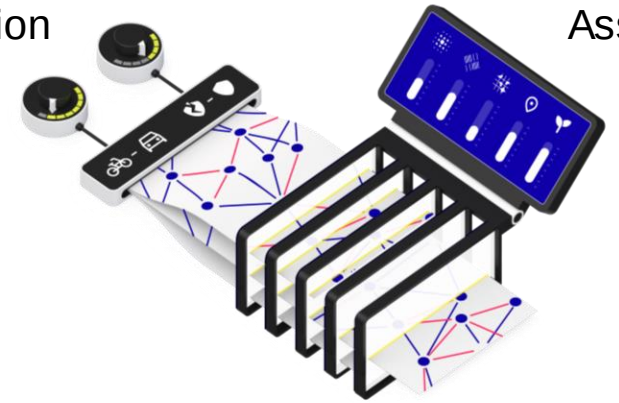
E-Bike City network **Design**

Designing the Bike Network Using Mathematical Optimization

Problem: Scenario exploration for bike network design and evaluation relies on heuristic methods and manually crafted evaluations.

Optimization

Assessment



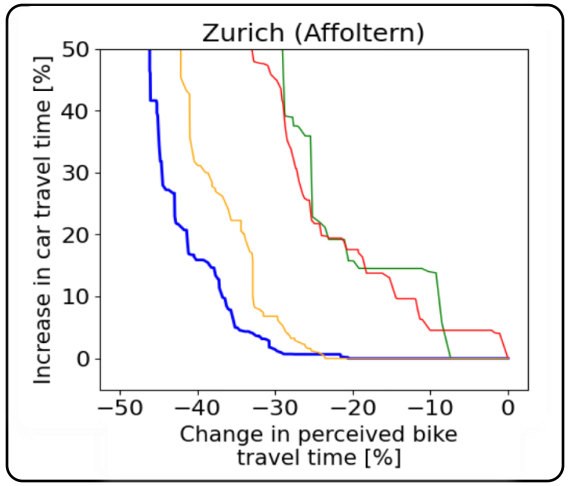
Combinatorial Problem: involves multiple objectives.

Optimization Approach: linear programming formulation.

Pareto Frontier: illustrates multiple optimal scenarios.

Performance: outperforms heuristic approaches.

Flexibility: adaptable to various evaluation criteria.



Optimization | Betweenness bottom-up (bike) | Betweenness top-down | Betweenness bottom-up (car)

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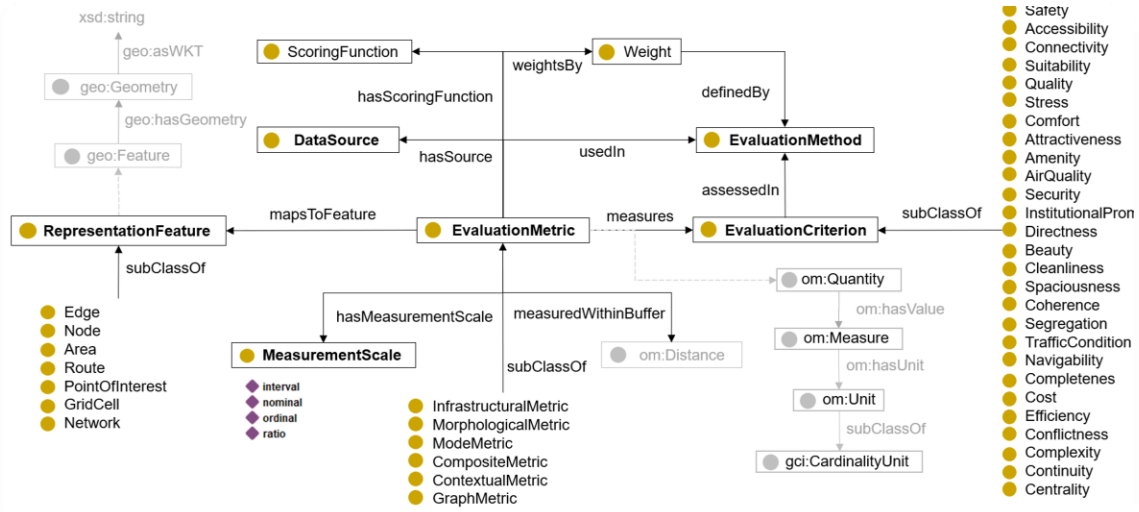
E-Bike City network **Evaluation**

Bike Network Evaluation Metrics Ontology (VeloNEMO)

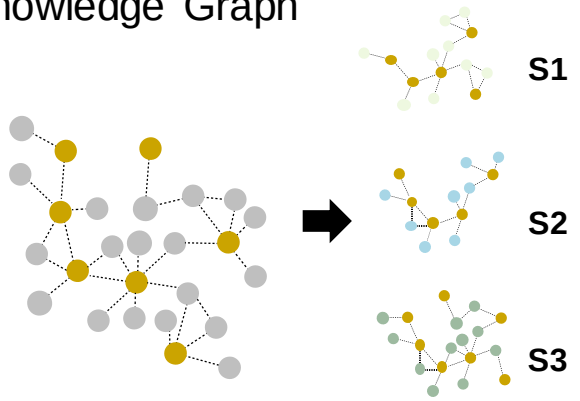
- **Interpretability Problem:** metric representations are ambiguous.
- **Formal Ontology:** a structured approach to interpret evaluation metrics.
- **Knowledge Graph:** the first database for common evaluation metrics.
- **Meta-analysis:** automated evaluation comparison.
- **Scenario Exploration:** multi-criteria evaluation frameworks.

Take away: we propose methods to streamline scenario explorations and support bike network design and evaluation.

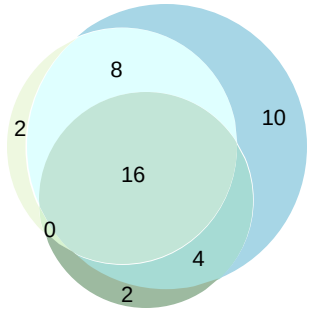
VeloNEMO



Knowledge Graph



Scenario Comparison



Evaluation overlap across scenarios

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