Spatio-temporal public transport accessibility analysis and benchmarking in an interactive WebGIS

by **MAJK SHKURTI**

Assessing public transport using the concept of accessibility is of rising importance in the planning practice. The accessibility measures have gained vital importance in designing and evaluating the public transport system regarding mobility and sustainability. To conduct these measures a wide range of indicators are used for modelling and visualizing accessibility which are usually modeled using GIS methods and different routing algorithms. Meanwhile, the ever-increasing technological progress in GIS, web technologies, and the rising availability of data facilitate fast innovation [1]. This research aim to identify the most suitable benchmark and develop a framework for interactive public transport benchmark [2]
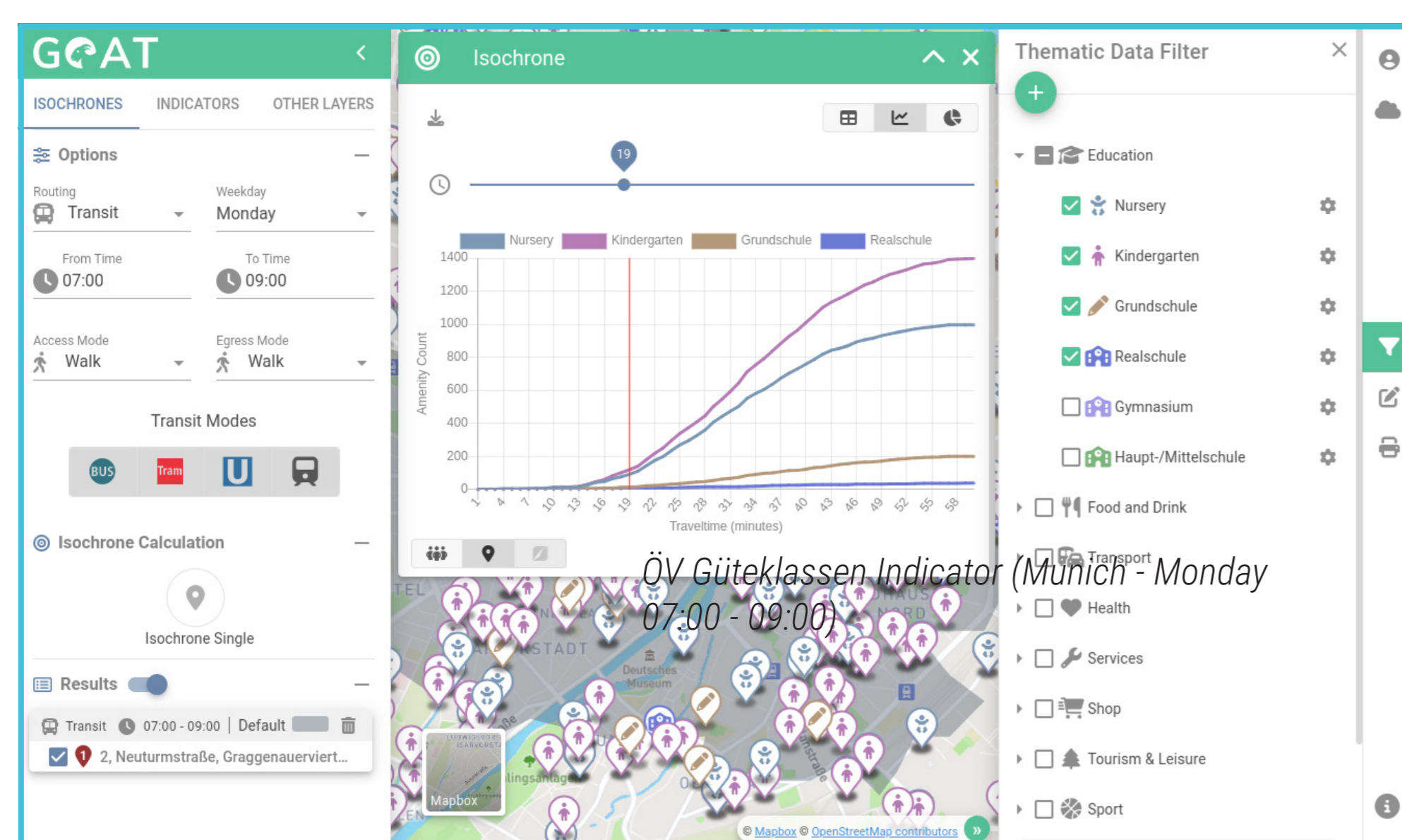
Fig 1. GOAT (Geo Open Accessibility Tool) user interface with public transport Isochrone indicator
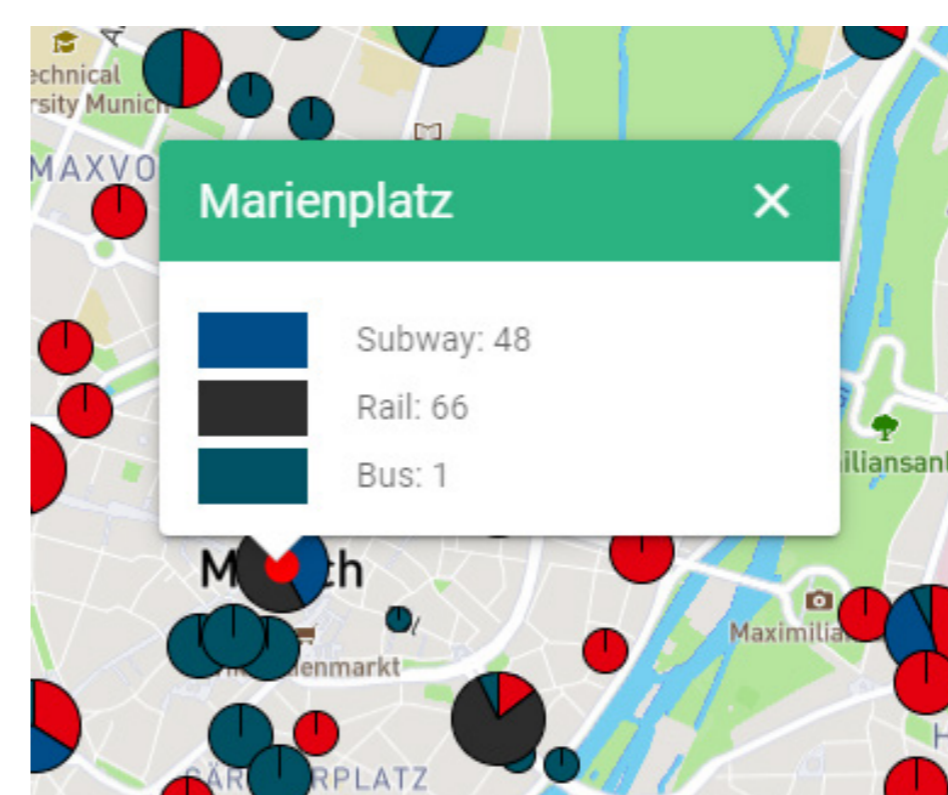

Fig. 2. Station Count Indicator (Munich - Monday 07:00 - 09:00)

ÖV Güteklassen (Fig. 3) Combines the analysis of the accessibility and service quality. It computes catchment areas (radiis) depending on the quality (frequency and type of public transport). Each station is assigned a category based on the frequency and used for identifying the buffer classes from each station on predefined distances. Used in Switzerland for evaluating the quality in public transport and spatial planning.
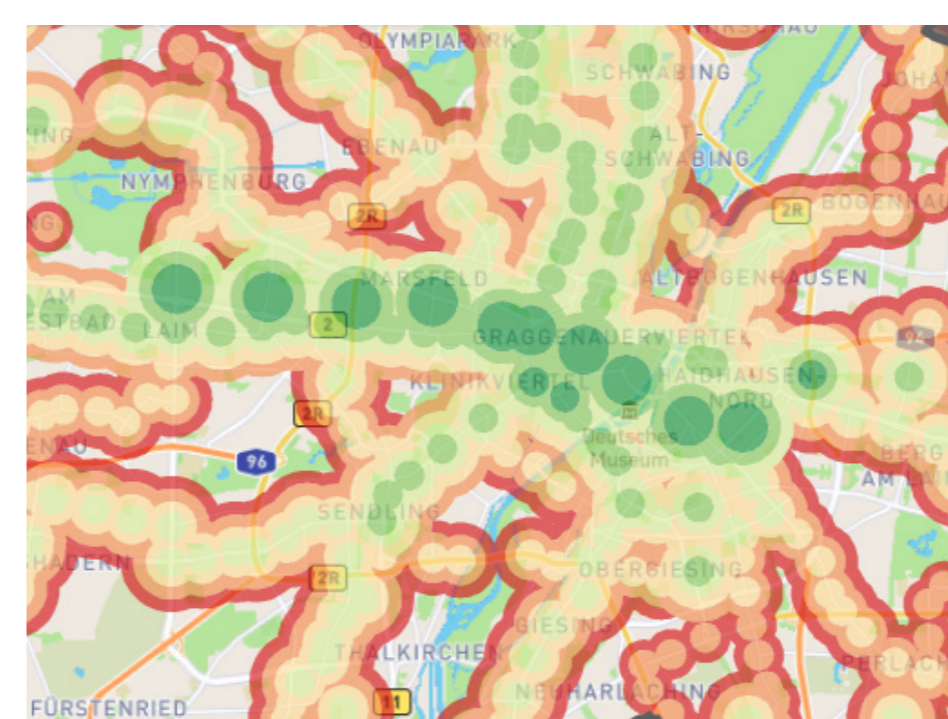

Fig. 3. ÖV Güteklassen Indicator (Munich - Monday 07:00 - 09:00)

OBJECTIVE

- Identify the most suitable accessibility benchmarks

- Develop backend framework for interactive public transport benchmark analyses

- Integration of public transport benchmarks into the dynamic user interface

RESEARCH QUESTIONS

1. Which Spatio-temporal public transport benchmarks can integrate into a web-based accessibility instrument considering practice relevance, technical feasibility and data availability ?

2. How to compute and visualize Spatio-temporal public transport benchmarks in a web-based accessibility instrument

METHODOLOGY

From the literature review existing indicators used in the planning practice were identified and organized in a comparision table alongside characteristics of measure class, resolution and other aspects. The list was reviewed and reduced to only indicators used in German spaking countries and was used for a workshop session with planners to know better which indicators are the most relevant in the planning process considering institutionalization, technical feasibility, data availability and indicator complexity. Based on the output of the workshop the implementation was done on GOAT, a WebGIS environment in a classical client-server architecture.

RESULTS

Three indicators were selected and implemented:

1. Public Transport Isochrone. (Fig. 1) The most relevant indicator in the planning practice based on workshop results. The indicator was calculated and displayed in a dynamic visualization for each minute and complemented with other datasets (Points of Interest and Population)

2. Station Count. (Fig.2) Provides analysis by showing the departures for each stop from the GTFS timetables. This indicator is calculated dynamically on different times and is visualized on the map using pie chart styling. On each station user can get information for the frequency of every service as an average number per hour.

CONCLUSION

With the new development in web technologies, public transport analysis nowadays can be provided in an easy and lightweight web interface that hides the complex calculation workflows which usually come when accomplished using conventional methods. This study attempted to identify a set of indicators most relevant in the planning practice and integrate them into a web tool that brings the data-driven analysis closer to experts. The feedback from the experts showed that the recognized development has the potential to support real-world planning problems and facilitate more individuals in performing data-driven analyses in public transport planning.

REFERENCES

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