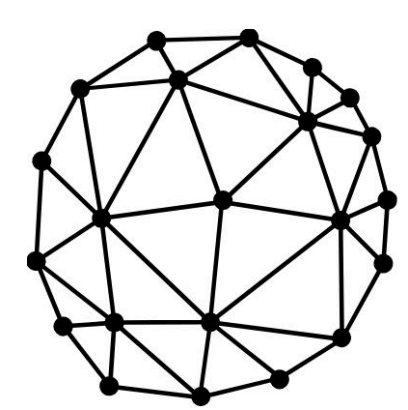


BikeScienceWeb: a tool for bicycle-related urban planning



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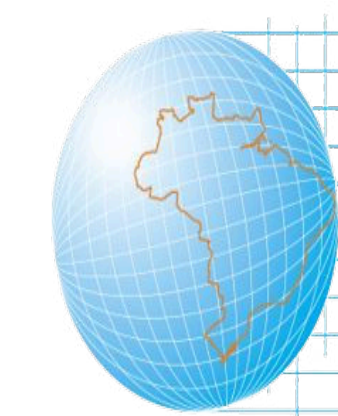
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1. Introduction

BikeScienceWeb¹ is an open source data science tool containing analytic resources for bicycle-related urban mobility planning. The tool allows specialists to carry out their analyses without the need for programming knowledge. Urban planners may use it for planning cycling infrastructure or to incentivize modal shift.

2. Methodology and main features

BikeScienceWeb implements methodologies² based on geolocated data to provide several analyses, including:

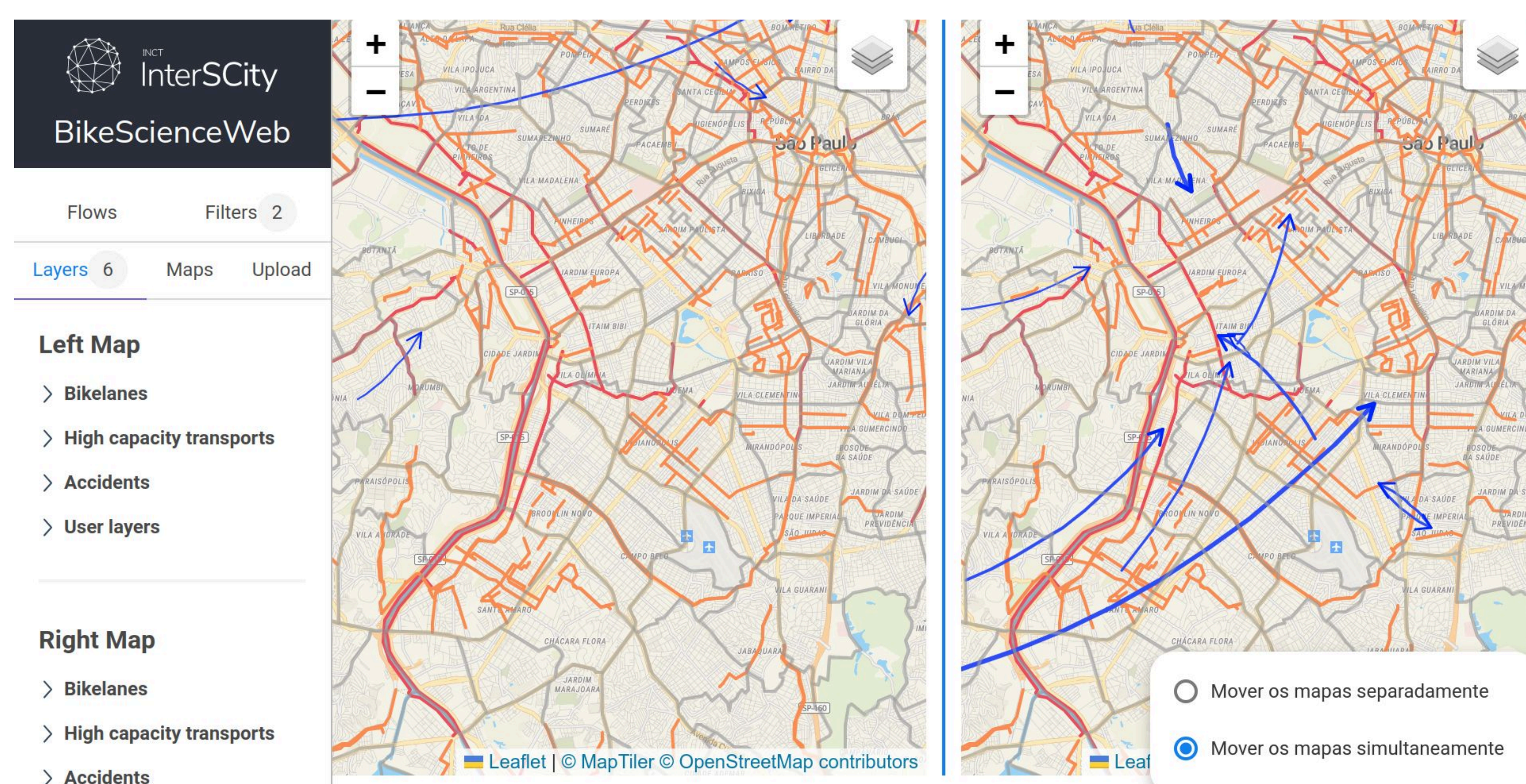
- Density of bicycle trip flows through regions of a city;
- Several map layers: bicycle infrastructure, high capacity transport, accidents, and custom layers;
- Filtering options related to time, duration, trip reasons and sociodemographics;
- Dual maps to compare distinct scenarios (Figure 1).

The data sources used to build the tool are:

- São Paulo's Origin-Destination travel survey;
- City layers such as bicycle infrastructure, zones, and public high-capacity transport stations;
- Location of accidents involving bicycles.

The frontend technologies used to develop the tool are JavaScript, Leaflet, and Vue.js. Backend technologies are Python, GeoPandas, and Flask.

Figure 1: Morning trip flows in the western region of São Paulo

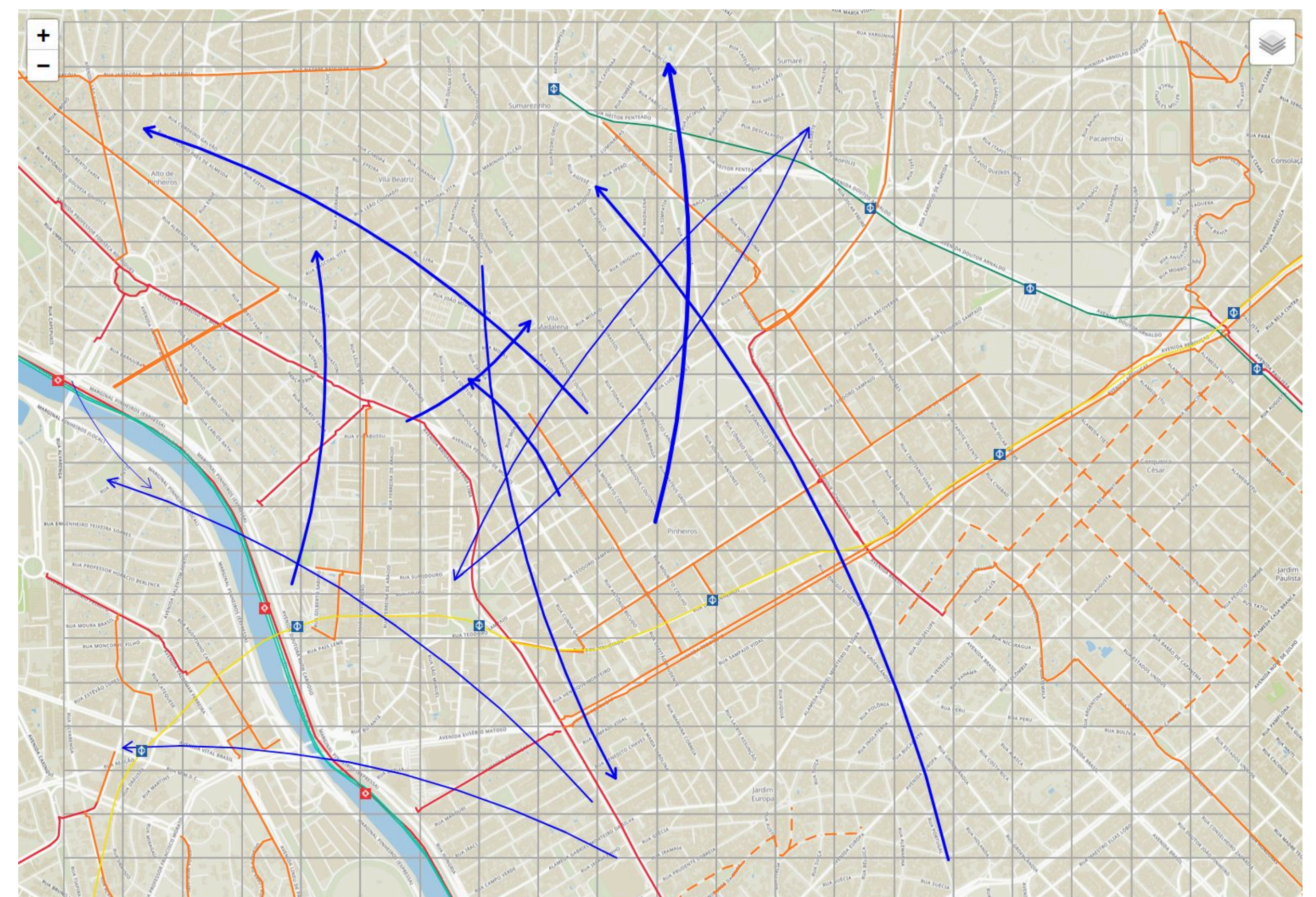


3. Assessment and usage example

The BikeScienceWeb incorporated analyses made along with specialists of São Paulo's transport authority³. The tool is available for any interested user through the QR code below. Figure 2 shows trip flows between 6PM to 11PM in the western region (Pinheiros

district) of São Paulo using a 20x20 grid with layers of cycling infrastructure, subway / train paths and stations.

Figure 2: Trip flows between 6 PM and 11 PM in the Pinheiros district.



The tool was assessed by 17 specialists (urbanists, traffic engineers, and other related areas). The results show that 76% agreed that the tool is useful for planning active mobility, 70% deemed the tool as easy to use, and 88% had the intention to use the tool (Figure 3).

Figure 3. Answers to the BikeScienceWeb questionnaire.

PU	7	3	3	2	2
PE	5	3	4	3	1
BI	9	4	2	1	1

■ totally agree ■ agree ■ somehow agree ■ neutral ■ somehow disagree ■ disagree ■ totally disagree

4. Final Remarks

BikeScienceWeb intends to help urban planners in analyzing, monitoring, and decision-making regarding public policies for cycling. As a web application, it can be used on any device or operational system, anytime, and anywhere. As an open source tool, it can be freely adapted by those interested in building BikeScienceWeb for other cities. Future work includes adding new functionalities such as creating bicycle routes between points of interest, exporting maps and charts, and analyzing potential new bicycle trips for modal shifts.

5. Bibliographic references

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3. de Souza, H. A. et al. Implantação e uso da ferramenta de análise de mobilidade de bicicletas BikeScience na CET: Identificando caminhos cicláveis em São Paulo. Revista UniCET, 3(1):21–43. 2021.

