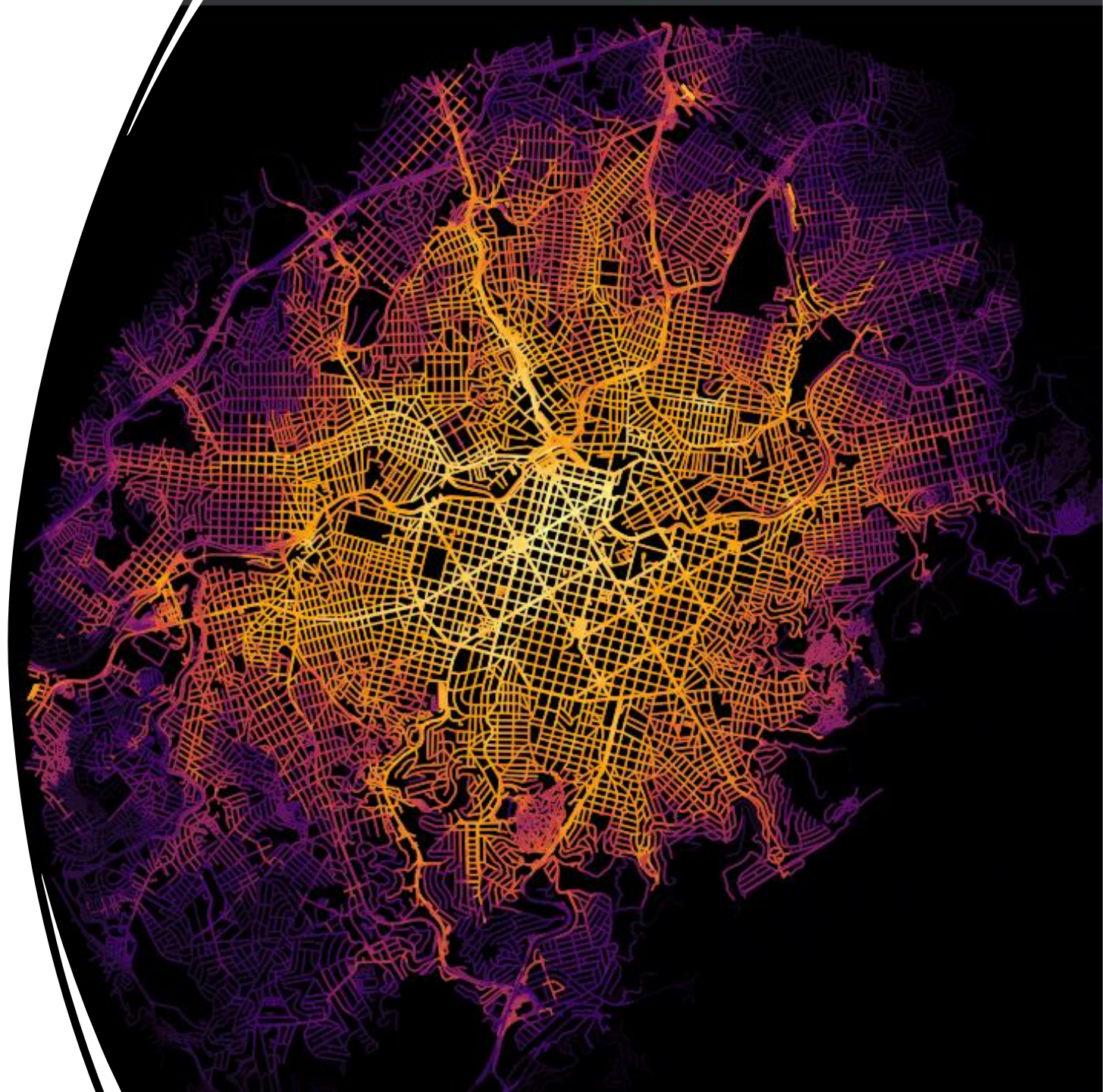


Computational  
requirements



# Computational requirements:

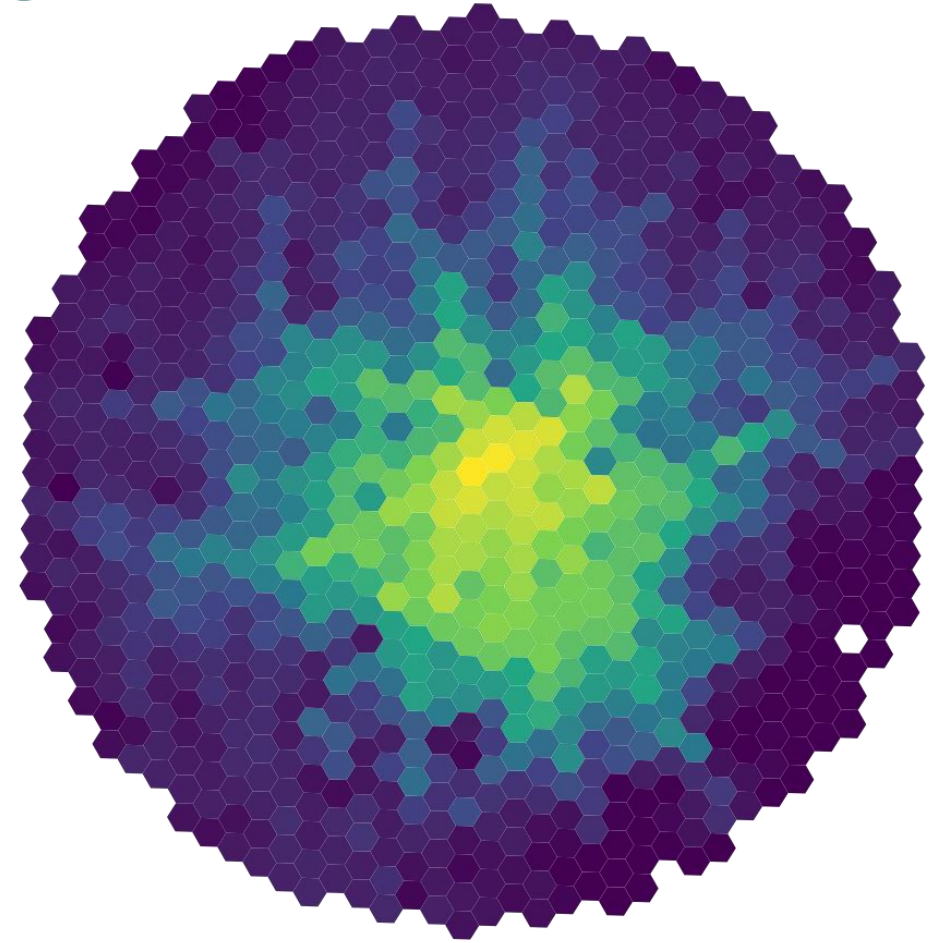
## 1. A computer ☺

- No super-computer needed
- 8 GB RAM is enough for most cases

## 2. A routing engine / algorithm

Good news!

Growing number of open-source tools

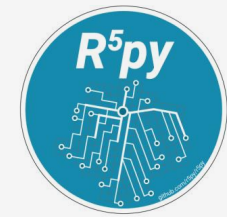


# Routing engines

\* network analysis packages

*Multimodal*

R<sup>5</sup>



OpenTripPlanner



VALHALLA



urbanaccess



AequilibraE

m4ra

Graphhopper



pgRouting

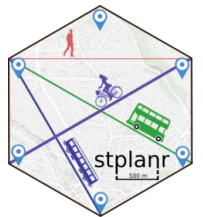
dodgr

openroute  
service



OSRM  
OPEN SOURCE ROUTING MACHINE

OSMnx



AccessMod 5

GOAT



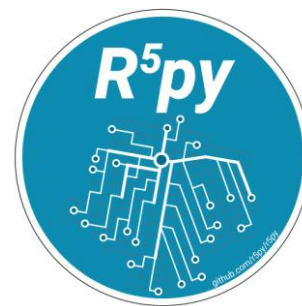
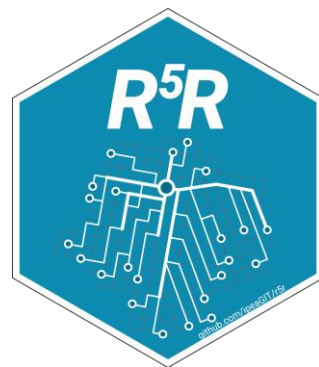
Pandana



# Our tool of choice:



by Conveyal





# r5r: rapid realistic routing with R5 in R

CRAN 2.0

downloads 912K

DOI 10.32866/001c.21262

GitHub code

<https://ipeagit.github.io/r5r>



Conveyal

Fast routing on multimodal transport networks

- Travel time / distance matrices
- Accessibility
- Trip planning
- Isochrones
- Level of traffic stress for cycling
- Terrain elevation
- Monetary costs
- Time window



# Blazing fast

**Table 3. Performance Analysis Results**

Activity	Scenario	ArcGIS Pro	R-OTP	Python-OTP	R5R	Emme
Make/Build Network	All	11m 26s	8m 19s	7m 24s	2m 39s	1m 25s
Calculate OD Matrix and Accessibility	1 x 100	1m 37s	20s	23s	<1s	2m 23s
	1 x 1,000	1m 47s	2m 49s	24s	<1s	4m 46s
	1 x 10,000	2m 51s	22m 37s	28s	1s	28m 36s
	1 x 100,000	12m 59s	7h 12m 15s	1m 4s	7s	<i>not run</i>
Calculate OD Matrix and Accessibility	100 x 100	3m 24s	25m 30s	2m 2s	1s	5m 5s
	1,000 x 1,000	6m 56s	>24h (DNF)	13m 42s	9s	18m 33s
	10,000 x 10,000	49m 53s	<i>not run</i>	4h 49m 18s	7m 50s	13h+
	100,000 x 100,000	<i>not run</i>	<i>not run</i>	<i>not run</i>	18h 15m 43s	<i>not run</i>

r5r is x times faster than:

Number of OD pairs	ArcGis	OTP-Py	Emme
100 <sup>2</sup>	204	122	305
1.000 <sup>2</sup>	46	91	124
10.000 <sup>2</sup>	6	37	100
100.000 <sup>2</sup>	<i>Inf</i>	<i>Inf</i>	<i>Inf</i>

Higgins et al (2022) Calculating Place-Based Transit Accessibility: Methods, Tools and Algorithmic Dependence.  
Journal of Transport and Land Use <https://jtl.org/index.php/jtl/article/view/2012>



# r5r: rapid realistic routing with R5 in R

CRAN 2.0

downloads 912K

DOI 10.32866/001c.21262

GitHub code

<https://ipeagit.github.io/r5r>

New version **v2.0**

It requires **Java JDK 21** : several open-source providers – [Link](#)

**Check your Java version using the {rJavaEnv} package:**

```
rJavaEnv::java_check_version_rjava()
```

```
> Using current session's JAVA_HOME: C:\Program Files\Amazon Corretto\jdk21.0.3_9"
```

If your output points to a JDK 11, you can install the older version of {r5r}

```
devtools::install_version(package = 'r5r',  
                           version = '1.1.0')
```



# r5r: rapid realistic routing with R5 in R

CRAN 2.0

downloads 912K

DOI 10.32866/001c.21262

GitHub code

<https://ipeagit.github.io/r5r>

New version **v2.0**

It requires **Java 21**: several open-source providers – [Link](#)

**Install Java (check version) with:**

```
# install {rJavaEnv}
install.packages("rJavaEnv")

# check version of Java currently installed (if any)
rJavaEnv::java_check_version_rjava()

# install Java 21
rJavaEnv::java_quick_install( version = 21,
                              distribution = 'Corretto')
```



# A crash course on Urban accessibility with R

Rafael H. M. Pereira

 @UrbanDemog