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Characterizing and Comparing Cellular Network Traffic in French Cities

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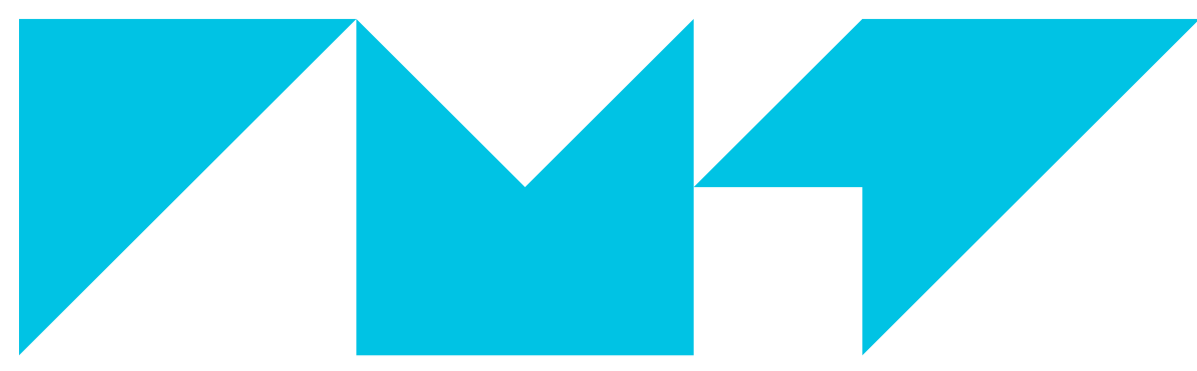
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Characterizing and Comparing Cellular Network Traffic in French Cities

Goals:

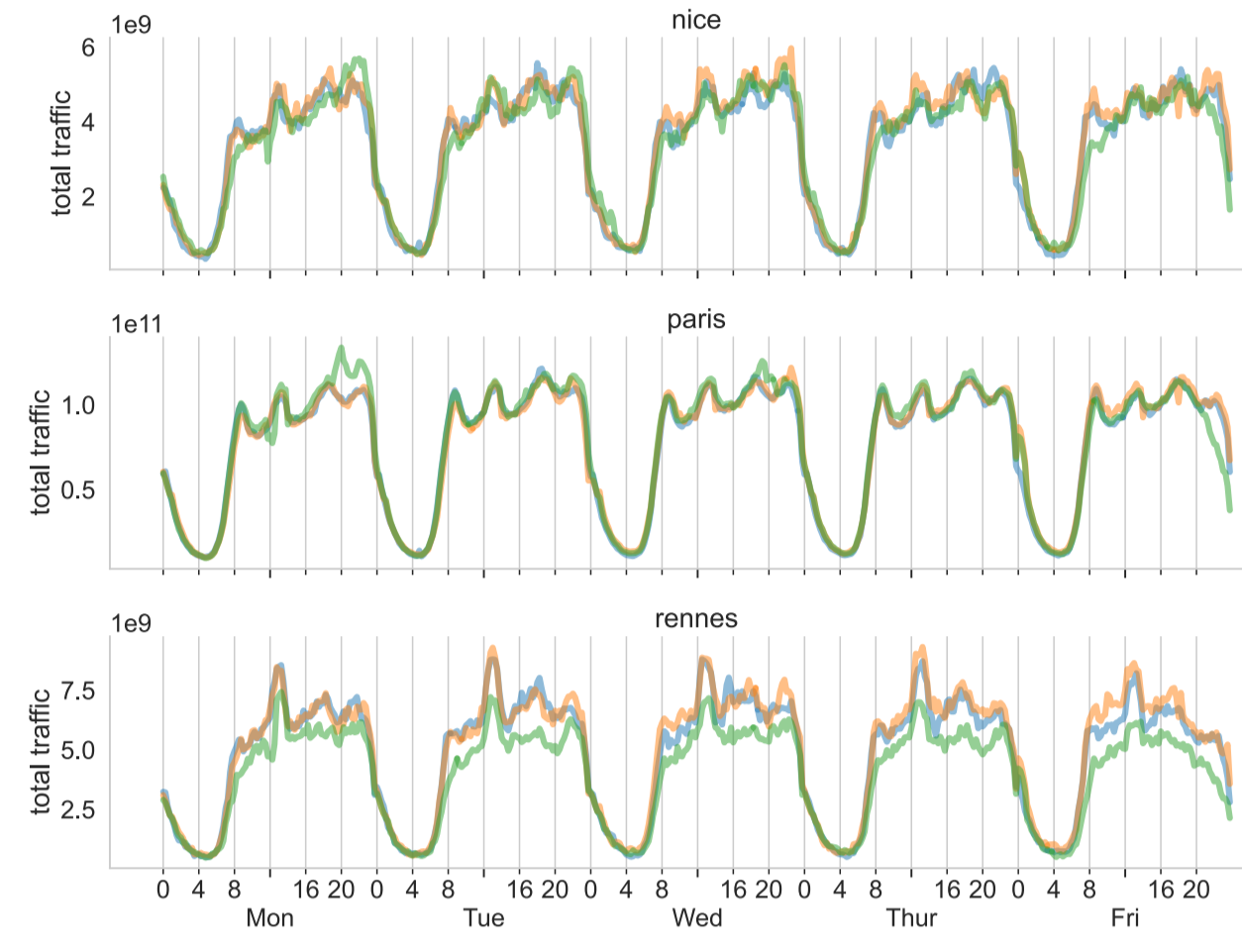
- ▶ Characterize the **spatial** and **time** diversity of the traffic
- ▶ Exploit the diversity to **place Network Functions**

Total Traffic

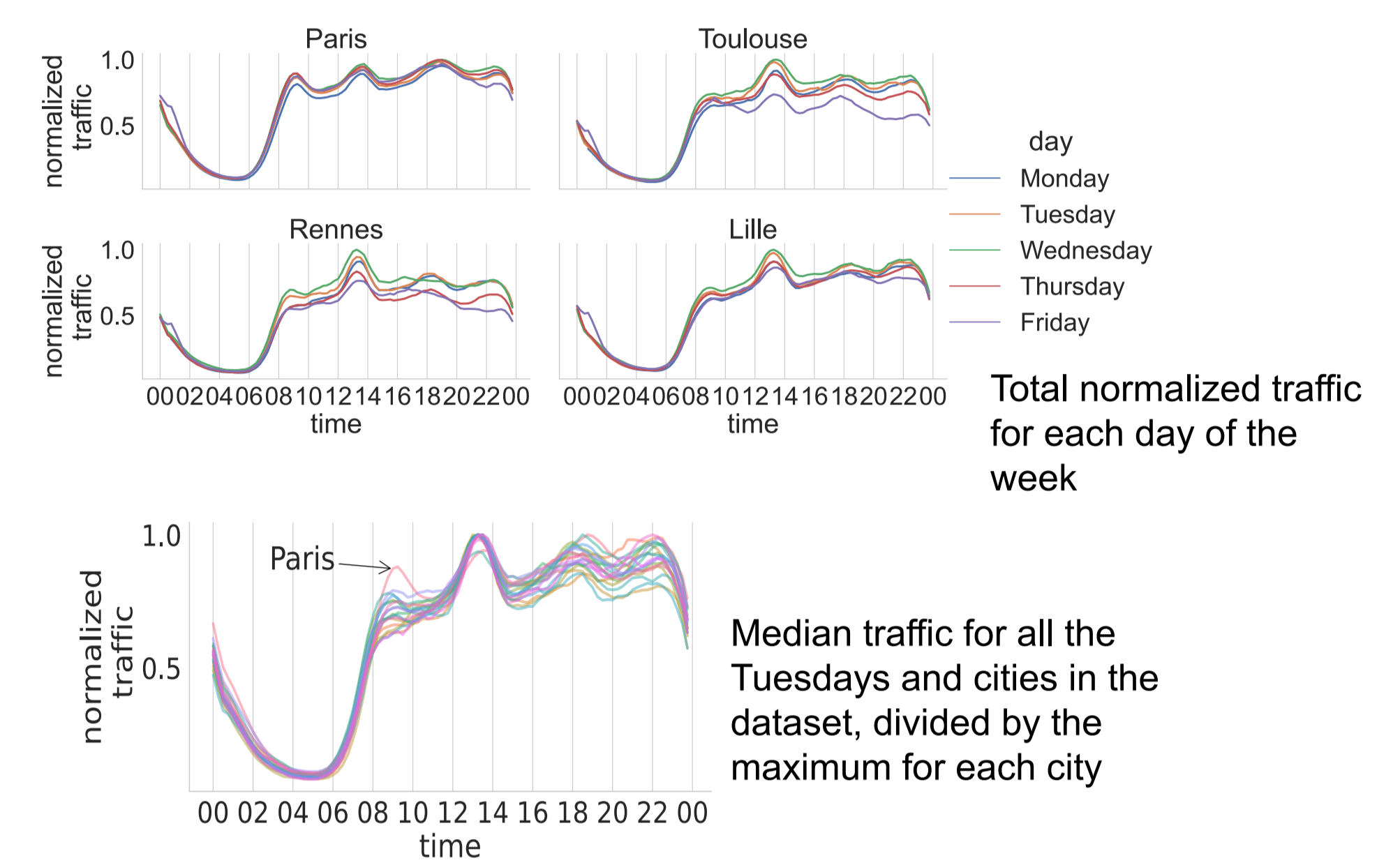
▶ Daily/weekly patterns

- Friday is different from other days
- Always a peak in the early afternoon
- Smaller peaks at 8 and 10 p.m.

▶ Midday peak at the same time in all cities

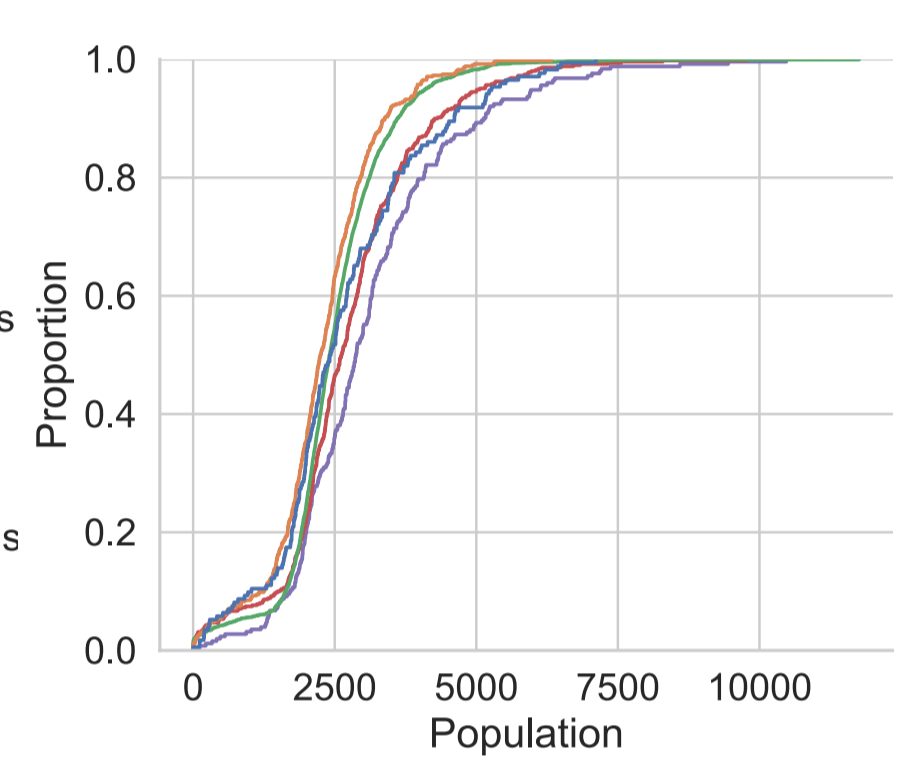
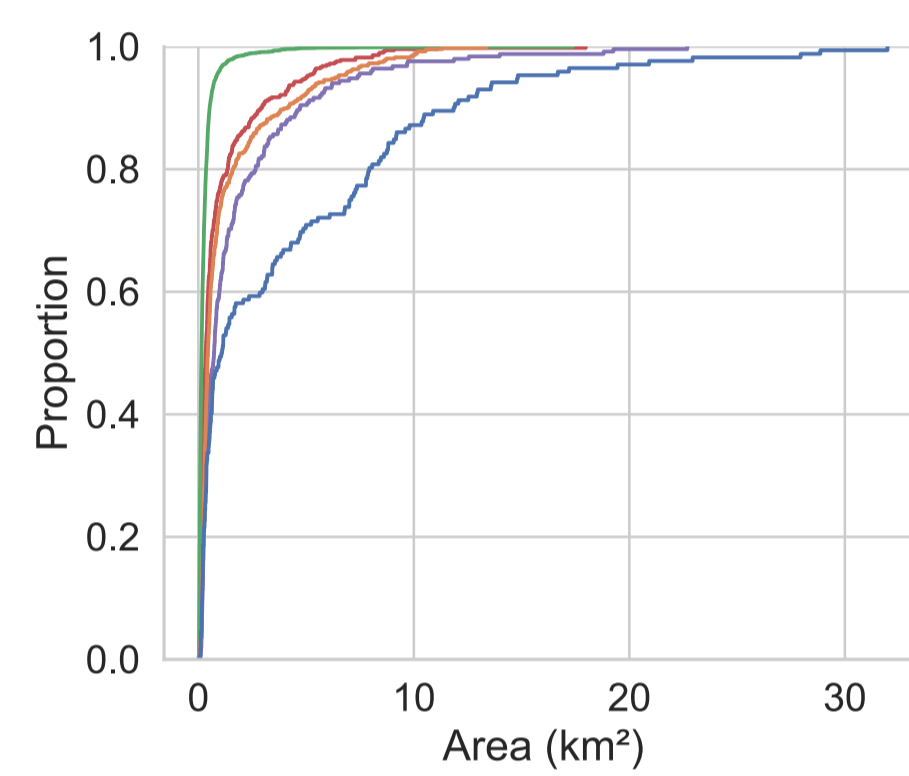


Total traffic in the 1st, 2nd, and 3rd week in the dataset (selected cities)

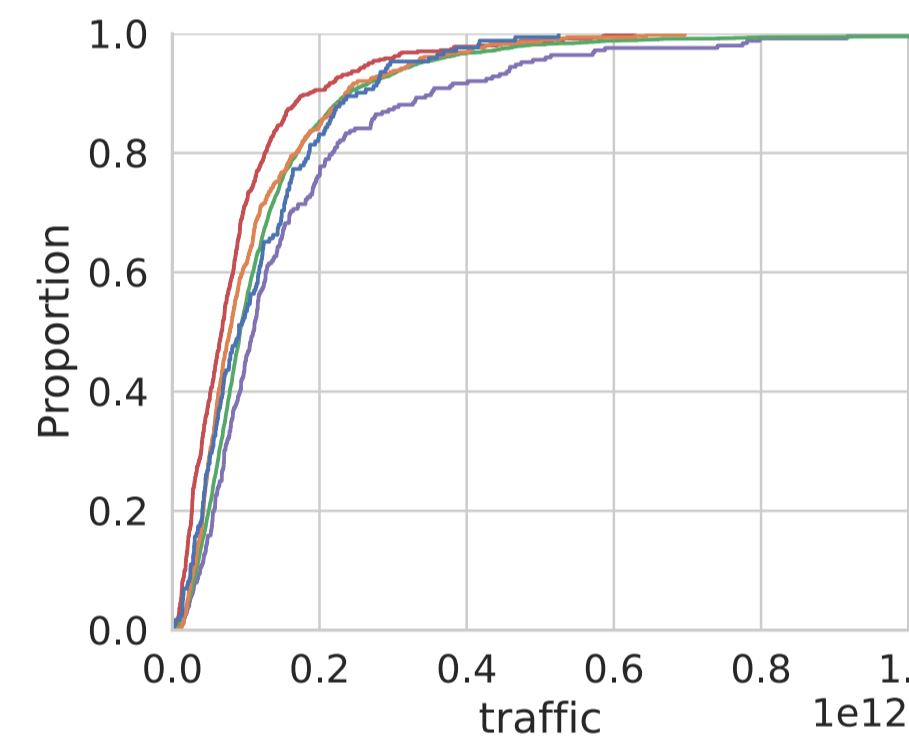


Total normalized traffic for each day of the week

Median traffic for all the Tuesdays and cities in the dataset, divided by the maximum for each city



The empirical distributions of the area, population, and traffic in each IRIS zone for selected cities



IRIS Zones

▶ Defined by the French National Statistical Agency (INSEE)

- For towns with more than 10,000 people
- Between 1,800 and 5,000 inhabitants in each zone
- Different areas and population

▶ Different total traffic in each zone (but lower dispersion than the area)

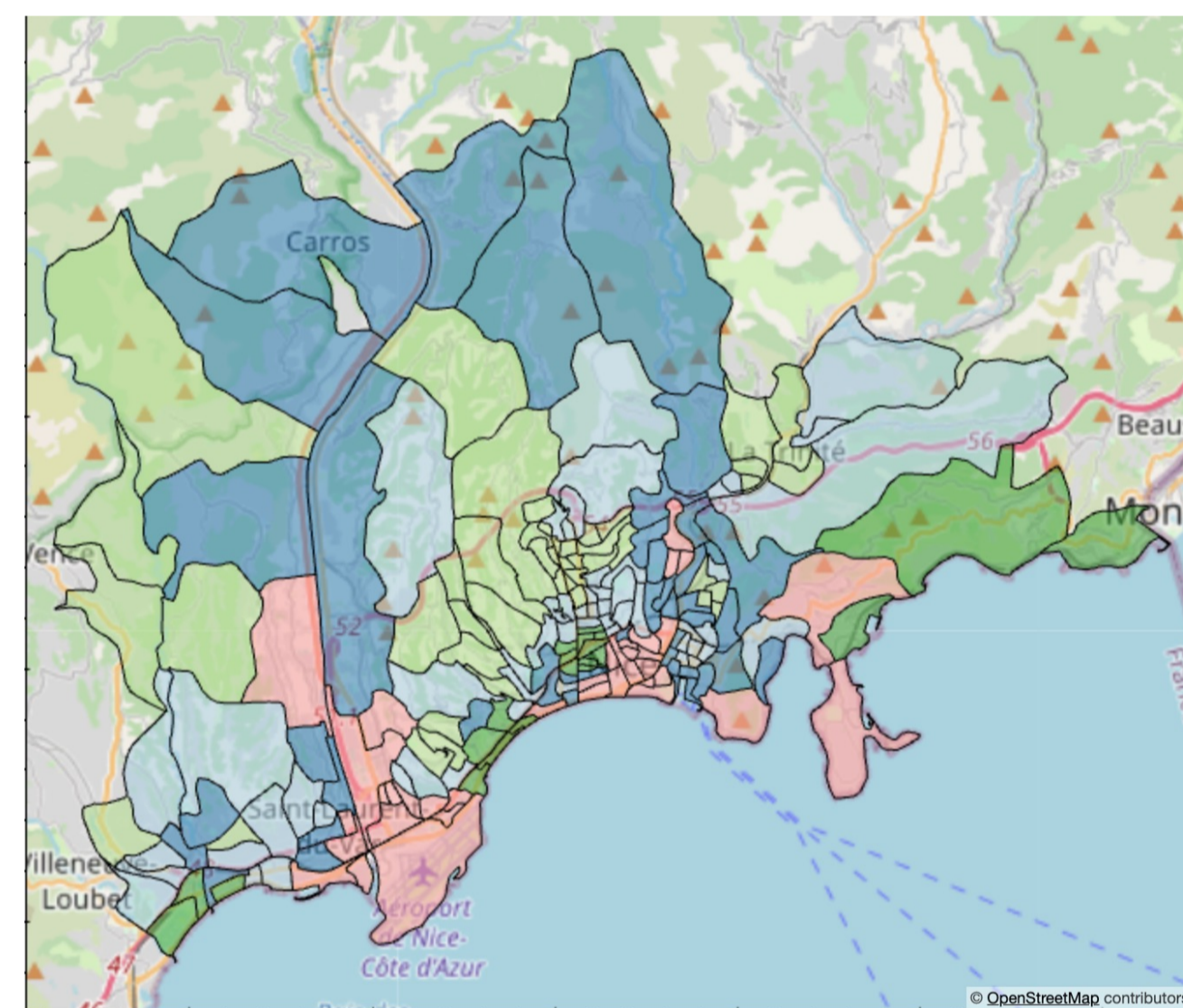
Clustering IRIS Zones

▶ Similar traffic patterns?

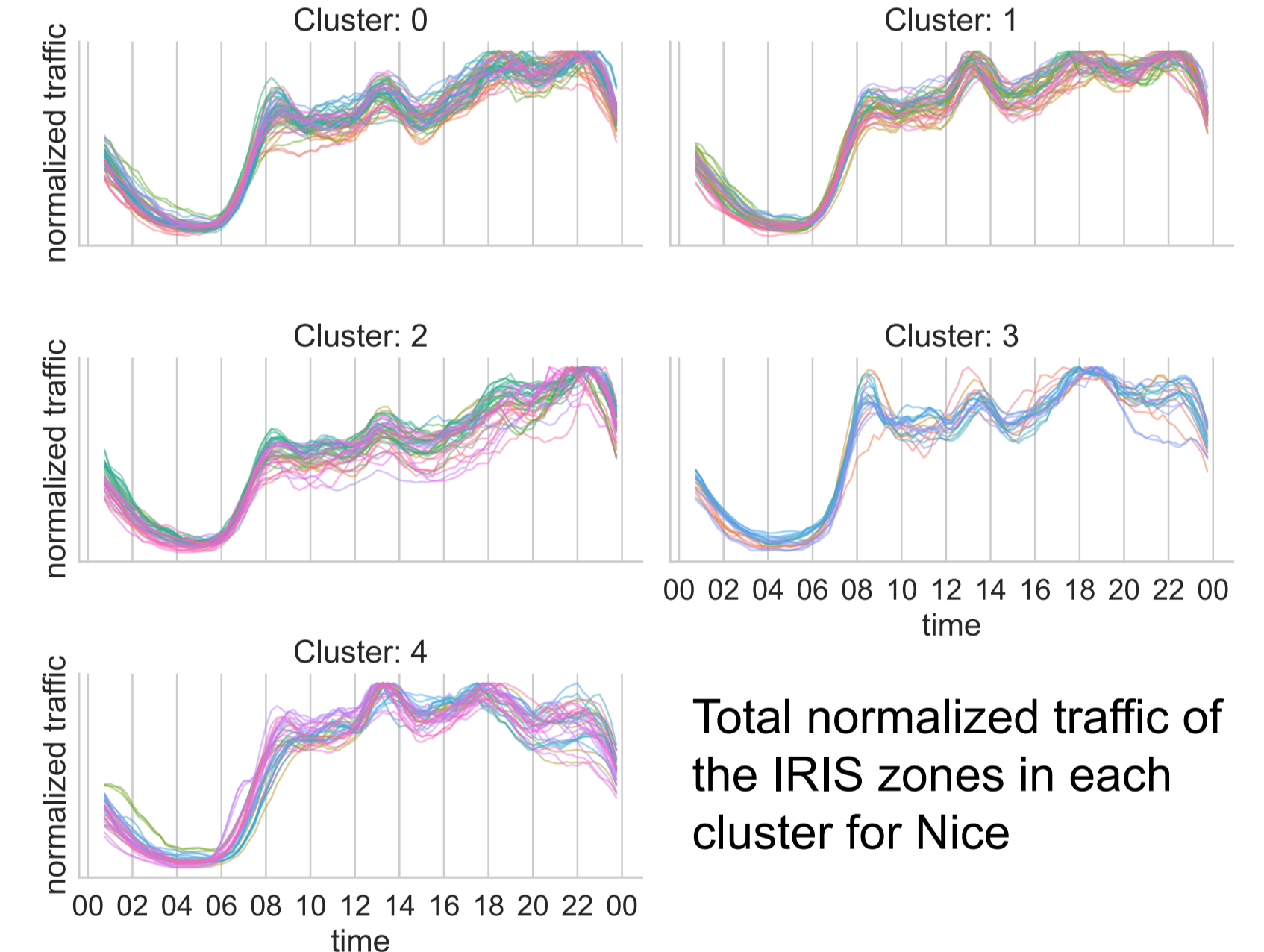
- Possible to detect between 4 and 7 clusters in each city
- Always a few exceptions

▶ IRIS zones are a good candidate for analyzing this dataset

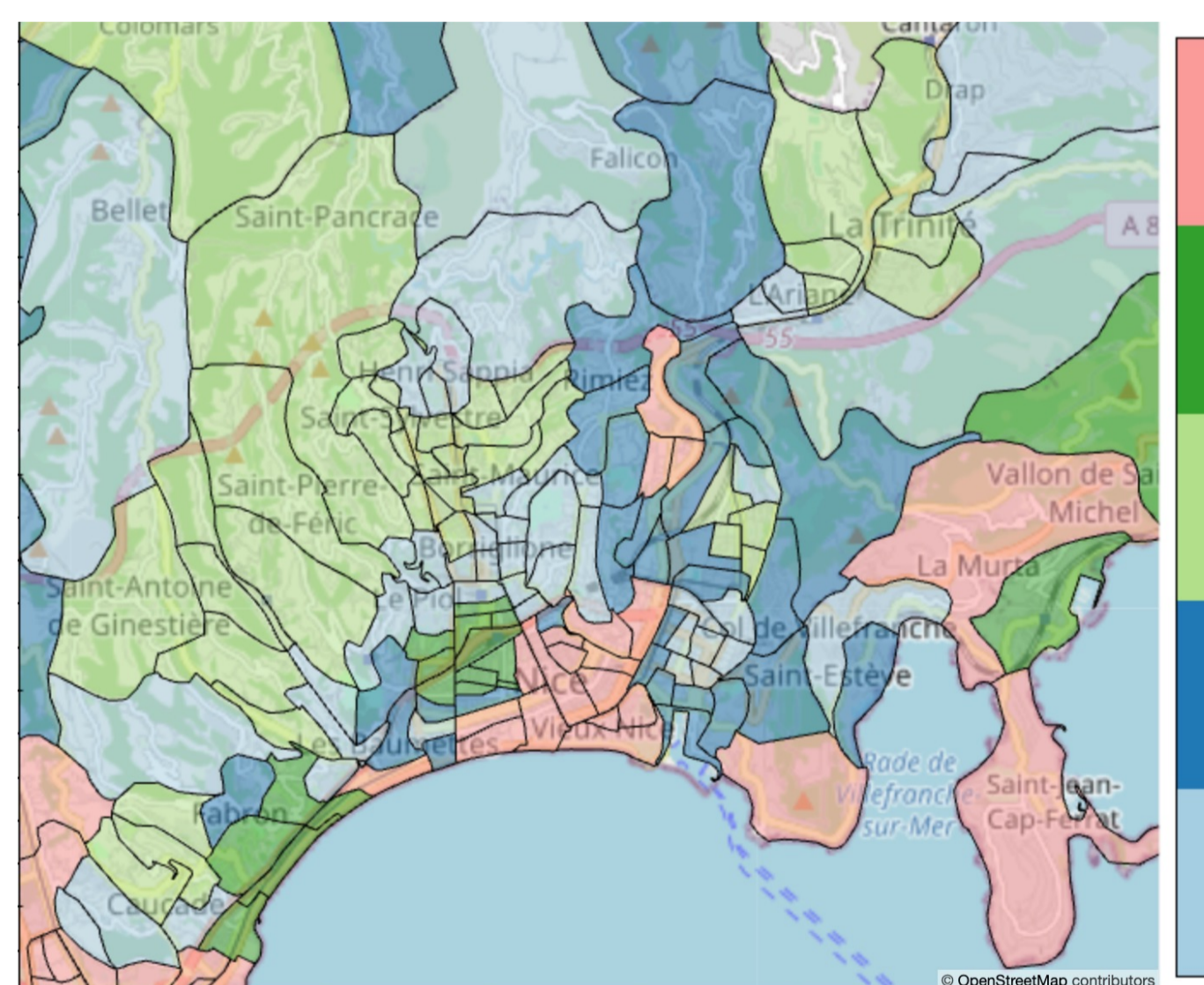
- Carefully defined to reflect the underlying characteristics
- Updated every year
- Detailed demographic estimates (by age, gender)



Maps of the clusters in Nice (whole metro area and city center)

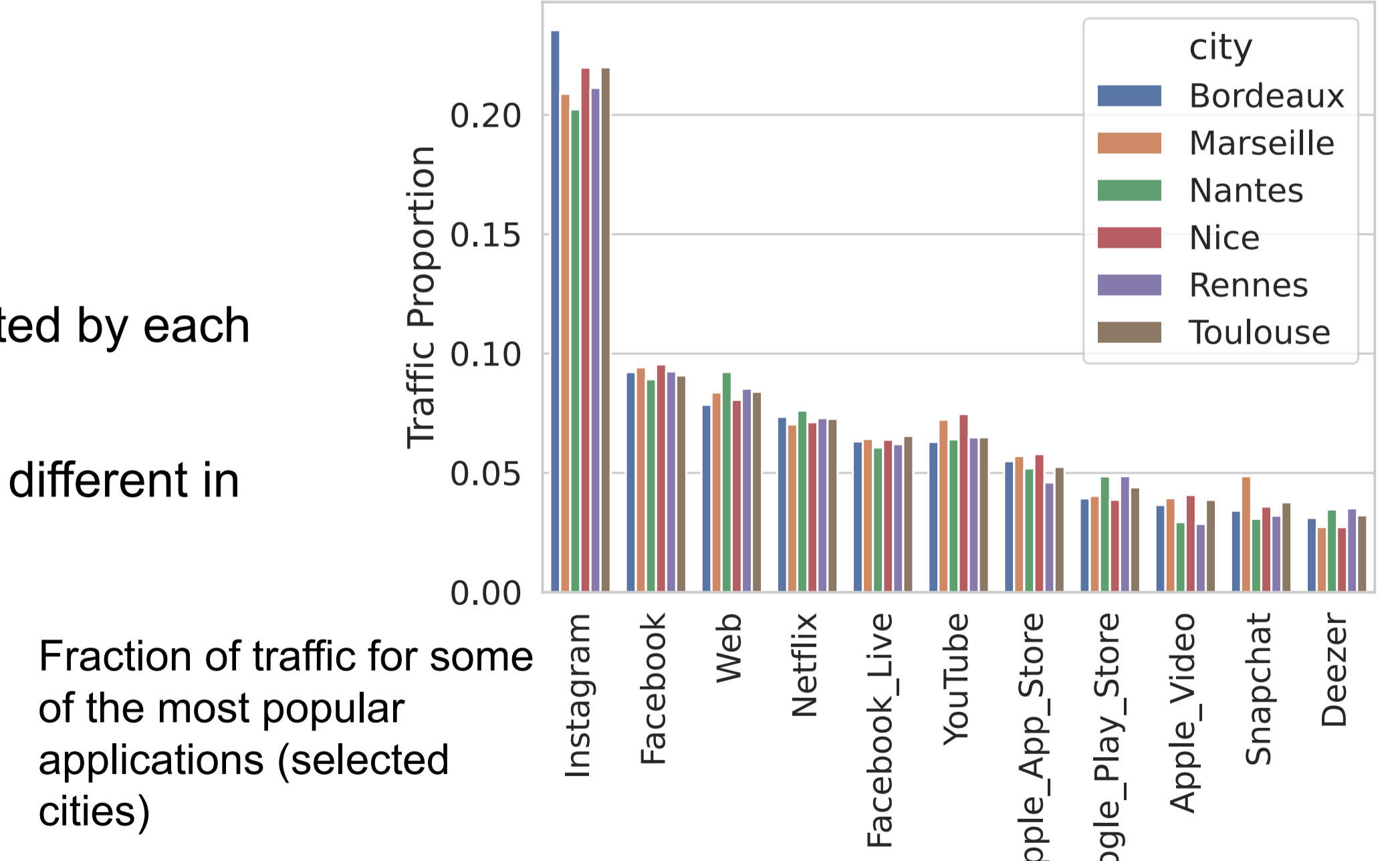


Total normalized traffic of the IRIS zones in each cluster for Nice

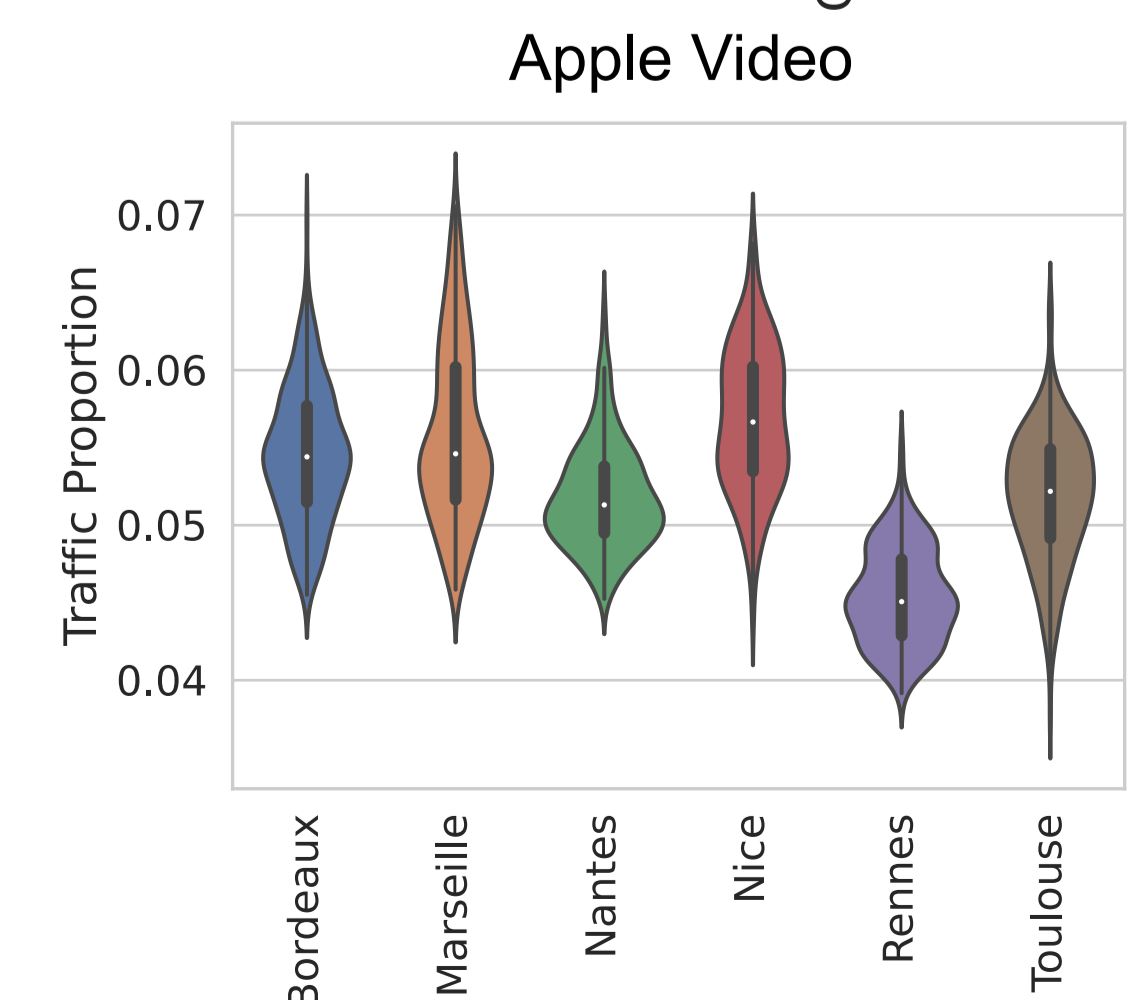
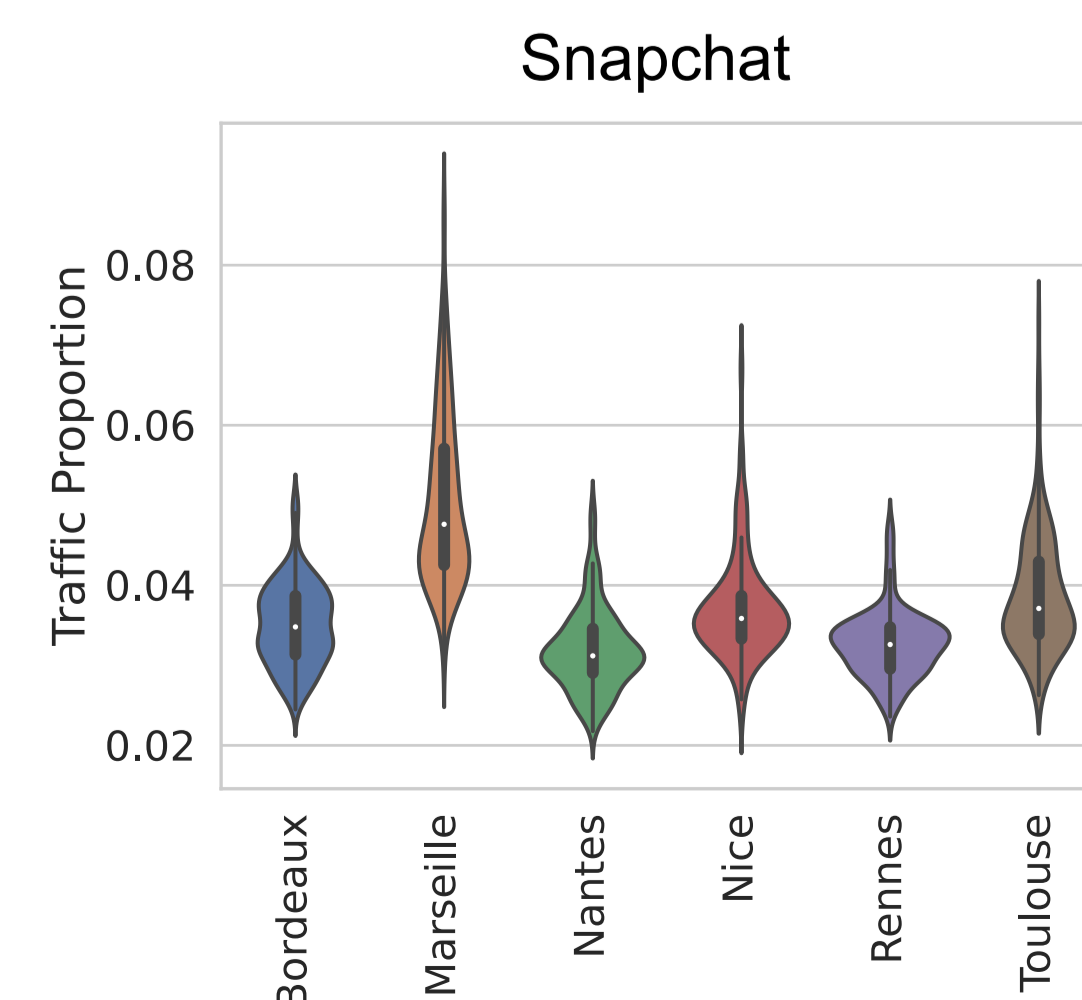
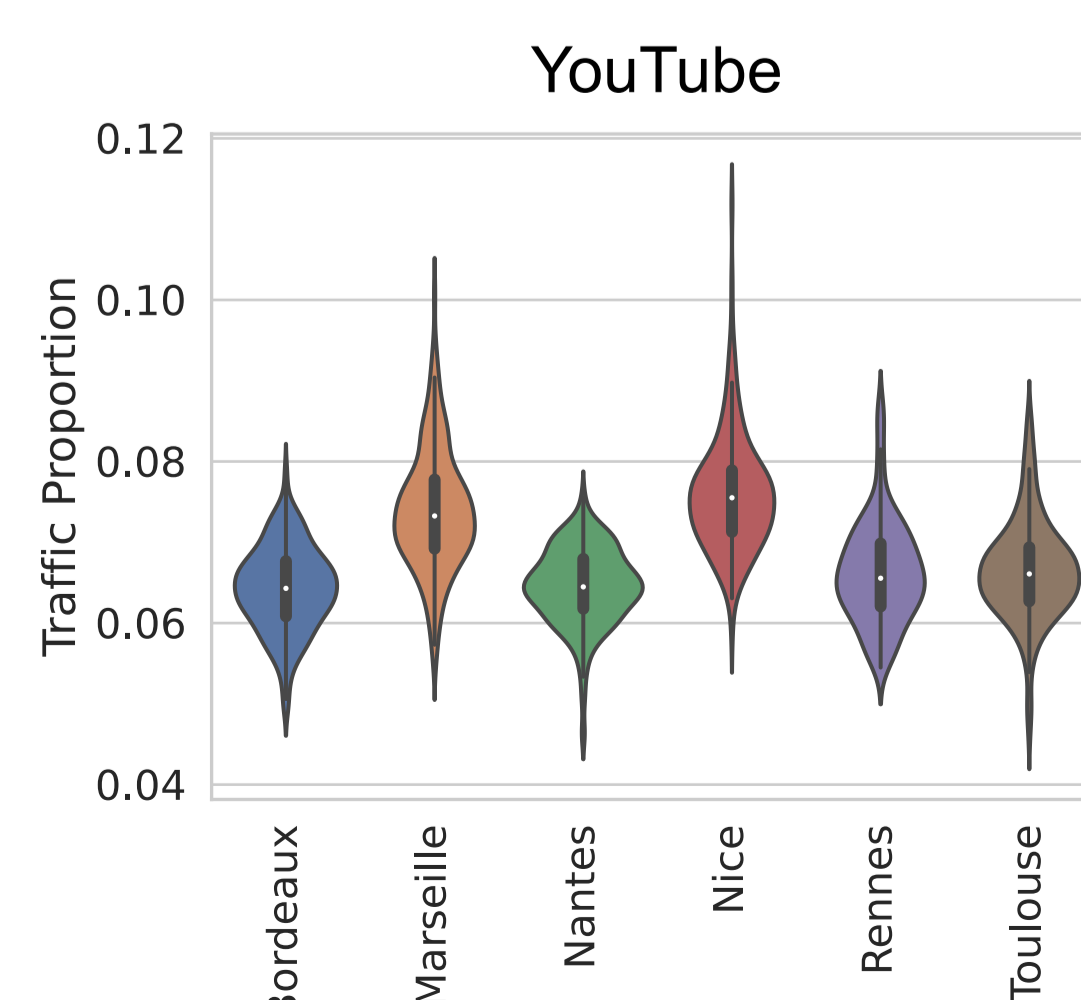
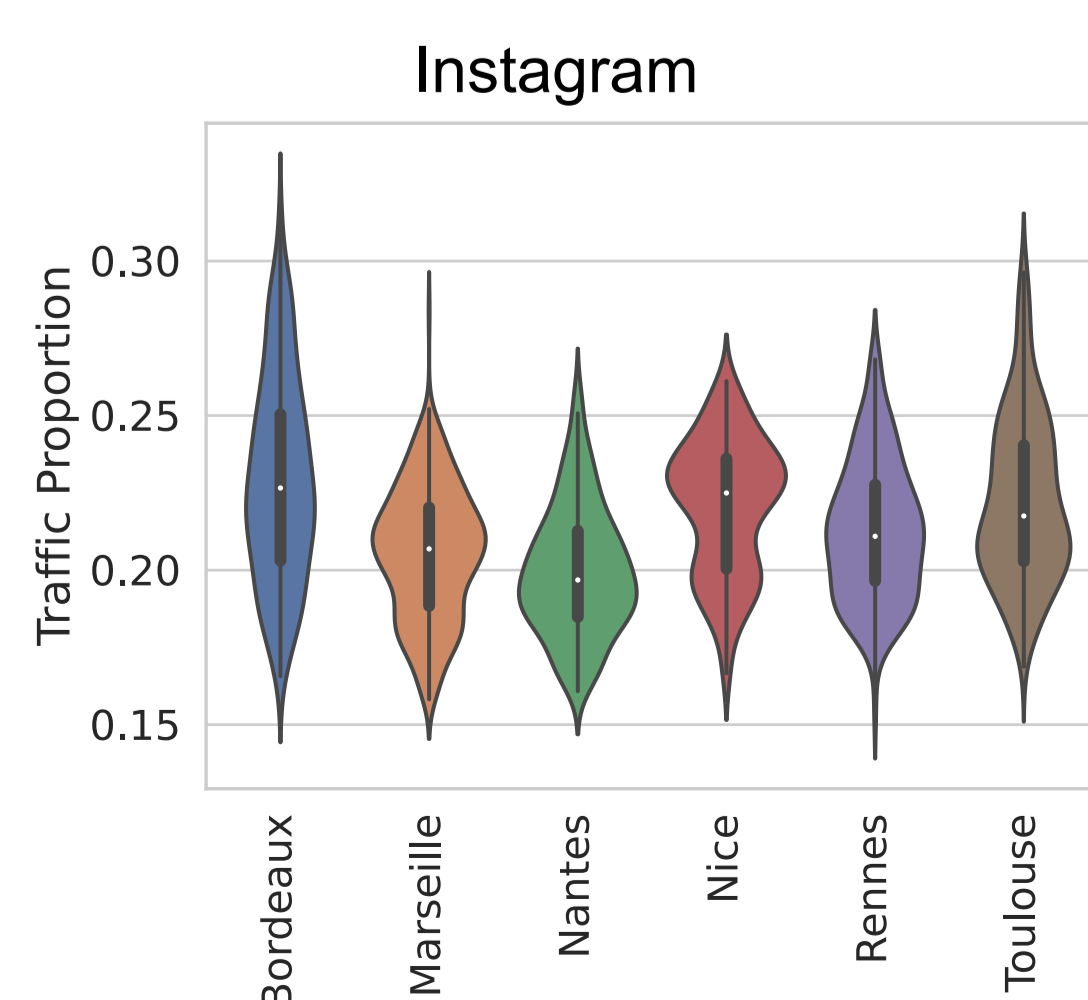


Applications' traffic

- ▶ Percentage of traffic generated by each application similar for all cities
- ▶ Variation among IRIS zones different in each city



Fraction of traffic for some of the most popular applications (selected cities)



Violin plots of the percentage of traffic in each IRIS zone for selected applications and cities

Authors

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