Cartography M.Sc.

Thesis defense:
Tourists vs. Locals Mapping Urban Traces from Social Media

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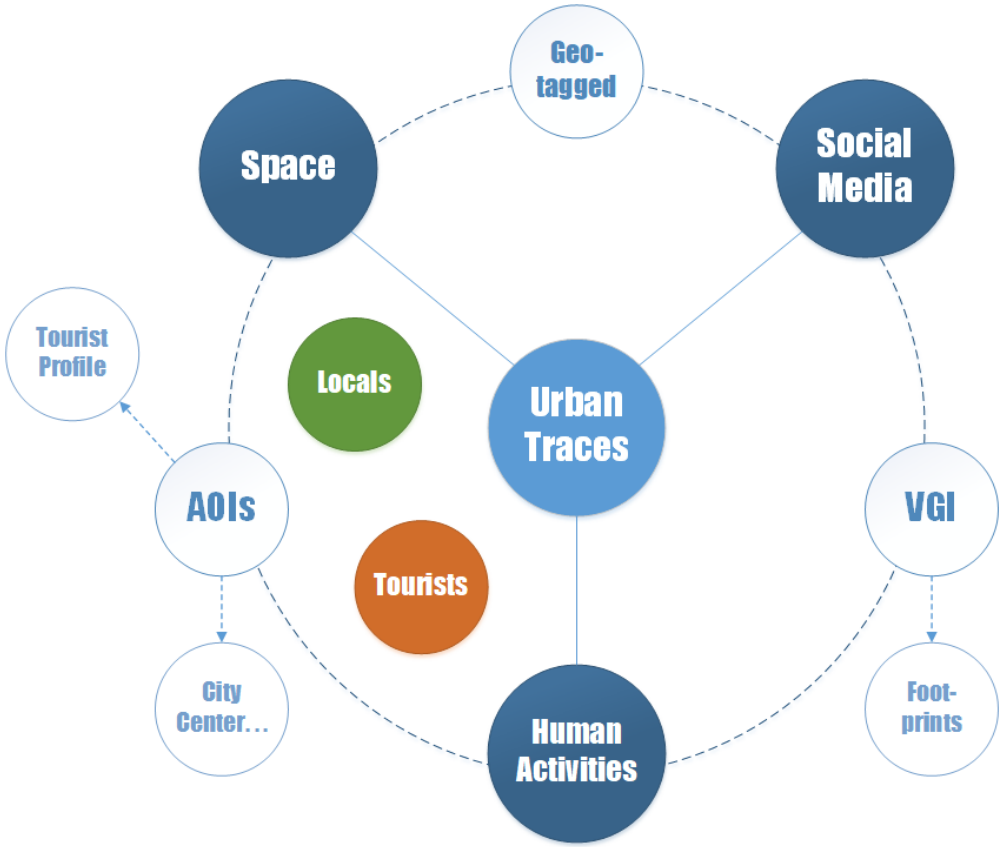
September 26th, 2019

Outline

1. Introduction and motivations
2. Research objectives and questions
3. Related works
4. Methodology
5. Results and conclusions
6. Limitations

1. Introduction and motivation



2. Research Objectives and questions

2.1 Main objective:

To design an approach to differentiate the urban traces left by tourists from diverse origin countries and local citizens as different social media user groups based on the volunteered geographic information(VGI) obtained from a social media platform.

2.2 Sub-objectives and questions

(a) To map the urban traces of tourists and local citizens from social media presented by their distinctive footprints

Question:

- **Are there differences in footprints between tourists from different origins and local citizens? Which are those differences?**

2.2 Sub-objectives and questions

(b) To model the city center according to the semantics extracted from VGI of tourists and local citizens

Question:

- **How differently do tourists and local citizens perceive the city center?**
- **Is there a relation between the footprints and perceived city center among tourists and local citizens? Is this relation clearer among certain user groups?**

2.2 Sub-objectives and questions

(c) To create a tourist profile categorized by the origin countries of tourists as well as the local citizens in respect of the diverse thematic point of interests (POIs)

Question:

- **Can we identify a unique tourist profile regarding different thematic POIs for different user groups?**
- **Are there correlations between the thematic POIs in the diverse footprints and specific origin countries? Is there a seasonal trend among them?**

3 Related work

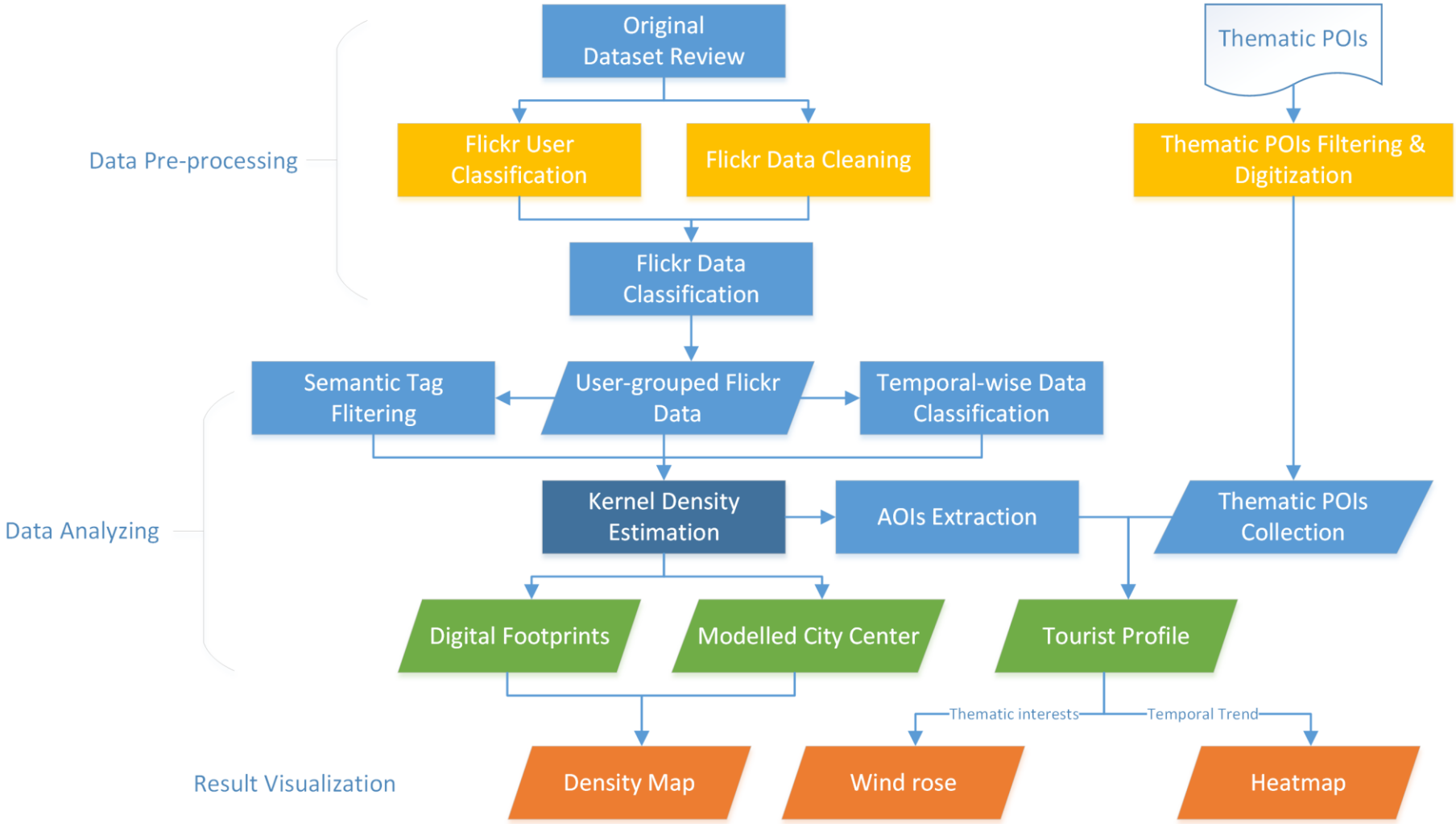
- Sun, Fan, Helbich, & Zipf, 2013 →

  Uncover spatial temporal patterns of tourists' accommodation in Vienna with Flickr data; Kernel density estimations and spatial scan statistics are used to explore the distribution of photos
- García-Palomares, Gutiérrez, & Mínguez, 2015; Girardin et al., 2008 →

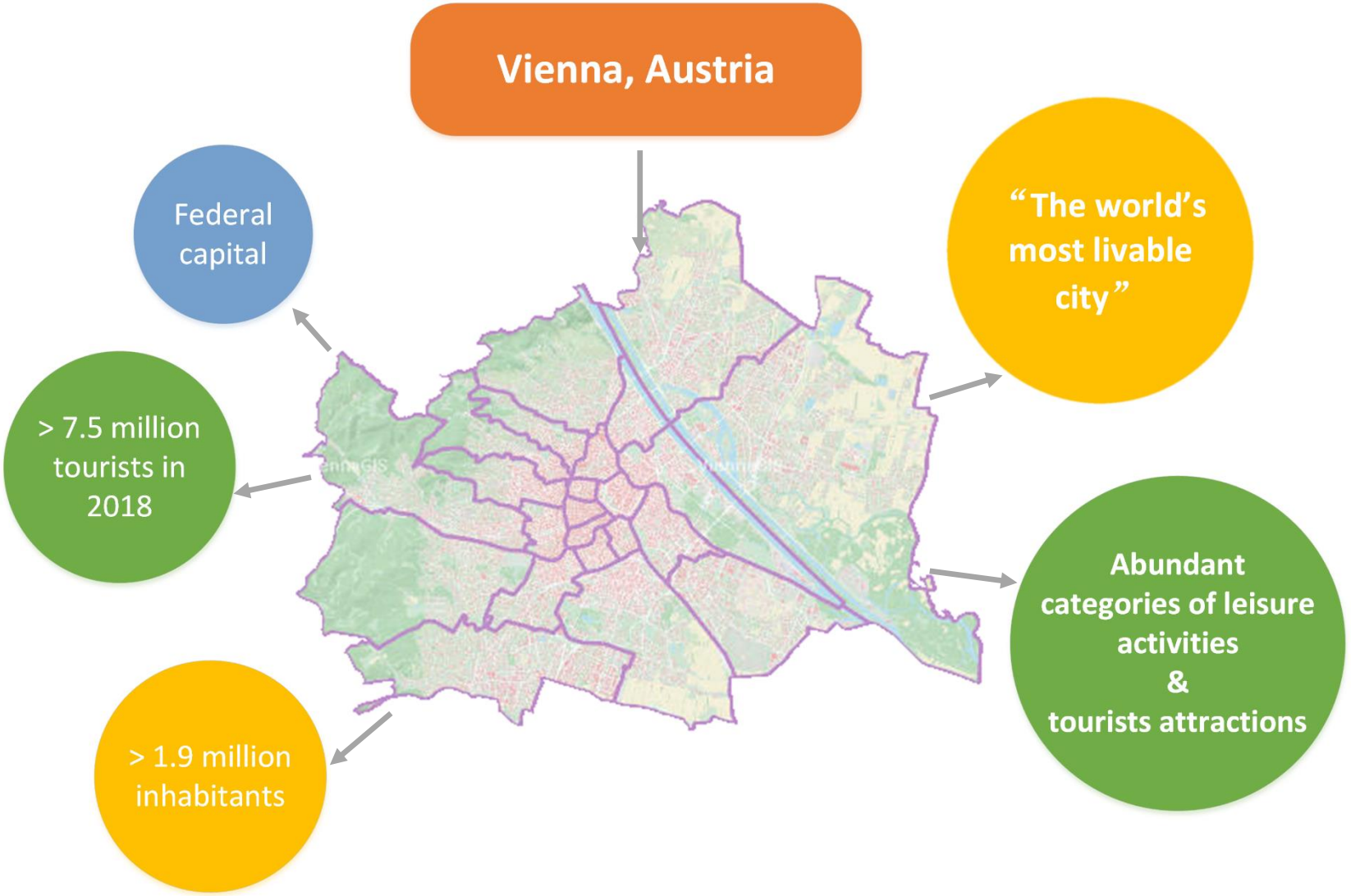
  Identify the tourists hotspots and evaluate their attractiveness in the city with VGI
- Grothe & Schaab, 2009 → Apply KDE to generate footprints of Flickr data
- Salas-Olmedo, Moya-Gómez, García-Palomares, & Gutiérrez, 2018 →

  Analyze the digital footprints with density map

4 Methodology
4.1 Approach overview



4.2 Study Area



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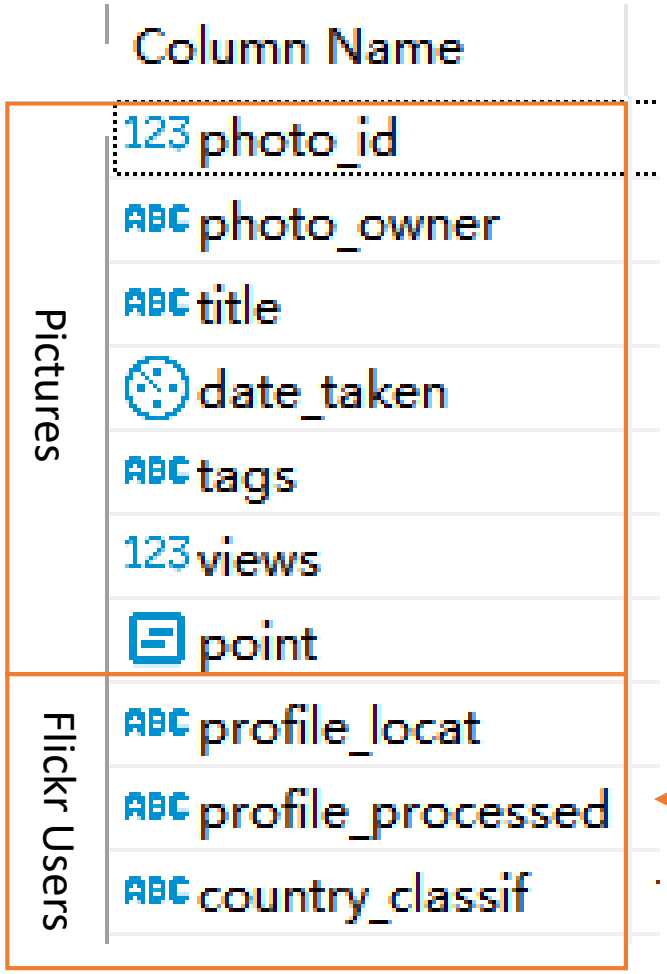
4.3 Data review

4.3.1 Flickr Data

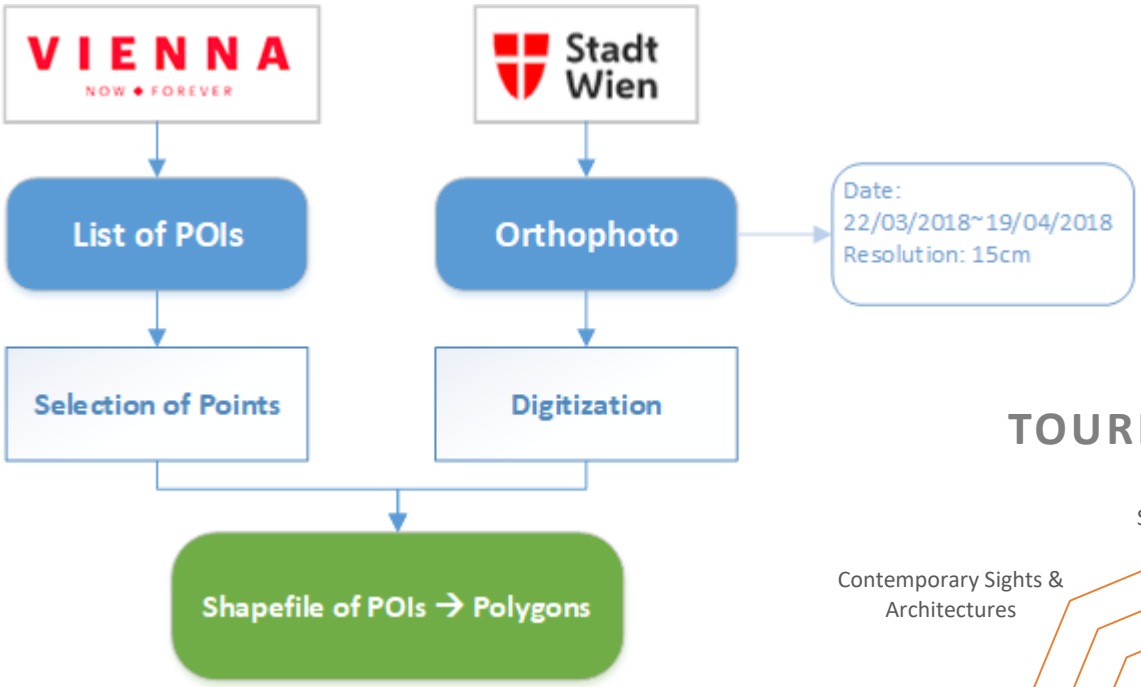


CRS: EPSG 4326
Data amount: 479,126 photos
Amount of users: 13,187 users
Number of origins: 117 countries/origins
Duration: 2002-01-02 ~ 2018-12-05

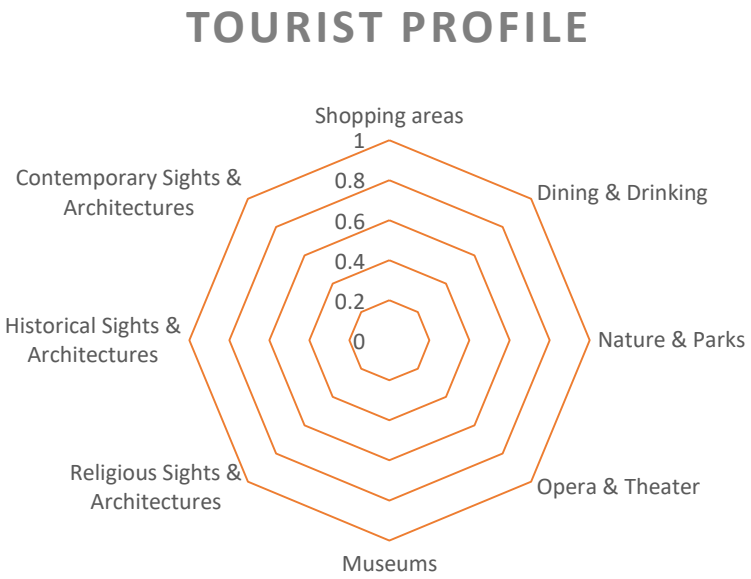
Study user group:
All tourists/Locals/Domestic tourists/GER/UK/US/IT

Collected by the Research Division Cartography of the Technical University of Vienna with API and stored in a PostgreSQL database

4.3.2 External Resources → Thematic POIs

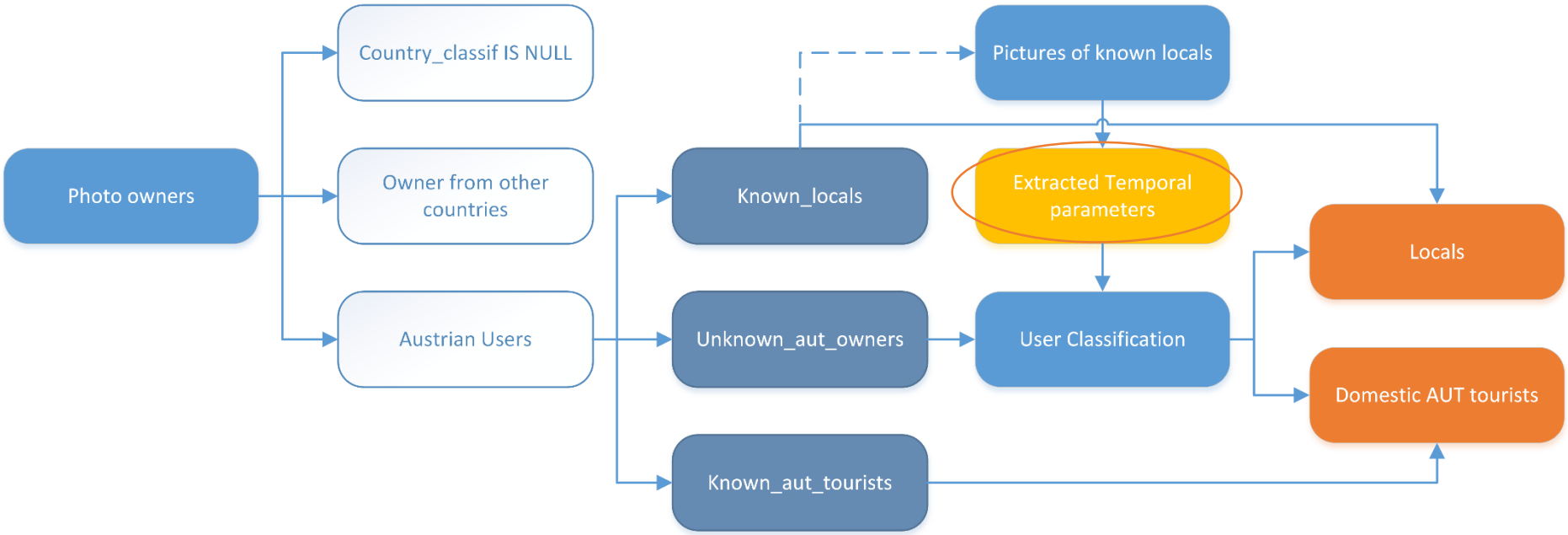


Total: 64 POIs



4.4 Data Pre-processing

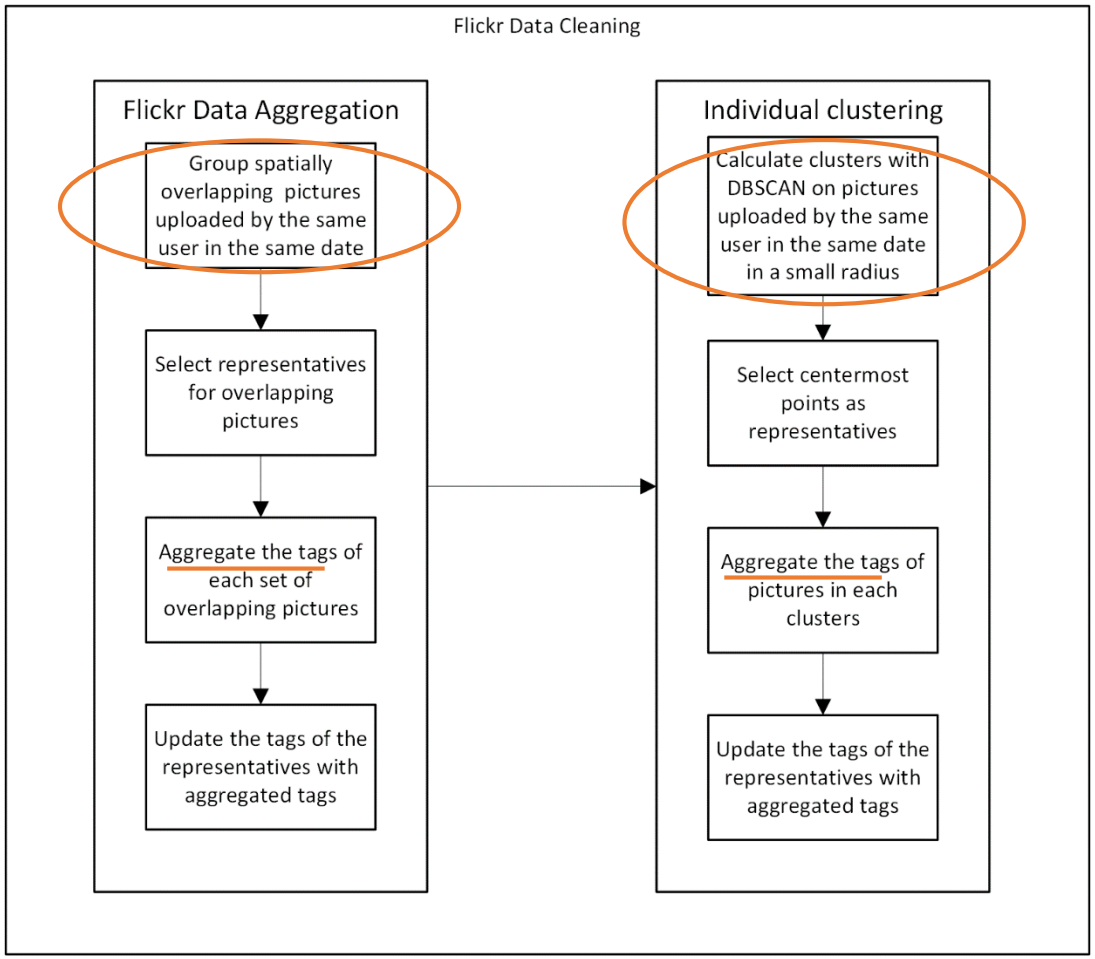
4.4.1 Flickr User Classification



	Avg(Avg_duration)	AVG(Interval_max)	Avg(Avg_visit time)
KNOWN_AUT from data	>1026 days	<598days	>46 days

→ **Added 36 locals/ 1203 domestic tourists**

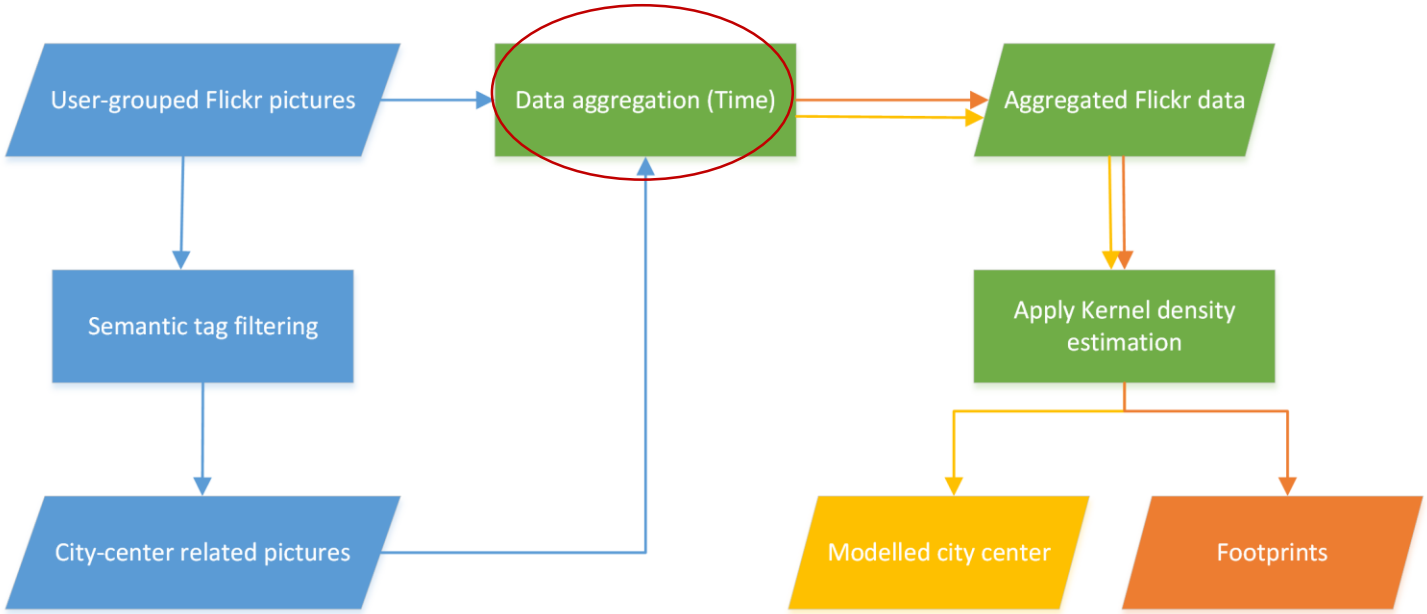
4.4.2 Flickr Data Cleaning



After experiments, parameters for DBSCAN: Epsilon = 30 meters
MinPts = 1

4.5 Data Analyzing

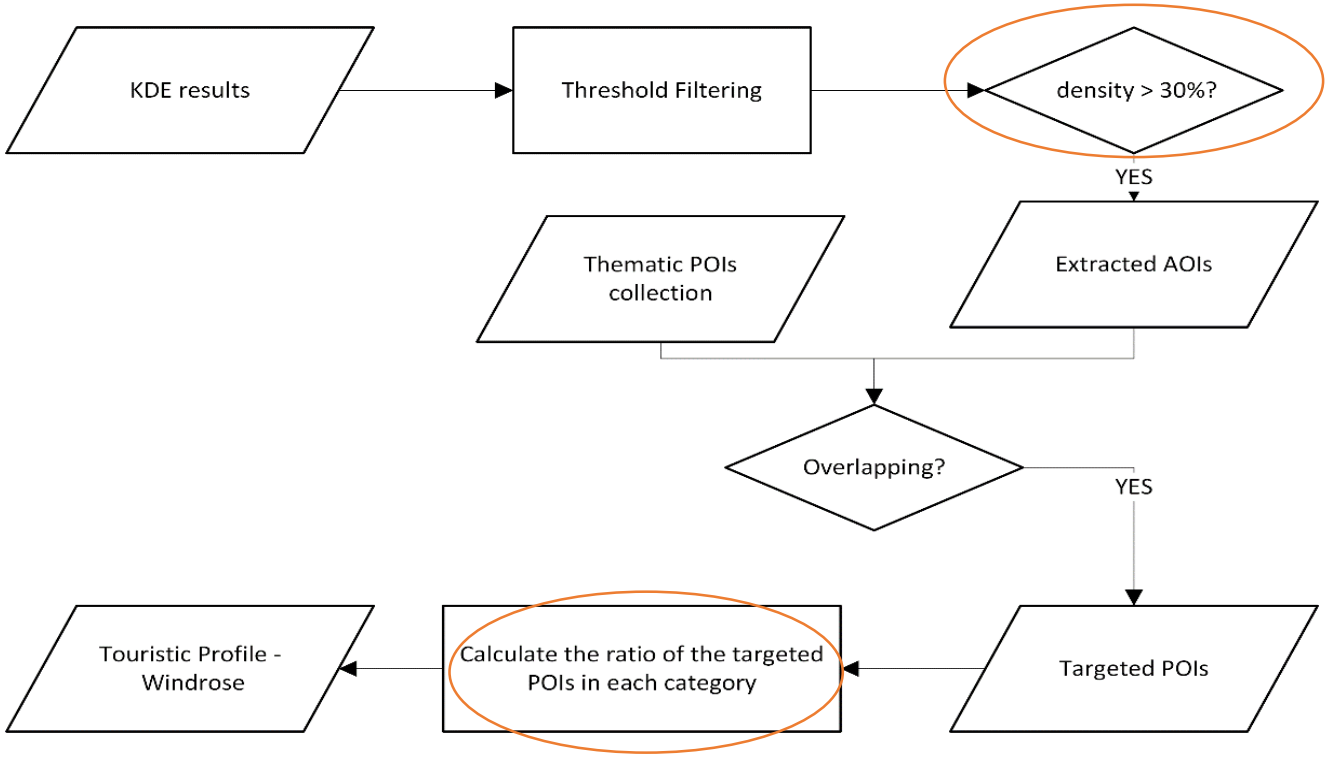
4.5.1 Approach to obtain footprints and modelled city center



4.5 Data Analyzing

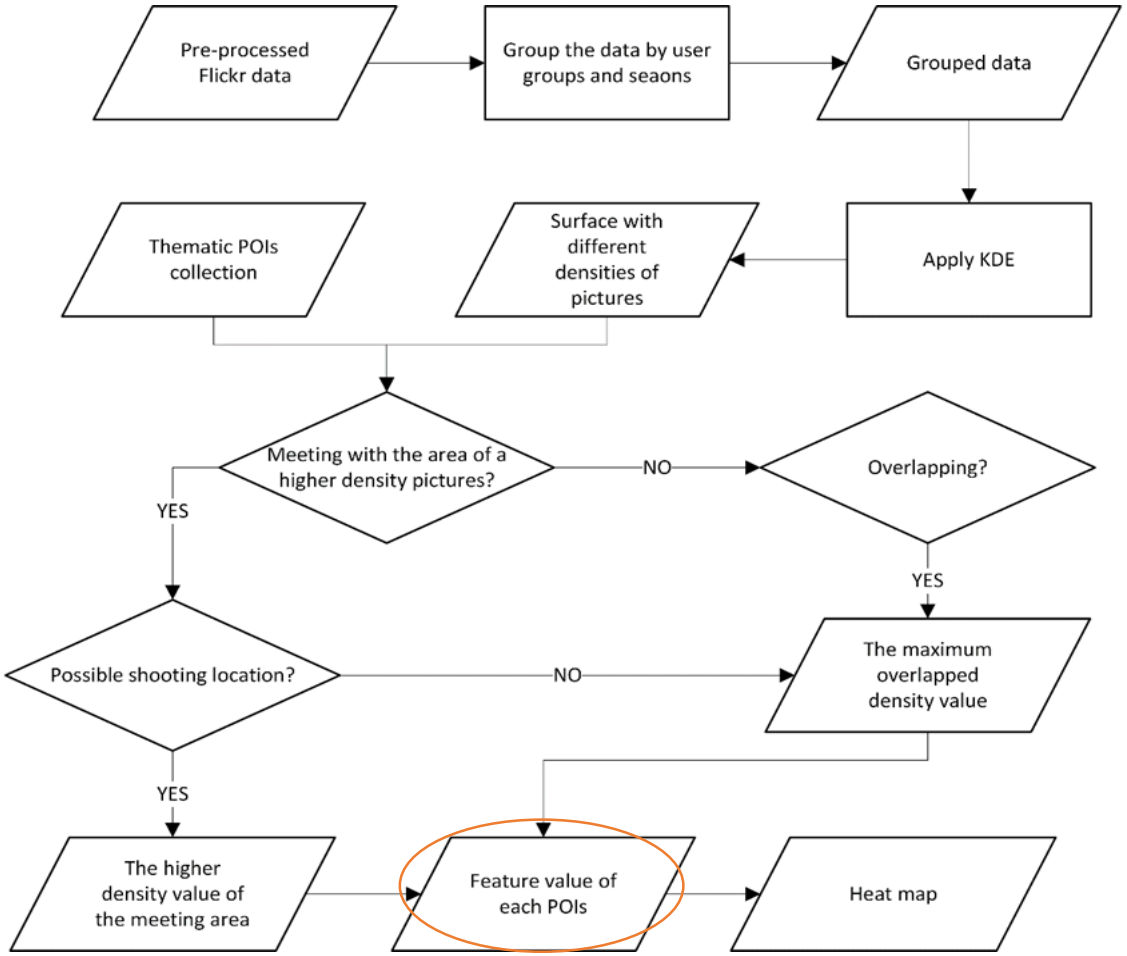
4.5.2 Approach to obtain tourist profile

Thematic interests – Wind rose



4.5.2 Approach to obtain tourist profile

Temporal trend -- Seasonal trend -- Heat map



5 Results and Conclusions

5.1 Footprints

Sub-objective a: To map the urban traces of tourists and local citizens from social media presented by their distinctive footprints

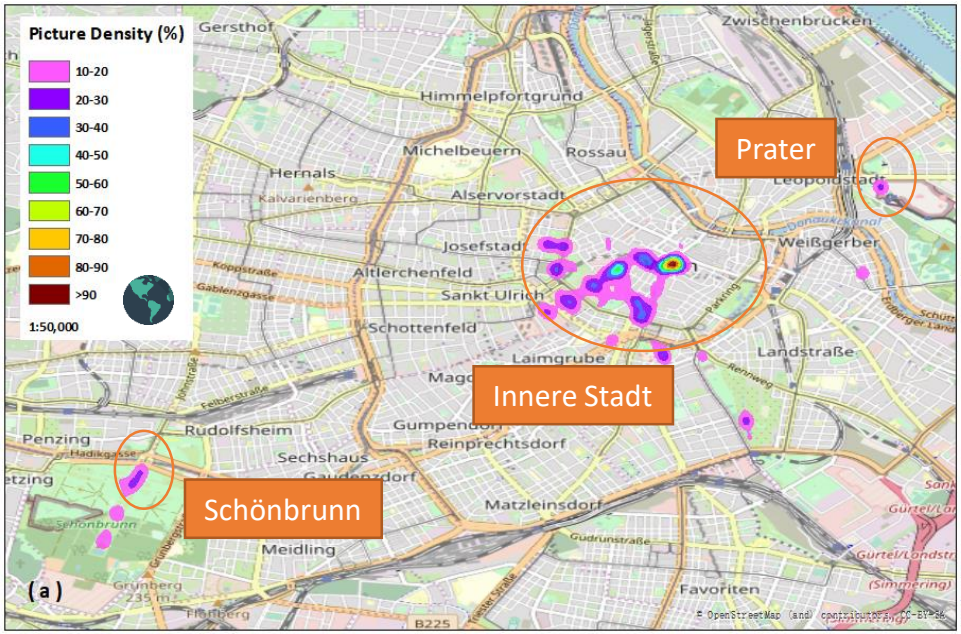
Research question:
Are there differences in footprints between tourists from different origins and local citizens? Which are those differences?

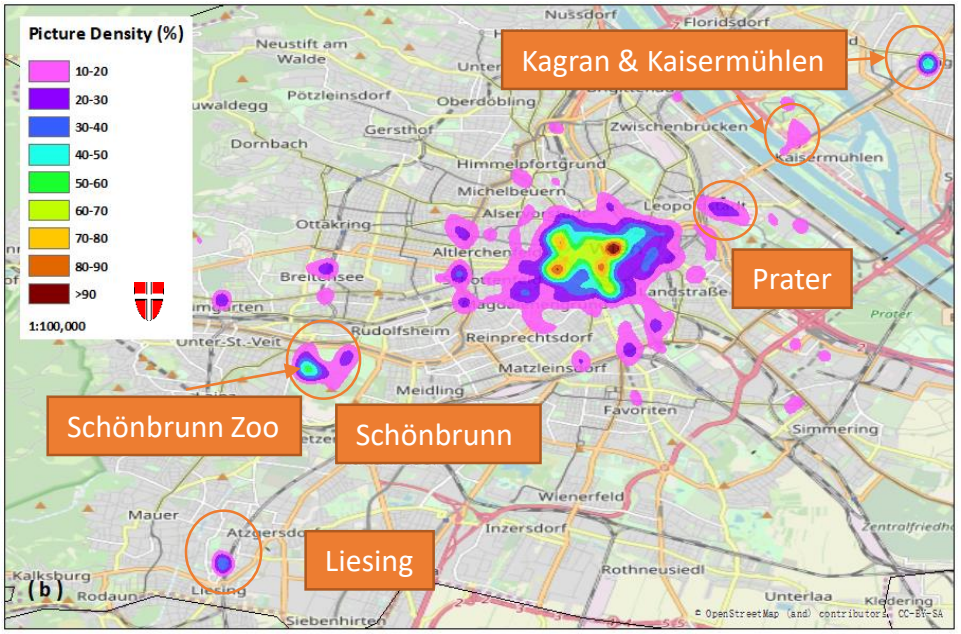
As it will be shown in the following footprints results, distinctive footprints are generated for each user group. Despite the similarity in patterns, there are certainly differences among these footprints.

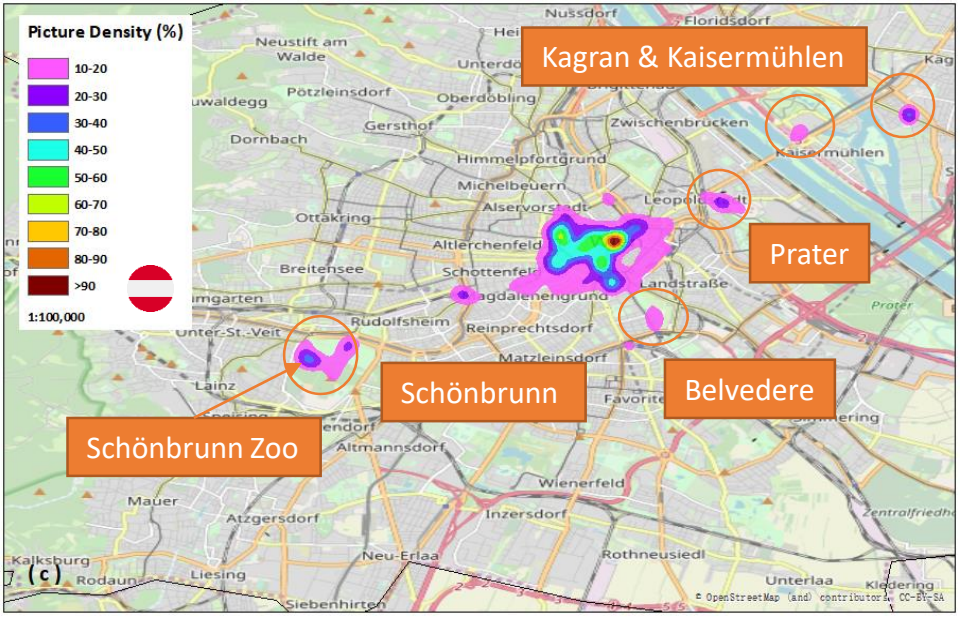
5 Results and Conclusions

5.1 Footprints

Footprints of different user groups: (a) All tourists (b) Locals (c) Domestic tourists







Similar overall pattern: Pictures concentracted in the southwest part of Innere Stadt, Schönbrunn, Belvedere, and the northwest corner of Prater.

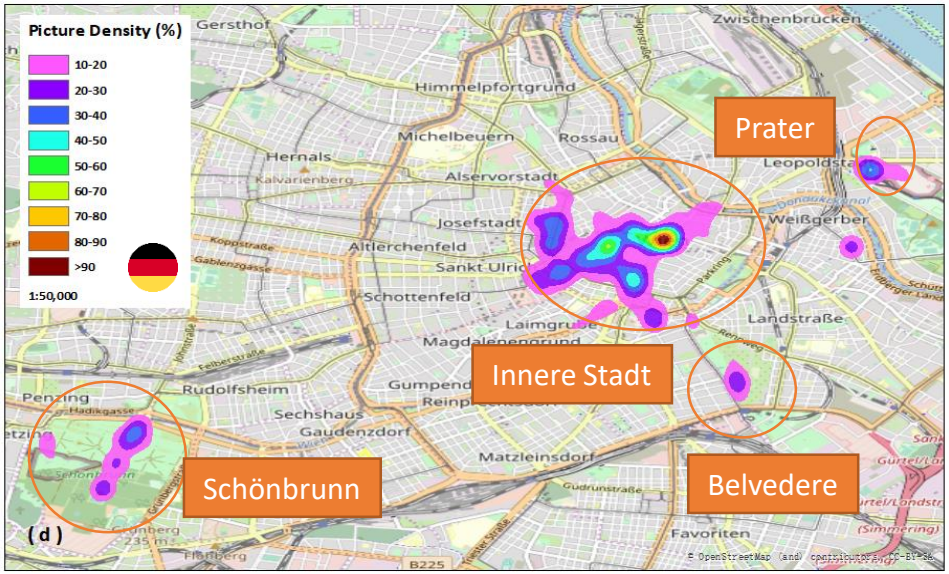
Locals: More dispersed; Relatively higher density of pictures; Picture highly concentrated area expanded

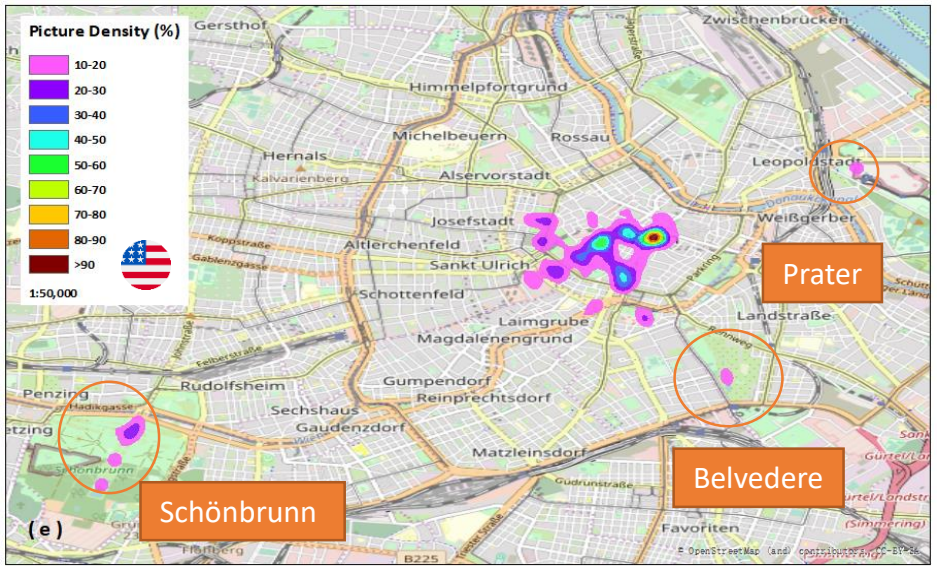
Domestic: Similar hotspots with locals&tourists; Higher picture density at the zoo (like locals)

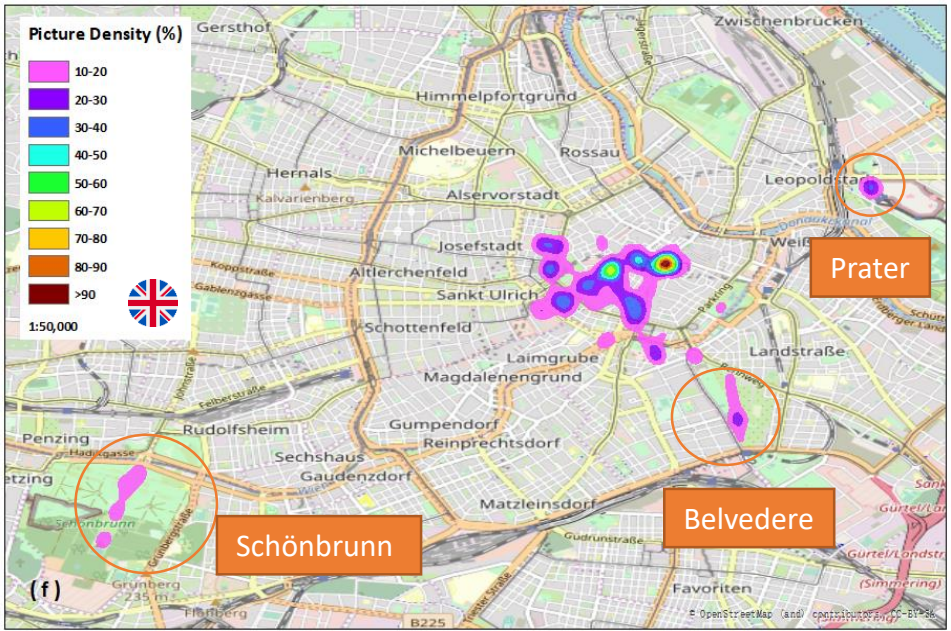
5 Results and Conclusions

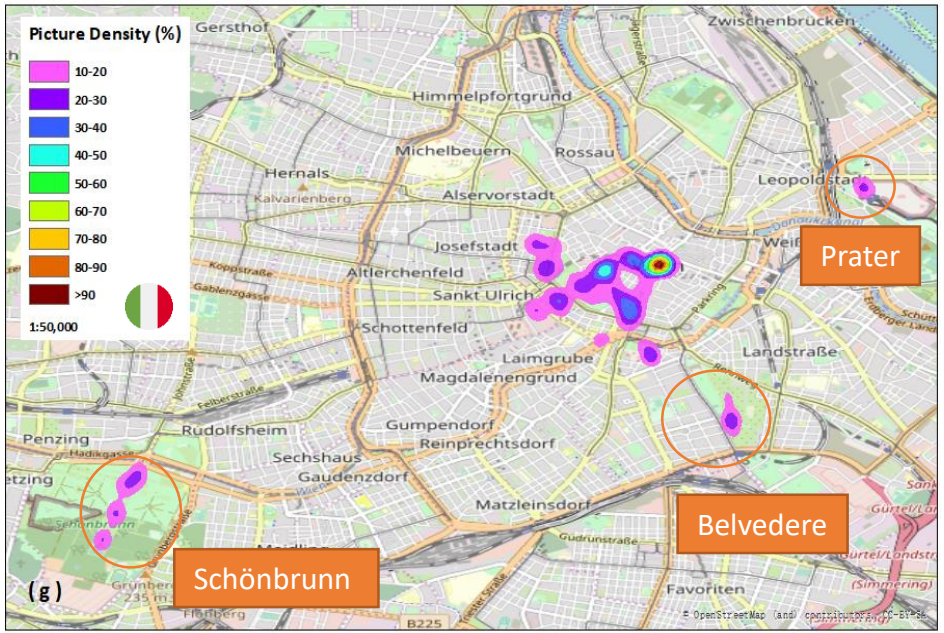
5.1 Footprints

Footprints of different user groups: (d) Germany (e) US (f) UK (g) Italy







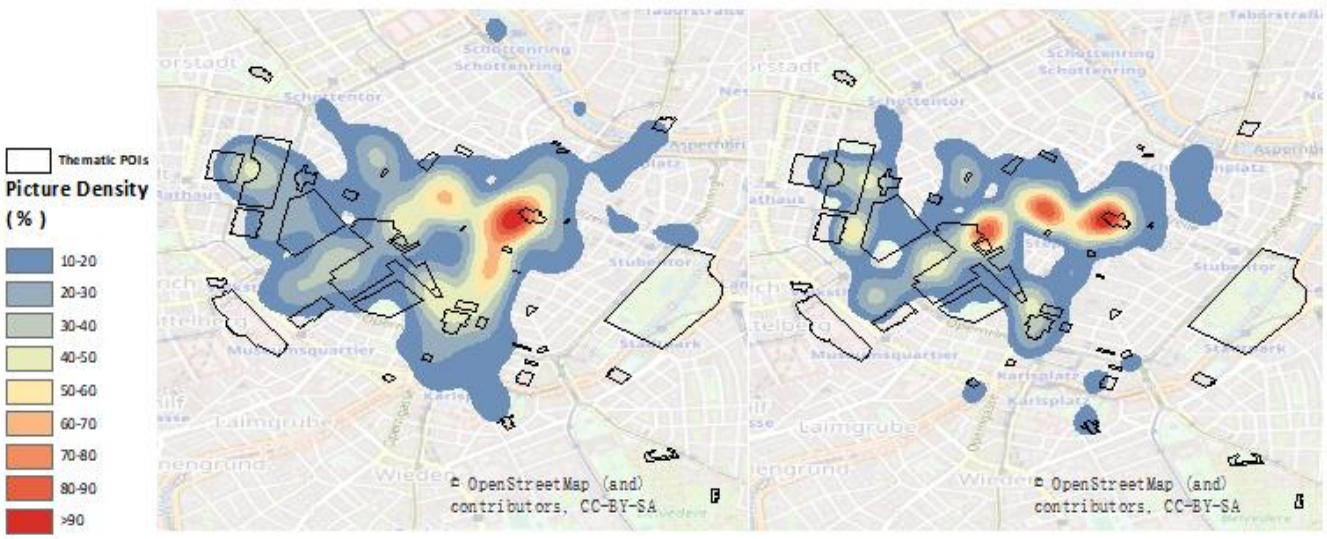


5 Results and Conclusions

5.2 Modelled city center

Sub-objective b: To model the city center according to the semantics extracted from VGI of tourists and local citizens

Research question:
1. How differently do tourists and local citizens perceive the city center?



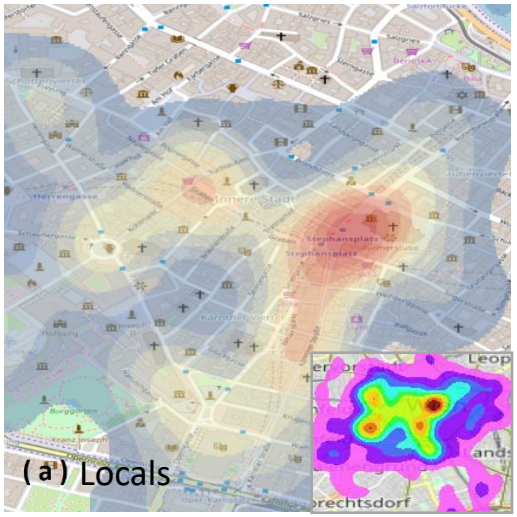
(a) Locals (b) All Tourists

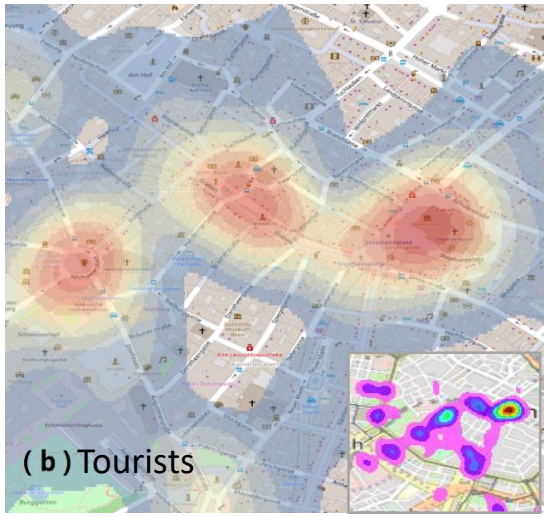
- Rough agreement on the location
- Stephansdom
- Locals: more certain
- Tourists: more ambiguous

5 Results and Conclusions

5.2 Modelled city center

Research question:
2. Is there a relation between the footprints and perceived city center among tourists and local citizens? Is this relation clearer among certain user groups?





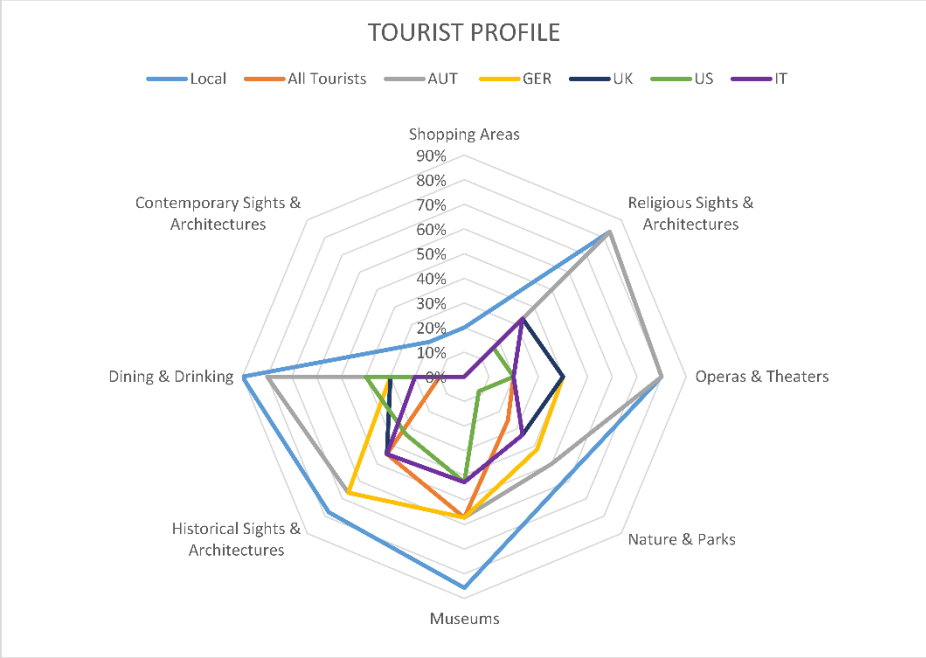
- The answer is positive.
- Stephansdom: >90% density in the footprints of both groups
- The relation is clearer among the tourists user group.

5 Results and Conclusions

5.3 Tourist Profile

Sub-objective c: To create a tourists profile categorized by the origin countries of tourists as well as the local citizens in respect of diverse thematic POIs

Research question:
1. Thematic Interests: Can we identify a unique tourist profile regarding different thematic POIs for different user groups?



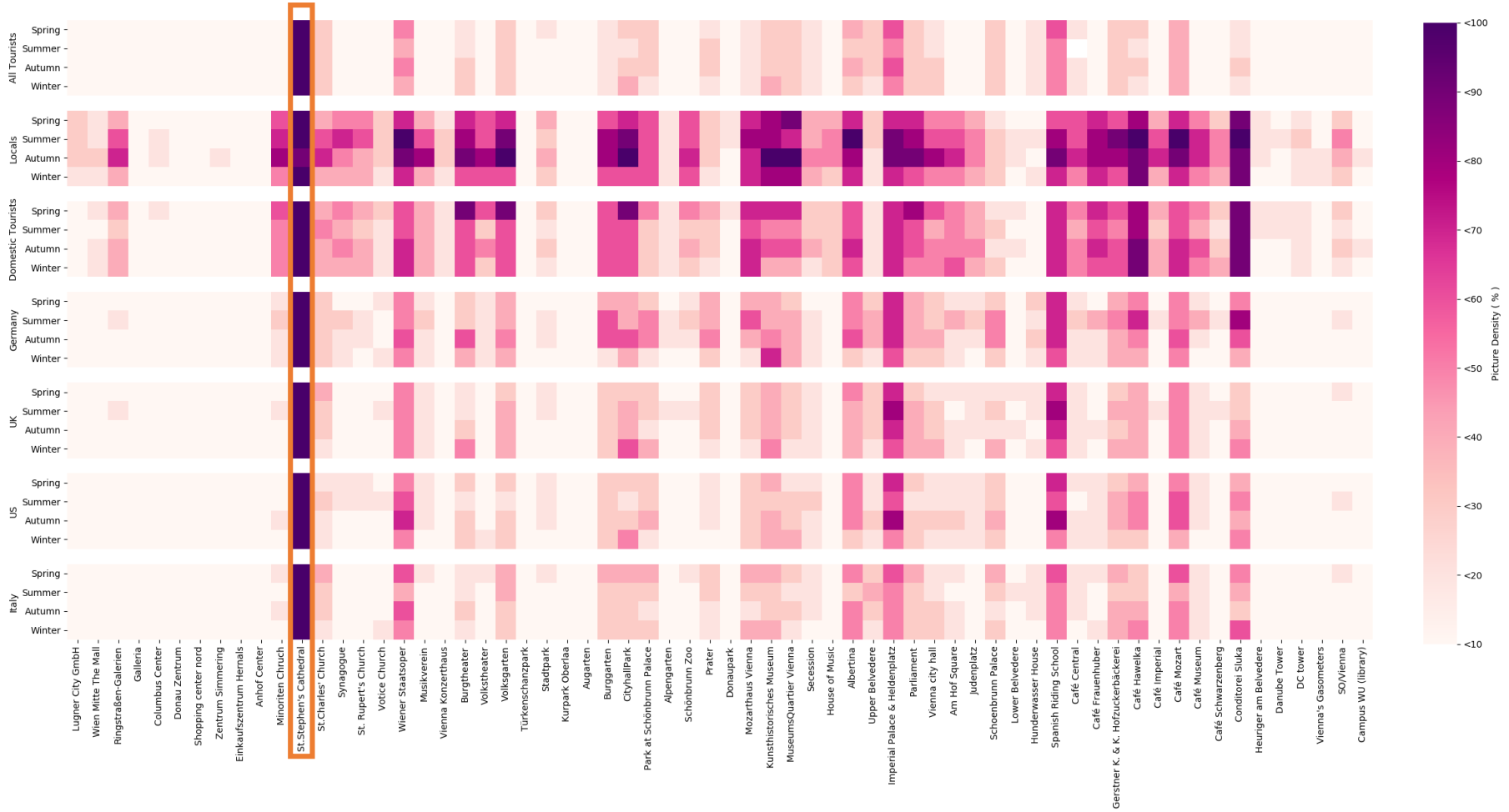
- Yes
- Ratio ↑ Interest ↑
- Least interests: shopping areas & contemporary sights
- Locals: leading position (particularly museums) followed by Domestic tourist
- Different emphasis for each tourists groups

5 Results and Conclusions

5.3 Tourist Profile

Research question:

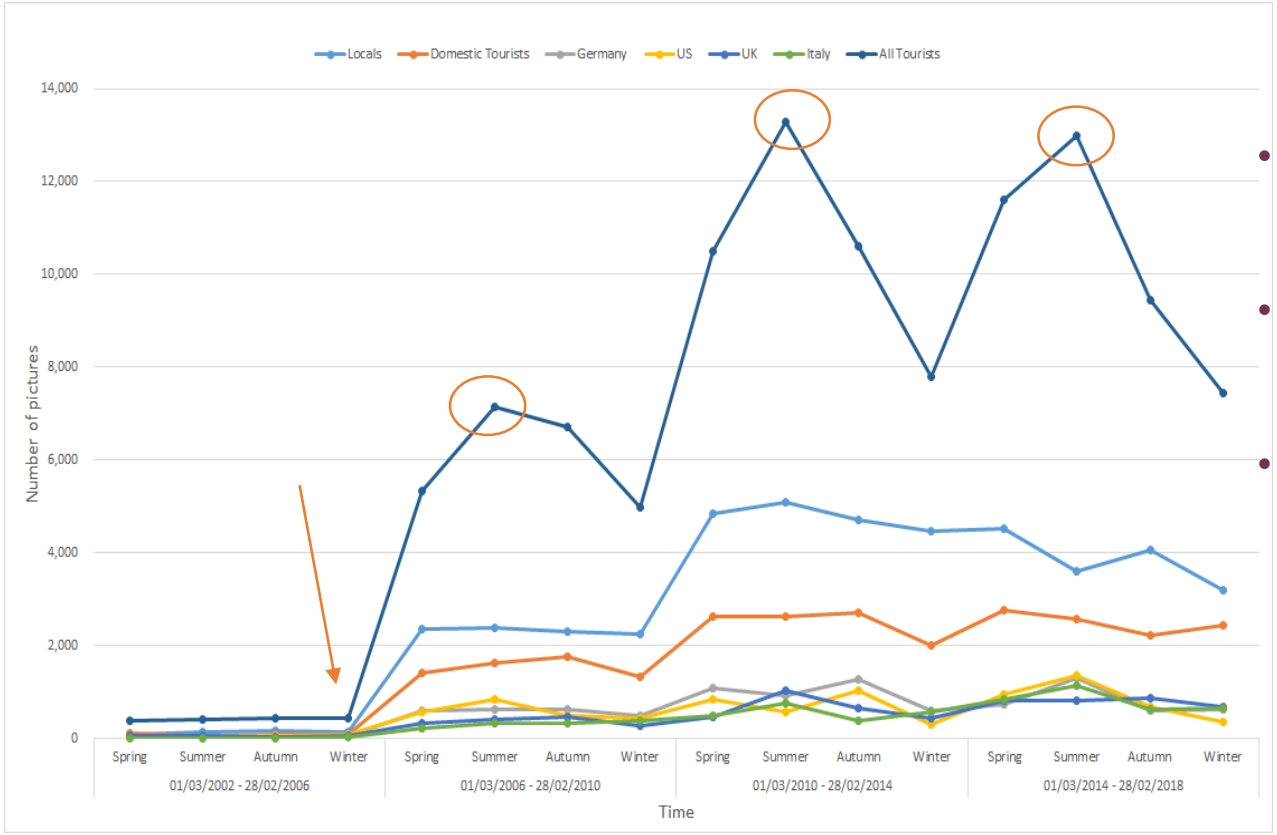
2. Are there correlations between the targeted thematic POIs in the diverse footprints and specific origin countries? Temporal trend: Is there a seasonal trend among them?



5 Results and Conclusions

5.3 Tourist Profile –

Temporal trend



- **Stable uploads amount: March 2002-Feb. 2006**
- **Remarkable growth: Spring 2006**
- **Upload peaks: Summer**

6 Limitations

- **Quality of VGI is not assured:**
  Localness of the VGI contributor & Motivations →
  False location tagging

- **Limited representativeness of users:**
  Less digital literacy; Single social media(Flickr) →
  Some groups are under-represented

- **Classification of locals and tourists:**
  Uploading behavior →
  Extracted temporal parameters for the classification of those with ambiguous origin information.

6 Limitations

- **How a POI will be photographed and uploaded:**

  The type of the place and the related activities → Under-estimated POIs

  Delay in uploading → Higher possibility of false geotagging

  The location of taking the pictures → Dislocated picture concentrated spot for one POI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