Contribute to increase impact, sustainability, and business efficiency in the tourism sector

Version 1.0

Context

The Municipality of Porto is going through a complex and demanding internal reorganisation that aims to improve its internal data policy. One of the main outcomes of this endeavour it's to make available a new open-data and public resource to serve its inhabitants, visitors, companies and institutions.

Two major aspects of this investment are:

- The implementation and operation of an Urban Data Platform that aggregates, processes and publishes city data (such as environmental sensor data, geolocation data, mobility data and others);
- The launch of the Porto Open Data Portal which is constantly being updated to improve the quality and value of its data.

One of the main goals for the coming years is to find ways to utilise and create value from our datasets. With this focus, we want to release a challenge to use municipality data to create new insights, dashboards and indicators, but always with a critical mindset towards the quality and preparation of the datasets available or of new data sources.

One possible application of the open data available is the creation of indicators that can show the current state of areas of interest for city governance, such as mobility, tourism or economy, while providing decision makers and city planners tools to support the design of local policies that effectively contribute to urban sustainable planning. These can be simple indicators based on data analysis and insights from the day-to-day urban activity data, or advanced indicators developed using more intricate analysis techniques and approaches.

An example of such an advanced indicator has been studied and developed in a previous research project Data4Covid in collaboration with NOVA Urban Analytics (link). The Urban Dynamic Indicator (UDI) consists of a composite indicator designed to create a holistic and daily view of the city of Porto. It measures the current state of the urban dynamics through factor analysis over traffic, public

transportation, air quality and noise data-sources to deliver a single indicator that represents the city's activity.

Another example of an indicator that can support local authorities, is the Illegal Parking Score, a system to measure, predict and simulate the risk of parking illegalities (link). The system calculates a conditional probability of illegal parking occurring in a road segment, based on parking ticket occurrences and spatiotemporal conditions (like period of the day and climatic conditions). The IPS was first calculated for the Lisbon Municipality, and it is supported by a Light Gradient Boosting Machine model that allows to predict the IPS for future conditions.

Topic

As a topic for this year's Hackacity, Porto wants to focus on the creation of new indicators and visualisation of data for the Tourism scene in the city.

In recent years, tourism has flourished in the city, making it a very positive case study, deserving the attention of tourists, who come either for leisure or for business, and specialised publications regarding tourist activities and economic development, with several international awards.

The biggest differences are related to the economic enhancement, the specialisation and qualification of the tourist supply, the urban, cultural and heritage requalification, the creation of programs that promote the territory sustainability, cleanliness and safety, the greater attraction and fixation of people and companies that provide qualified jobs, in which the whole city progresses and benefits from the strategic development of the tourism sector. Another important change is the challenging decentralisation of tourist flows, with the creation of more points of interest and centralities throughout the city.

Goal

For this edition of Hackacity, we challenge you to create an indicator, or several indicators, that measure(s) the city's Tourism dynamism.

These indicators should allow officials to act on a well-informed basis and make decisions around the city, while also being simple to read and understand. While we leave it up to you to decide which questions can be answered through the

metric, without overcomplicating it, here are some examples of the types of challenges that the city is tackling (without order of importance):

- Within the city areas which ones are more visited? By which demographics?
- What are the most sought after points of tourist interest? By zones, typology (monuments, museums, restaurants, historic shops, etc.), demographics, time of year and day?
- Bearing in mind the tourist flows and the densest areas of the city, are hotels and local accommodation establishments distributed evenly? How to improve the sustainability of tourist accommodation in the city?
- Does the tourist activity have an impact on the promotion of local and traditional commerce? Is there any relationship between the geolocation of the historic “Porto de Tradição” shops and the influx of tourists?
- Does the proliferation of points of interest coincide with the areas with the highest volume of commercial transactions?
- Given the location of Porto Tourism info spots and iPoints (Sé Tourism Office, Porto Welcome Centre, Ribeira, Aliados and Campanhã iPoints, airport reception desk) – is there is a good geographical distribution and balance to respond to requests from tourists, guaranteeing a good tourist reception?

Participants are encouraged to study and systematise the dynamics of tourism in the city of Porto, by crossing datasets and available resources, creating an indicator, or several indicators, of tourist pressure zones in the city in real-time and the circulation of visitors, in order to create the best solutions and answers to the challenges presented.

The work developed should focus on contributing to increase impact, sustainability, and business efficiency in the tourism sector.

Outcome

The outcome of this challenge is four-fold:

1. Feedback on the quality of the current dataset and suggestions for other datasets that would be useful in solving the challenge;
2. Definition of one or more indicators for the Tourism Dynamics in Porto using the available datasets;

3. Suggestions to the changes of the indicators if further dataset in 1 could be provided, or possible extensions and future work;
4. Study the feasibility of predicting the suggested indicators with different time periods: 1 week ahead, 1 month ahead and 6 months ahead.

Submission: to end and successfully submit your solution, please send all code, notebooks and documents related with the solution in a zip file with the name of your team to hi@hackacity.eu.

Available Resources

The data shared within the context of the Hackacity 2022 by Porto Digital and the Municipality of Porto can only be used within for the purpose of the challenge. All data must be deleted at the end of the competition.

As a reminder, you can also use any data that is open, free and legally available.

The following list of resources is available for you to use:

FTP Server

Access: 185.101.179.132 / FTP Connection / Anonymous or Guest Login / No credentials

- Telecom Mobility Data as an ODM of 12 Hours/Day/Nationality;
- E-Scooter Mobility Data as event logs from devices;
- Wifi Usage Data as KPI's per Hour/Day/Month/Year;
- Wifi Usage Data as KPI's per Day/Month/Years/Nationality (obtained from device language);
- Flight Data for inbound and outbound flights from/to OPO airport;
- Commercial Transaction Data Per Month/Sector/Nationality;
- City Sensors Data as time series for meteorological, air quality and noise sensors;
- Data from the utilisation of Explore.Porto related to amount of people that are accessing the Beacons spread around the city;
- Data related to the amount of visitors, beds available and occupancy provided by the Tourism department.

Orion Context Broker (Urban Platform)

API Endpoint: https://broker-ld.fiware.dev.urbanplatform.portodigital.pt/
API Doc: https://fiware-orion.readthedocs.io/en/1.13.0/user/walkthrough_apiv2/index.html

- Points of Interest as descriptive and geolocation data
- Location of Access Points - spread around Porto (Porto Free-Wifi);
- Real-time of Bus/Metros positions;
- Real-time data from environmental sensors (Weather/Noise/Air Quality);
- Real-time data of the occupancy of soft mobility sharing spots.

Open Data Portal

Website: https://opendata.porto.digital/

- Static Data as GTFS/Geolocation (Metro + STCP);
- Varied several geo location data from the City of Porto;
- PDM 2021 Data for the City of Port;
- Other municipal data.

The description of the datasets can be found in the dictionary.

Tips

- Using the Analytics from the usage of the Explore.Porto platform it should be possible to understand the amount of interest in a particular Point of Interest.
- The Flights datasets carry a lot of interesting data to cross-analyze. For instance, how did the amount of destinations, number of travellers change over time? Does it have any causal relation, or correlation with social media trends with Porto?
- Studies like (Turismo em Portugal) and (Perfil do Turista no Porto) depict very common indicators for measuring tourism. This can be a good starting point!
- Can we mine data from social media such as Twitter, TripAdvisor or other data?
- Wifi Data per AP Location can be a good indicator of crowd trends in the city centre of Porto.

- You can use Porto Sensor data or OpenWeather API to collect data on weather conditions for possible correlation with the number of visitors.
- Don't forget to check data available at Porto's OpenData Portal.
- Think of metrics and indicators that are actionable! Don't forget that the goal is to help city managers to make better informed decisions.

Further Background Information

Papers and Studies:

- The daily urban dynamic indicator: Gauging the urban dynamic in Porto during the COVID-19 pandemic
- The illegal parking score – Understanding and predicting the risk of parking illegalities in Lisbon based on spatiotemporal features
- Compositional data analysis to model tourists' expenditure by categories
- Social Media Data for Tourism Analysis
- O impacto do Turismo na Qualidade de Vida dos Locais
- Perfil do Turista no Porto (2018)
- Turismo em Portugal - Numbers (2018)

News:

- https://www.investporto.pt/pt/setores/turismo/
- Porto. Desertificação, rendas e turismo são maiores problemas do centro

Other resources:

- Porto Ambiente BI
- Turismo de Portal Dados Abertos