ESPON

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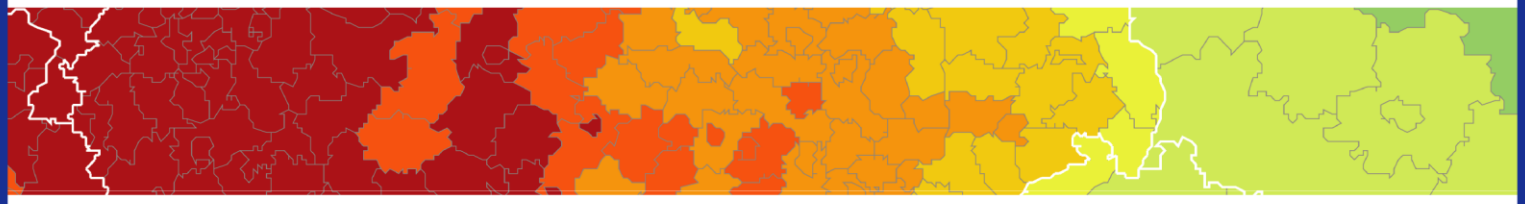
Inspire policy making by territorial evidence



Carrying capacity methodology for tourism

Targeted Analysis

Dashboard Manual

Dashboard Manual

This targeted analysis activity is conducted within the framework of the ESPON 2020 Cooperation Programme, partly financed by the European Regional Development Fund.

The ESPON EGTC is the Single Beneficiary of the ESPON 2020 Cooperation Programme. The Single Operation within the programme is implemented by the ESPON EGTC and co-financed by the European Regional Development Fund, the EU Member States and the Partner States, Iceland, Liechtenstein, Norway and Switzerland.

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Dashboard Manual

Carrying capacity methodology for tourism

Version 11/11/2020

Disclaimer:

This document is a final report.

The information contained herein is subject to change and does not commit the ESPON EGTC and the countries participating in the ESPON 2020 Co-operation Programme.

The final version of the report will be published as soon as approved.

Table of contents

List of Figures

List of Tables

1 Menu Structure

The navigation structure of the dashboard consists of two tab panels, namely Level 1 (main topics) and Level 2 (sub-topics) (see User Interface). Table 1.1 presents the structure of the two levels. Level 2 tabs appear after the selection of the respective Level 1 tabs.

Table 1.1: Menu Structure (Level 1, Level 2)

Level 1 (main topics)	**Level 2 (sub-topics)**
Carrying Capacity	Quartile-Matrix-Benchmark
	Density-Matrix-Benchmark
Tourist Flow	Prediction (3-years)
	Time-Series-Quartile-Benchmark
	Spatial-Benchmark
Database	Raw Data Inspection
	Descriptive Statistics
	Variable Description
Big Data	Touristic OpenStreetMap (OSM) Points-Of-Interest (POIs) Locations
	Touristic OSM POI Hotspots
	Instagram Post Time Series
	Instagram Post Hotspots
	Instagram-Based Overall Sentiment
	Instagram-Based Basic Emotions
Upload/Analyse Text	STEP 1 (own data): Data Upload
	STEP 2 (own data): Calculate Overall Sentiment/Basic Emotion Values
	STEP 3a (own data): Overall Sentiment
	STEP 3b (own data): Basic Emotions

Source: Consortium, 2020.

2 User Interface

Figure 2.1 shows the general structure of the tabbed user interfaces.

❶ Main topics (Level 1) [default colour: light grey; selection: dark grey)]

❷ Sub-topics (Level 2) [default colour: red; selection: white)]

❸ Selection (compulsory) [drop-down menu]

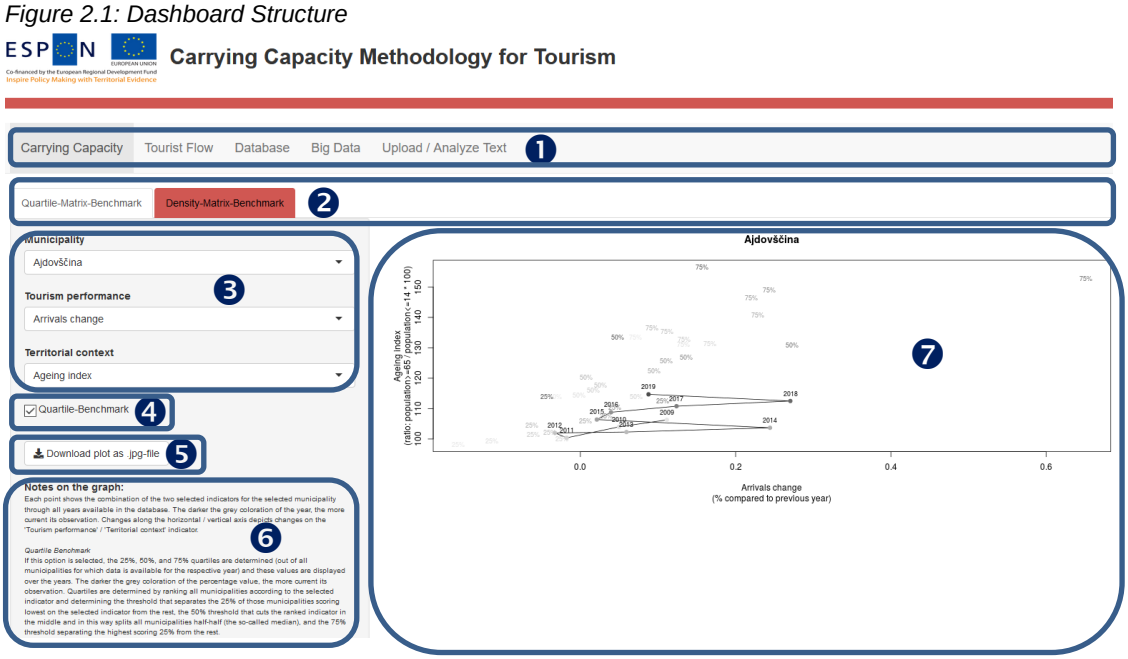
❹ Selection (optional) [checkbox]

❺ Download-button [.jpg-file]

❻ Notes

❼ Visualization surface

Figure 2.1: Dashboard Structure



Source: Consortium, 2020.

3 Features

3.1 Carrying Capacity

Level 1 tab – Carrying Capacity – includes two Level 2 tabs:

- Quartile-Matrix-Benchmark
- Density-Matrix-Benchmark

3.1.1 Quartile-Matrix-Benchmark

Figure 3.1 gives an example for the Quartile-Matrix-Benchmark.

❶ Step 1 (compulsory): Select the municipality to be displayed.

❷ Step 2 (compulsory): The “Tourism Performance”-indicator selected from the drop-down menu is plotted along the horizontal axis.

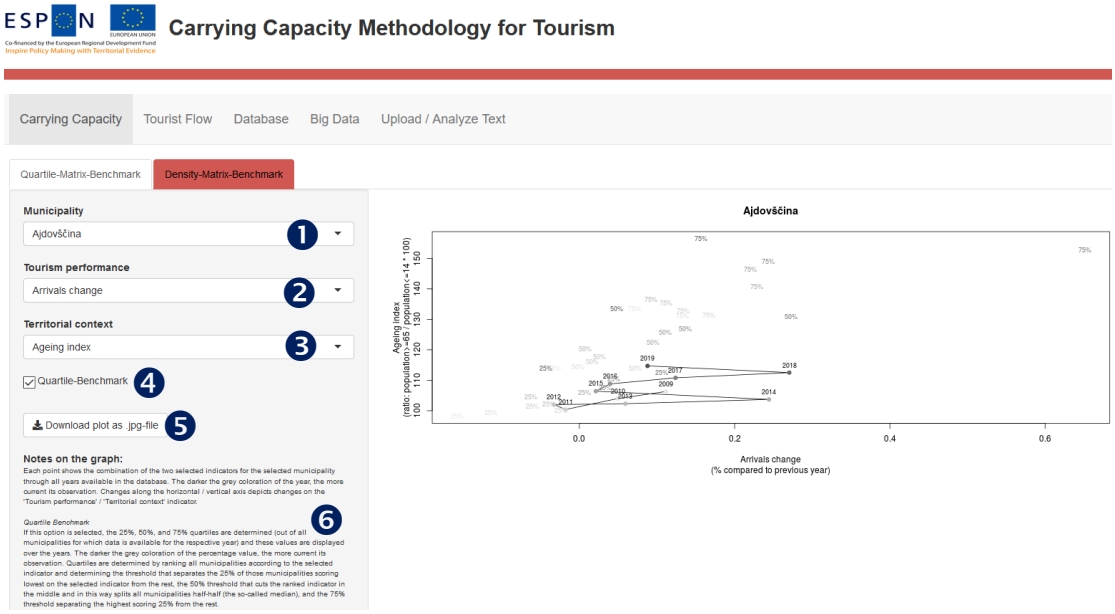
❸ Step 3 (compulsory): The “Territorial Context”-indicator selected from the drop-down menu is plotted along the vertical axis.

❹ Step 4 (optional): Select the “Quartile-Benchmark”-checkbox to compare the selected municipality of Step 1 with all other municipalities in the database for which data is available for the respective years. If this option is selected, the 25%, 50%, and 75% quartiles are determined from these municipalities and displayed over the years. The darker the grey coloration of the percentage value, the more current its observation. Quartiles are determined by ranking all municipalities according to the selected indicator and determining the threshold that separates the 25% of those municipalities scoring lowest on the selected indicator from the rest, the 50% threshold that cuts the ranked indicator in the middle and in this way splits all municipalities half-half (the so-called median), and the 75% threshold separating the highest scoring 25% from the rest.

❺ Download plot in .jpg format.

❻ Notes: Each point named with a year shows the combination of the two selected indicators for the selected municipality through all years available in the database. The darker the grey coloration of the year, the more current its observation. Changes along the horizontal/vertical axis depict changes on the “Tourism performance”/”Territorial context” indicator.

Figure 3.1: Quartile-Matrix-Benchmark



Source: Consortium, 2020.

3.1.2 Density-Matrix-Benchmark

Figure 3.2 gives an example for the Density-Matrix-Benchmark.

❶ Step 1 (compulsory): Select the municipality to be displayed.

❷ Step 2 (compulsory): The “Tourism Performance”-indicator selected from the drop-down menu is plotted along the horizontal axis.

❸ Step 3 (compulsory): The “Territorial Context”-indicator selected from the drop-down menu is plotted along the vertical axis.

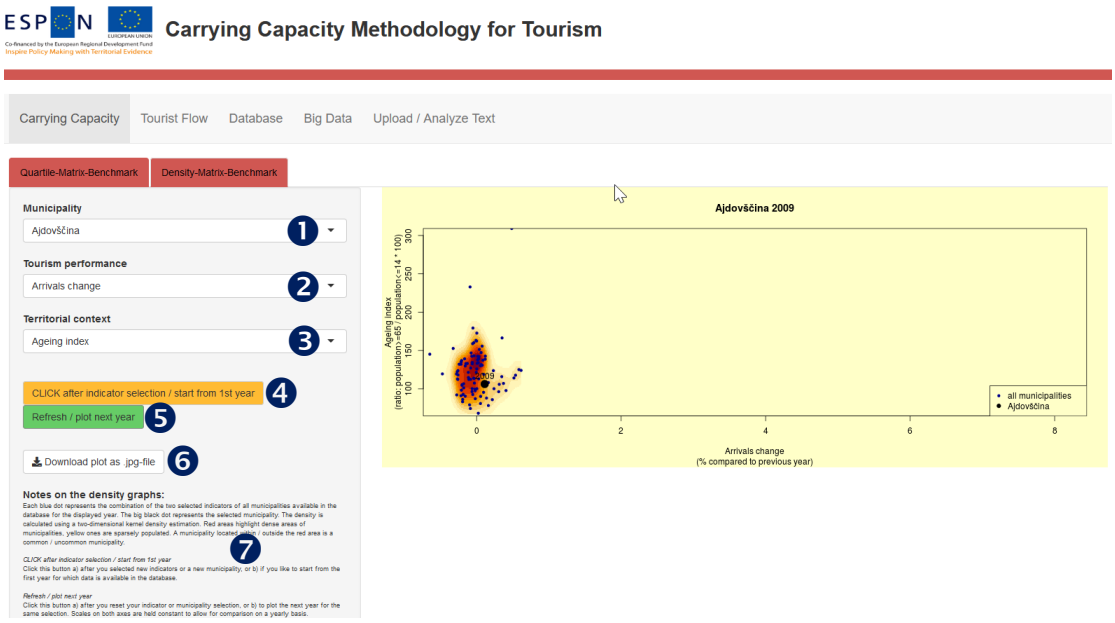
❹ Step 4 (compulsory): The “Refresh/plot next year”-button needs to be pushed to 1) plot the 1st year data is available for in the database for the chosen municipality and 2) to browse through the years available in the database for the chosen municipality.

❺ Step 5 (optional): The “CLICK after indicator selection/start from 1st year”-button needs to be pushed a) after new indicators or a new municipality has been selected (Steps 1-3), or b) to start plotting from the first year onwards. The “Refresh/plot next year”-button always needs to be pushed afterwards.

❻ Download plot in .jpg format.

❼ Notes: Each blue dot represents the combination of the two selected indicators of all municipalities available in the database for the displayed year. The big black dot represents the selected municipality. The density is calculated using a two-dimensional kernel density estimation. Red areas highlight dense areas of municipalities, yellow ones are sparsely populated. A municipality located within/outside the red area is a common/uncommon municipality.

Figure 3.2: Density-Matrix-Benchmark



Source: Consortium, 2020.

3.2 Tourist Flow

Level 1 tab – Tourist Flow – includes three Level 2 tabs:

- Prediction (3-years)
- Time-Series-Quartile-Benchmark
- Spatial-Benchmark

3.2.1 Prediction (3-years)

Figure 3.3 gives an example for a 3-years Prediction.

❶ Step 1 (compulsory): Select the municipality to be displayed.

❷ Step 2 (compulsory): Select the indicator to be plotted along the vertical axis.

❸ Download plot in .jpg format.

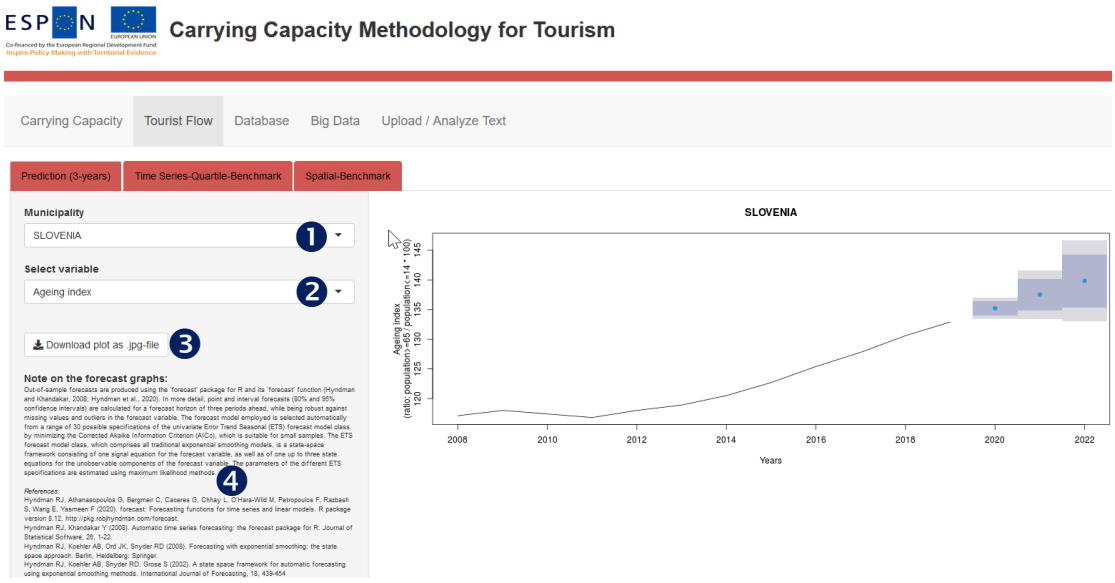
❹ Notes: Blue dots give the predicted trend, the dark/light grey areas the 80%/95% confidence intervals. Out-of-sample forecasts are produced using the “forecast”-function of the “forecast” package in R (Hyndman and Khandakar, 2008; Hyndman et al., 2020). Point and interval forecasts are calculated for a forecast horizon of three periods ahead, while being robust against missing values and outliers in the forecast variable. The forecast model employed is selected automatically from a range of 30 possible specifications of the univariate Error Trend Seasonal (ETS) forecast model class by minimizing the Corrected Akaike Information Criterion (AICc), which is suitable for small samples. The ETS forecast model class, which comprises all traditional exponential smoothing models, is a state-space framework consisting of one signal equation for the forecast variable, as well as of one up to three state equations for the unobservable components of the forecast variable. The parameters of the different ETS specifications are estimated using maximum likelihood methods.

References:

Hyndman RJ, Athanasopoulos G, Bergmeir C, Caceres G, Chhay L, O”Hara-Wild M, Petropoulos F, Razbash S, Wang E, Yasmeen F (2020). forecast: Forecasting functions for time series and linear models. R package version 8.12.

Hyndman RJ, Khandakar Y (2008). Automatic time series forecasting: the forecast package for R. Journal of Statistical Software, 26, 1-22.

Figure 3.3: Prediction (3-years)



Source: Consortium, 2020.

3.2.2 Time-Series-Quartile-Benchmark

Figure 3.4 gives an example for a Time-Series-Quartile-Benchmark.

❶ Step 1 (compulsory): Select the municipality to be displayed.

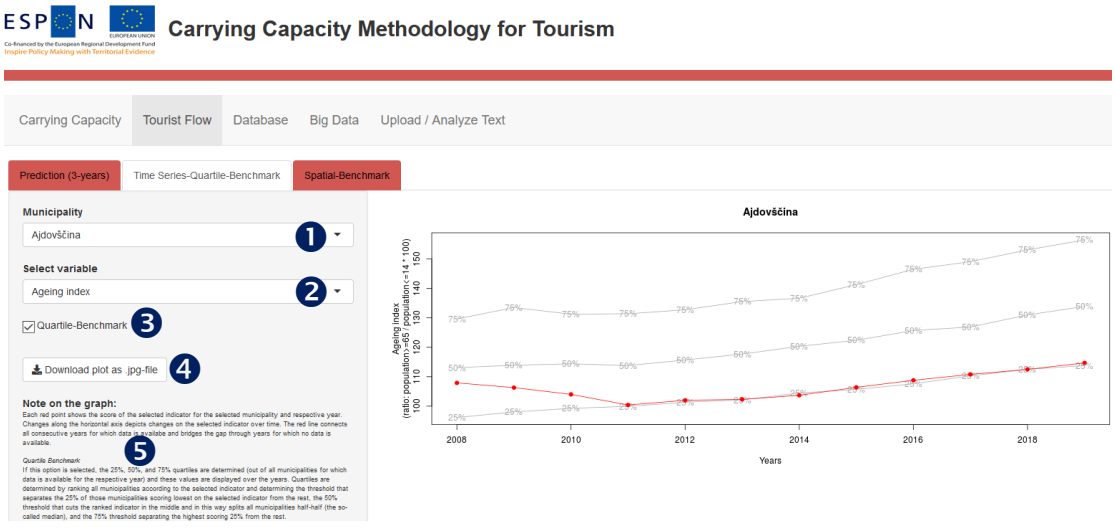
❷ Step 2 (compulsory): Select the indicator to be plotted along the vertical axis.

❸ Step 3 (optional): Select the “Quartile-Benchmark”-checkbox to compare the selected municipality with all other municipalities in the database for which data is available for the respective years. If this option is selected, the 25%, 50%, and 75% quartiles are determined (out of all municipalities for which data is available for the respective year) and these values are displayed over the years. Quartiles are determined by ranking all municipalities according to the selected indicator and determining the threshold that separates the 25% of those municipalities scoring lowest on the selected indicator from the rest, the 50% threshold that cuts the ranked indicator in the middle and in this way splits all municipalities half-half (the so-called median), and the 75% threshold separating the highest scoring 25% from the rest.

❹ Download plot in .jpg format.

❺ Notes: Each red dot gives the score of the selected indicator for the selected municipality and respective year. Changes along the horizontal axis depicts changes on the selected indicator over time. The red line connects all consecutive years for which data is available and bridges the gap through years for which no data is available.

Figure 3.4: Time-Series-Quartile-Benchmark



Source: Consortium, 2020.

3.2.3 Spatial-Benchmark

Figure 3.5 gives an example for a Spatial-Benchmark.

❶ Step 1 (compulsory): Select the municipality to be highlighted with a green border. This selection can be changed anytime.

❷ Step 2 (compulsory): Select the indicator to be plotted on the map.

❸ Step 3 (compulsory): The “Refresh/plot next year”-button needs to be pushed to 1) plot the 1st year data is available for in the database for the chosen municipality and 2) to browse through the years available in the database for the chosen municipality.

❹ Step 4 (optional): The “CLICK after indicator selection/start from 1st year”-button needs to be pushed a) after a new indicator has been selected, or b) to start plotting from the first year onwards. The “Refresh/plot next year”-button always has to be pushed afterwards.

❺ Download left plot in .jpg format.

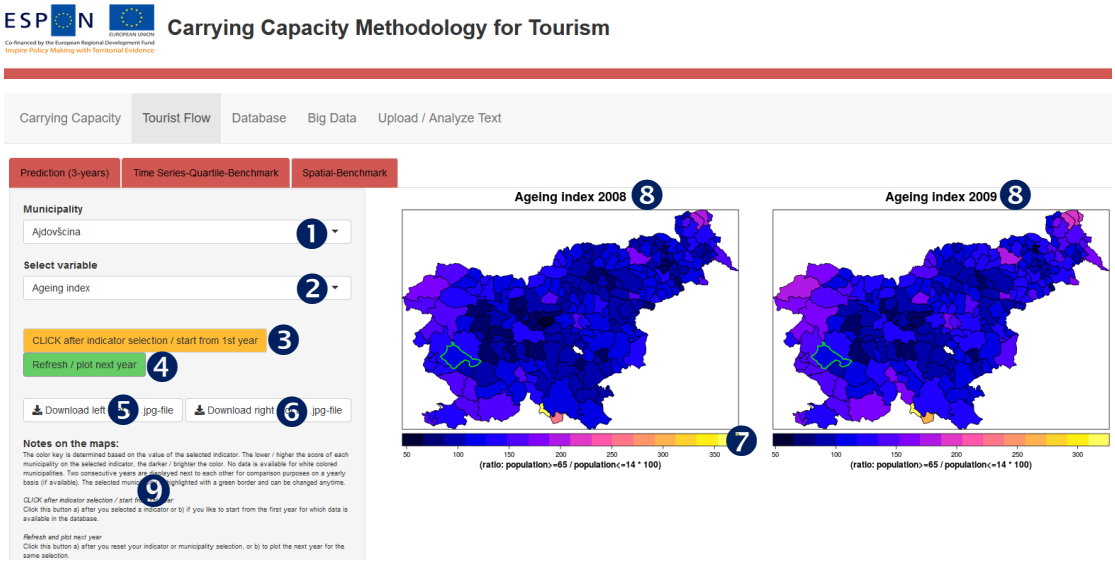
❻ Download right plot in .jpg format.

❼ The colour key is determined based on the value of the selected indicator. The lower/higher the score of each municipality on the selected indicator, the darker/brighter the colour.

❽ Two consecutive years are displayed next to each other for comparison purposes on a yearly basis (if available).

❾ Notes: No data is available for white coloured municipalities.

Figure 3.5: Spatial-Benchmark



Source: Consortium, 2020.

3.3 Database

Level 1 tab – Database – includes three Level 2 tabs:

- Raw Data Inspection
- Descriptive Statistics
- Variable Description

3.3.1 Raw Data Inspection

Figure 3.6 gives an example for the Raw Data Inspection.

❶ Step 1 (compulsory): Select the indicator to be displayed.

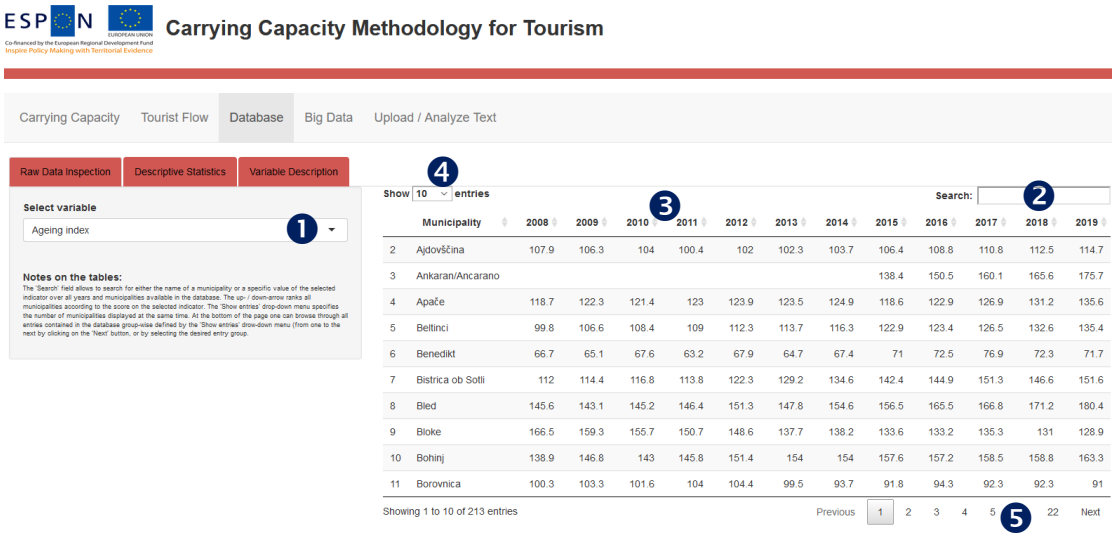
❷ Step 2 (optional): The “Search” field allows to search for either the name of a municipality or a specific value of the selected indicator through all years and municipalities available in the database.

❸ Step 3 (optional): The up-/down-arrow ranks all municipalities according to the score on the selected indicator.

❹ Step 4 (optional): The “Show entries” drop-down menu specifies the number of municipalities displayed at the same time.

❺ Step 5 (optional): One can browse through all entries contained in the database group-wise defined by the “Show entries” drop-down menu from one to the next by clicking on the “Next”-button or the “Previous”-button, or by selecting the desired entry group (one of the displayed numbers).

Figure 3.6: Raw Data Inspection



Source: Consortium, 2020.

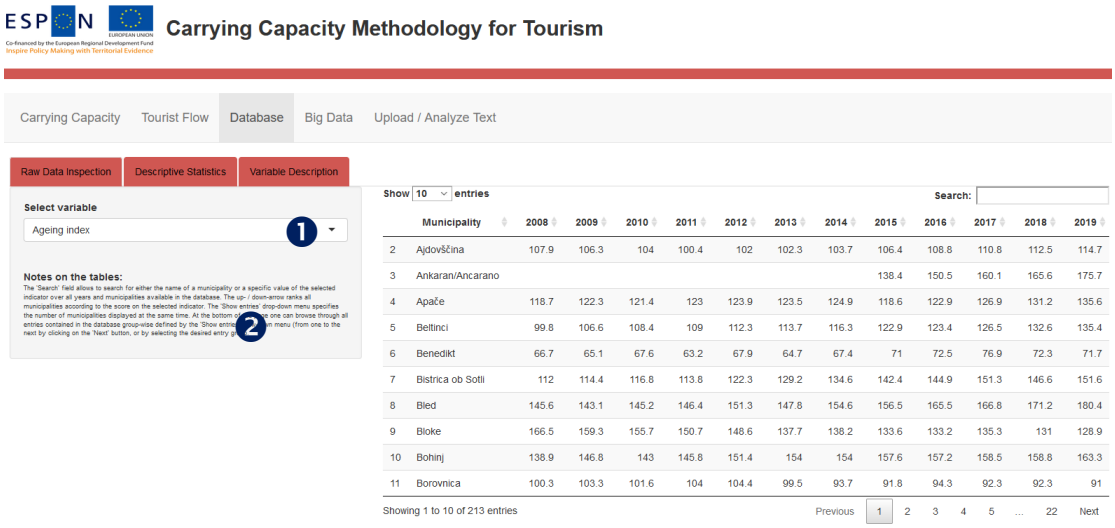
3.3.2 Descriptive Statistics

Figure 3.7 gives an example for Descriptive Statistics.

❶ Step 1 (compulsory): Select the indicator to be displayed.

❷ Notes: The tables display the minimum/maximum (min/max), the arithmetic mean (mean), the number of municipalities for which no data is available (NA), and the 25%, 50%, and 75% quartiles (out of all municipalities for which data is available) for the selected indicator for each year. Quartiles are determined by ranking all municipalities according to the selected indicator and determining the threshold that separates the 25% of those municipalities scoring lowest on the selected indicator from the rest, the 50% threshold that cuts the ranked indicator in the middle and in this way splits all municipalities half-half (the so-called median), and the 75% threshold separating the highest scoring 25% from the rest.

Figure 3.7: Descriptive Statistics



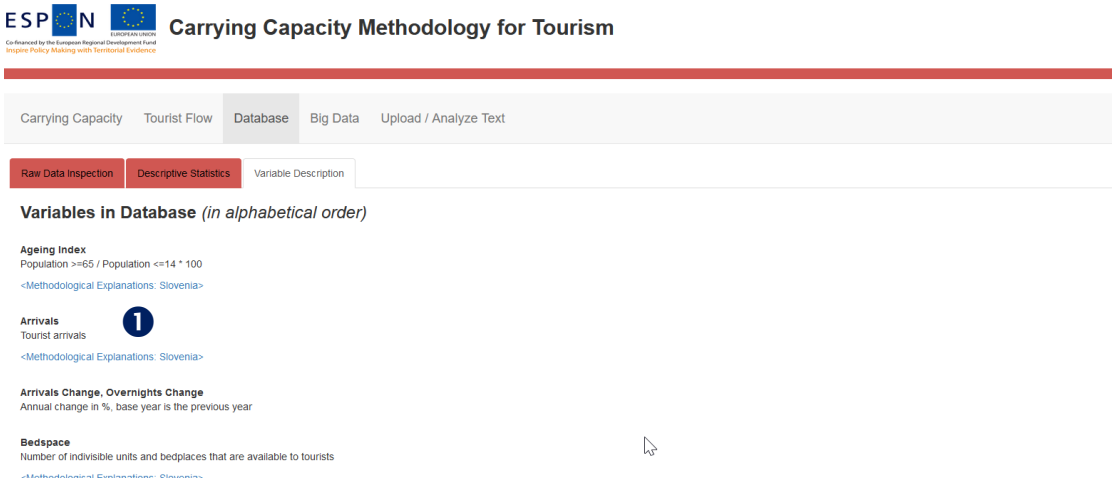
Source: Consortium, 2020.

3.3.3 Variable Description

Figure 3.8 shows the Variable Descriptions of the indicators contained in the database.

❶ The variables contained in the database are listed in alphabetical order and if available are interlinked with methodological explanations of the organization who collected the data.

Figure 3.8: Variable Description



Source: Consortium, 2020.

3.4 Big Data

Level 1 tab – Big Data – includes two Level 2 tabs:

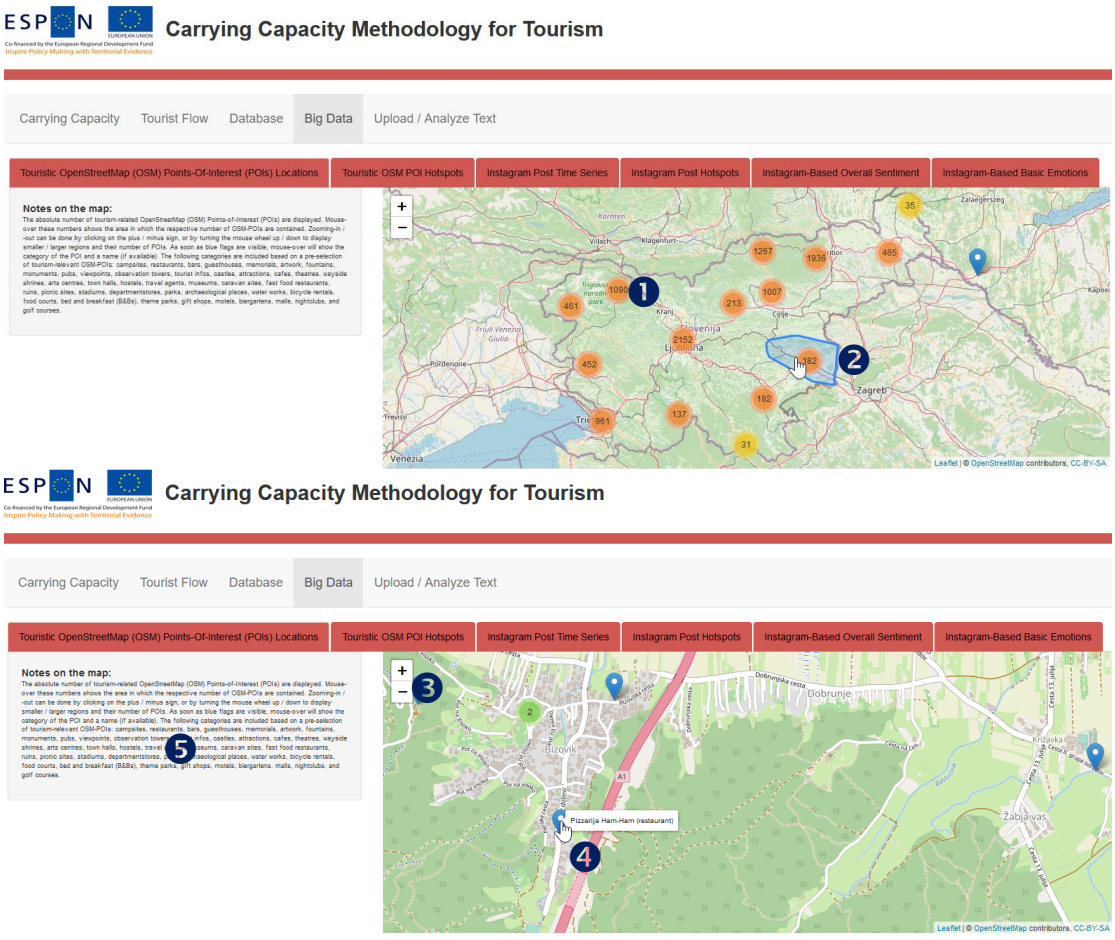
- Touristic OpenStreetMap (OSM) Points-Of-Interest (POIs) Locations
- Touristic OSM POI Hotspots
- Instagram Post Time Series
- Instagram Post Hotspots
- Instagram-Based Overall Sentiment
- Instagram-Based Basic Emotions

3.4.1 Touristic OpenStreetMap (OSM) Points-Of-Interest (POIs) Locations

Figure 3.9 shows a map of Touristic OpenStreetMap (OSM) Points-Of-Interest (POIs) Locations.

1. The absolute number of tourism-related OpenStreetMap (OSM) Points-of-Interest (POIs).
2. Mouse-over the numbers shows the area in which these OSM-POIs are contained.
3. Zooming-in/-out can be done by clicking on the plus/minus sign, or by turning the mouse wheel up/down to display smaller/larger regions and their number of POIs.
4. Mouse-over blue flags shows the category of the POI and (if available) a name.
5. Note: Included categories based on pre-selected tourism-relevant OSM-POIs: campsites, restaurants, bars, guesthouses, memorials, artwork, fountains, monuments, pubs, viewpoints, observation towers, tourist infos, castles, attractions, cafes, theatres, wayside shrines, arts centres, town halls, hostels, travel agents, museums, caravan sites, fast food restaurants, ruins, picnic sites, stadiums, department stores, parks, archaeological places, water works, bicycle rentals, food courts, bed and breakfast (B&Bs), theme parks, gift shops, motels, biergartens, malls, nightclubs, and golf courses.

Figure 3.9: Touristic OpenStreetMap (OSM) Points-Of-Interest (POIs) Locations



Source: Consortium, 2020.

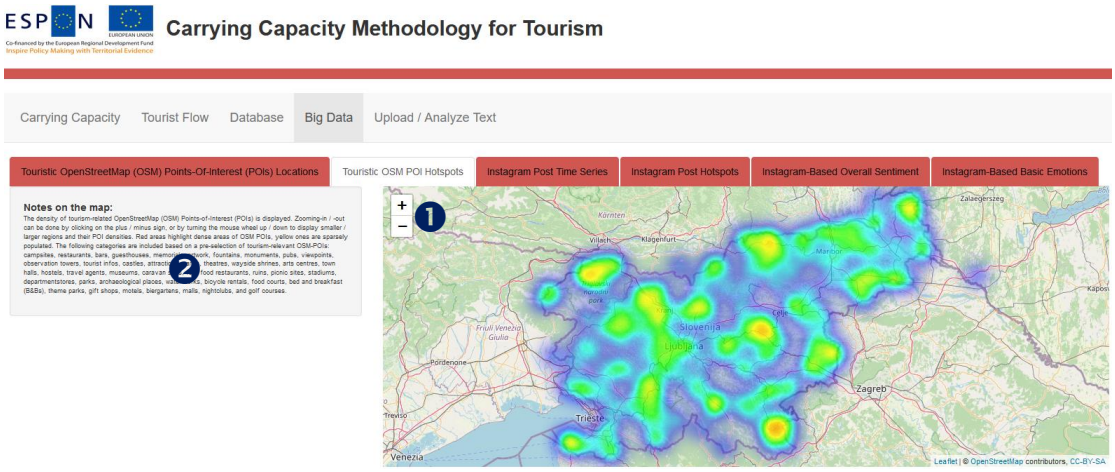
3.4.2 Touristic OSM POI Hotspots

Figure 3.10 gives an example for a Touristic OSM POI Hotspot map.

❶ Zooming-in/-out can be done by clicking on the plus/minus sign, or by turning the mouse wheel up/down to display smaller/larger regions and their POI densities.

❷ Note: The density of tourism-related OpenStreetMap (OSM) Points-of-Interest (POIs) is displayed. Red areas highlight dense areas of OSM POIs, yellow ones are sparsely populated. Included categories based on pre-selected tourism-relevant OSM-POIs: campsites, restaurants, bars, guesthouses, memorials, artwork, fountains, monuments, pubs, viewpoints, observation towers, tourist infos, castles, attractions, cafes, theatres, wayside shrines, arts centres, town halls, hostels, travel agents, museums, caravan sites, fast food restaurants, ruins, picnic sites, stadiums, departmentstores, parks, archaeological places, water works, bicycle rentals, food courts, bed and breakfast (B&Bs), theme parks, gift shops, motels, biergartens, malls, nightclubs, and golf courses..

Figure 3.10: Touristic OSM POI Hotspots



Source: Consortium, 2020.

3.4.3 Instagram Post Time Series

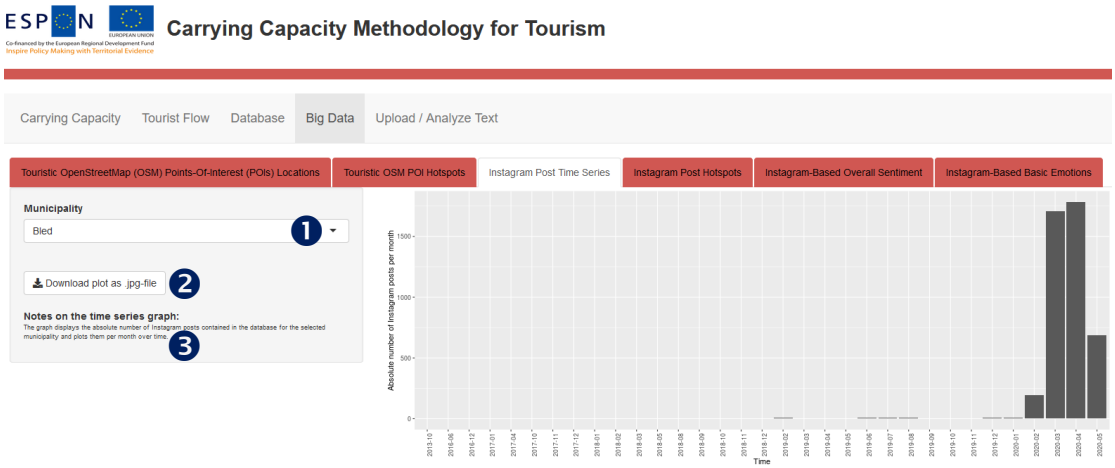
Figure 3.11 gives an example for an Instagram Post Time Series.

❶ Step 1 (compulsory): Select the municipality to be displayed.

❷ Download plot in .jpg format.

❸ Note: The graph displays the absolute number of Instagram posts contained in the database for the selected municipality and plots them per month over time.

Figure 3.11: Instagram Post Time Series



Source: Consortium, 2020.

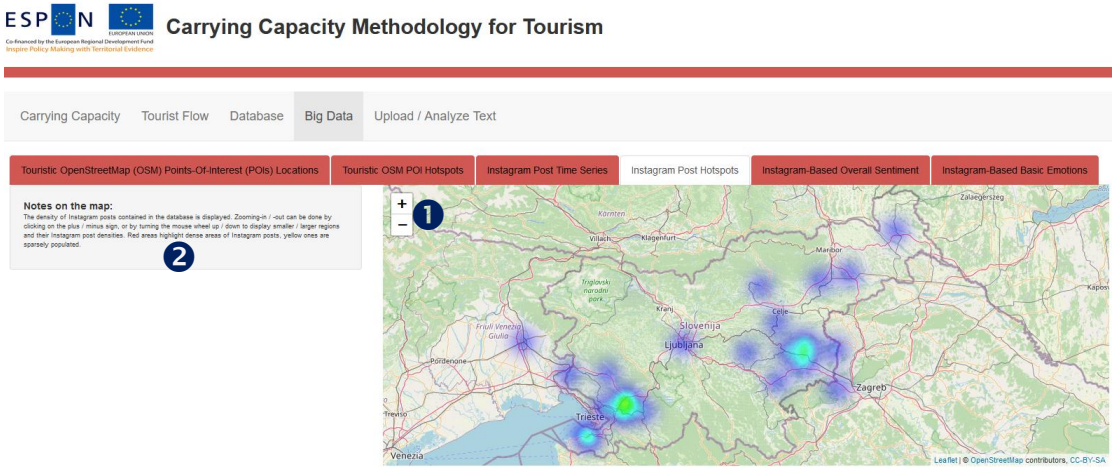
3.4.4 Instagram Post Hotspots

Figure 3.12 gives an example for an Instagram Post Hotspot map.

❶ Zooming-in/-out can be done by clicking on the plus/minus sign, or by turning the mouse wheel up/down to display smaller/larger regions and their Instagram post densities.

❷ Note: The density of Instagram posts contained in the database is displayed. Red areas highlight dense areas of Instagram posts, yellow ones are sparsely populated.

Figure 3.12: Instagram Post Hotspots



Source: Consortium, 2020.

3.4.5 Instagram-Based Overall Sentiment

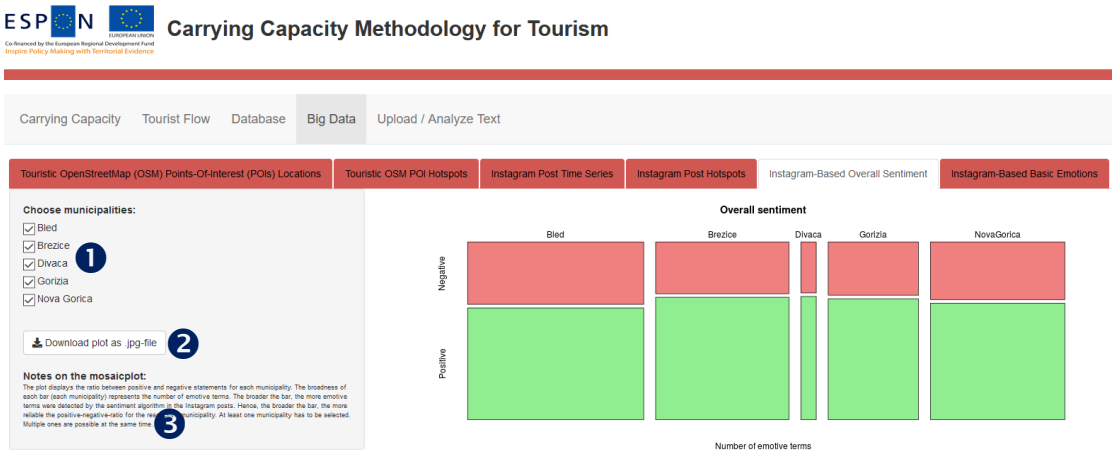
Figure 3.13 gives an example for an Instagram-Based Overall Sentiment visualization.

❶ Step 1 (compulsory): Select the municipalities to be displayed.

❷ Download the plot in .jpg format.

❸ Note: The plot displays the ratio between positive and negative statements for each municipality. The broadness of each bar (each municipality) represents the number of emotive terms. The broader the bar, the more emotive terms were detected by the sentiment algorithm in the Instagram posts. Hence, the broader the bar, the more reliable the positive-negative-ratio for the respective municipality. At least one municipality has to be selected. Multiple ones are possible at the same time.

Figure 3.13: Instagram-Based Overall Sentiment



Source: Consortium, 2020.

3.4.6 Instagram-Based Basic Emotions

Figure 3.14 gives an example for an Instagram-Based Basic Emotions visualization.

❶ Step 1 (compulsory): Select the municipalities to be displayed.

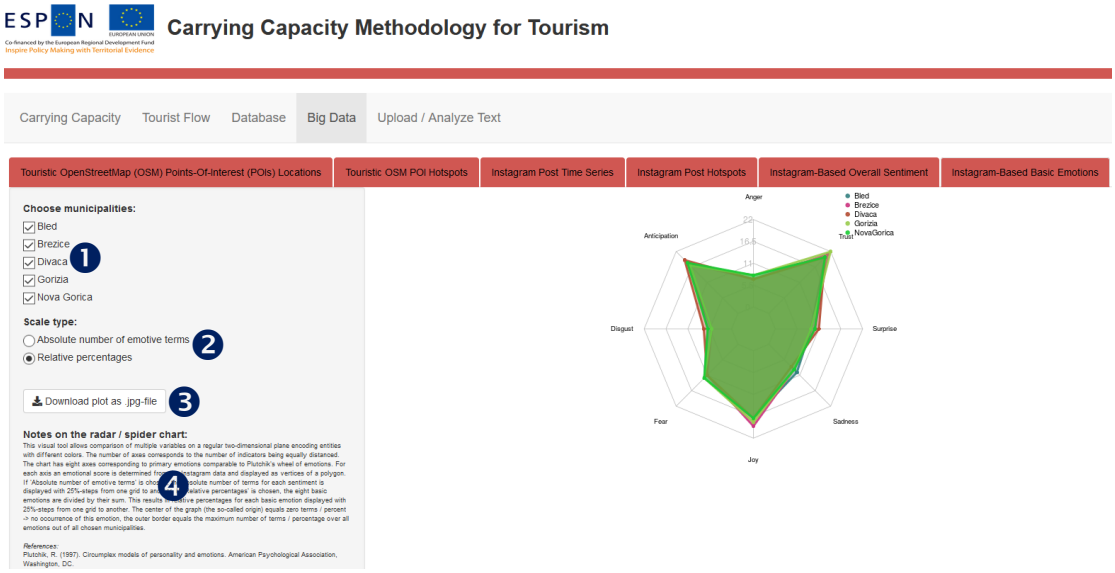
❷ If “Absolute number of emotive terms” is chosen, the absolute number of terms for each sentiment is displayed with 25%-steps from one grid to another. If “Relative percentages” is chosen, the eight basic emotions are divided by their sum. This results in relative percentages for each basic emotion displayed with 25%-steps from one grid to another.

❸ Download the plot in .jpg format.

❹ Note: This visual tool allows comparison of multiple variables on a regular two-dimensional plane encoding entities with different colours. The number of axes corresponds to the number of indicators being equally distanced. The chart has eight axes corresponding to primary emotions comparable to Plutchik’s wheel of emotions. For each axis an emotional score is determined from the Instagram data and displayed as vertices of a polygon. The center of the graph (the so-called origin) equals zero terms/percent -> no occurrence of this emotion, the outer border equals the maximum number of terms/percentage over all emotions out of all chosen municipalities.

References: Plutchik, R. (1997). Circumplex models of personality and emotions. American Psychological Association, Washington, DC.

Figure 3.14: Instagram-Based Basic Emotions



Source: Consortium, 2020.

3.5 Upload/Analyse Text

Level 1 tab – Carrying Capacity – includes four Level 2 tabs:

- STEP 1 (own data): Data Upload
- STEP 2 (own data): Calculate Overall Sentiment/Basic Emotion Values
- STEP 3a (own data): Overall Sentiment
- STEP 3b (own data): Basic Emotions

3.5.1 STEP 1 (own data): Data Upload

Figure 3.15 lists the steps necessary to conduct before analysing own text upon its sentiment.

❶ Preparatory work: Save the text to be analysed in csv.-format. The maximum upload size is restricted to 12.5MB. The .csv-file has to contain the text in a column starting with the term “caption”.

❷ The “Browse” button opens a window to browse for the file containing the textual information. The upload function tries to capture the other format specifications automatically. If the displayed file looks strange, several options can be specified manually.

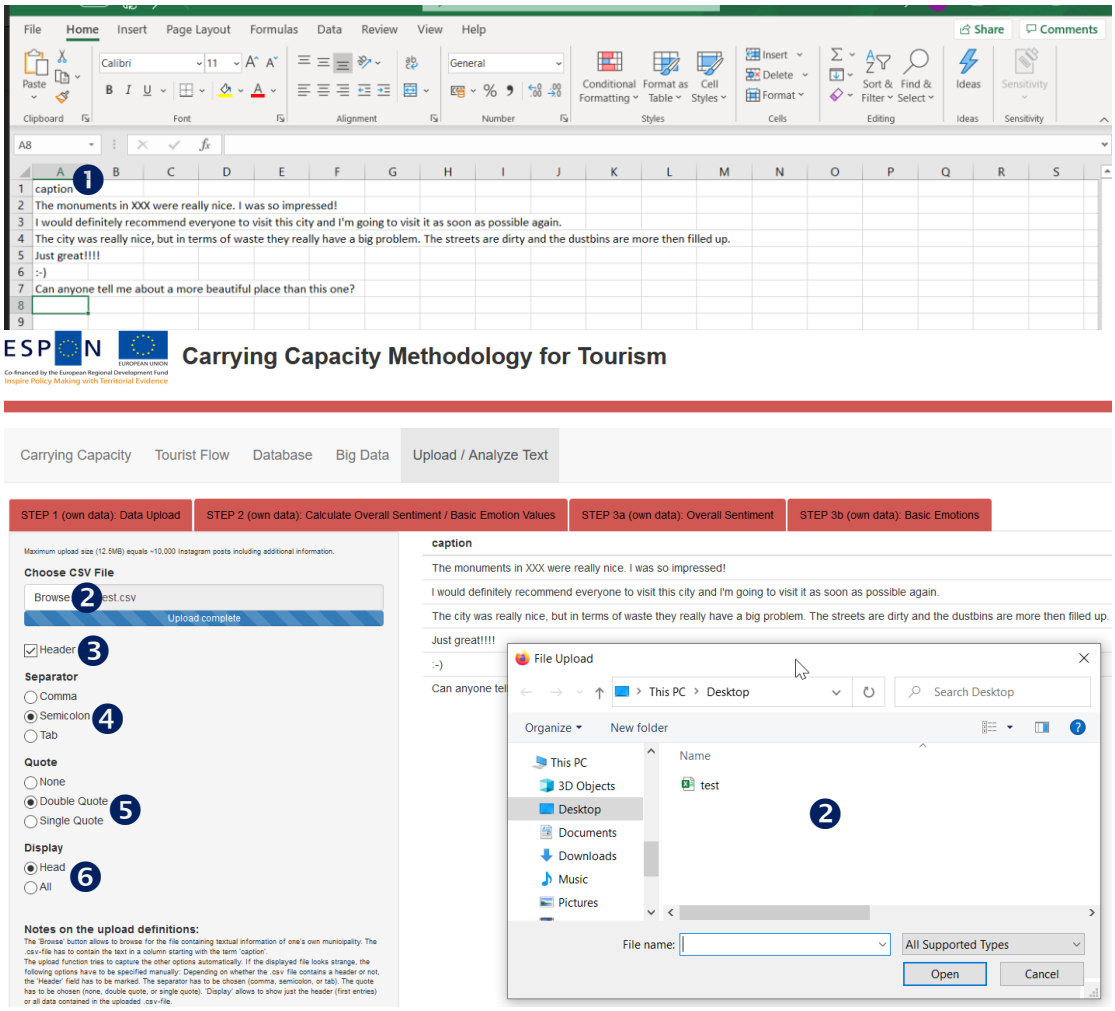
❸ Depending on whether the .csv file contains a header or not, this field has to be marked.

❹ The separator has to be chosen (comma, semicolon, or tab).

❺ The quote has to be chosen (none, double quote, or single quote).

❻ “Display” allows to show just the header (first entries) or all data of the uploaded .csv-file.

Figure 3.15: STEP 1 (own data): Data Upload



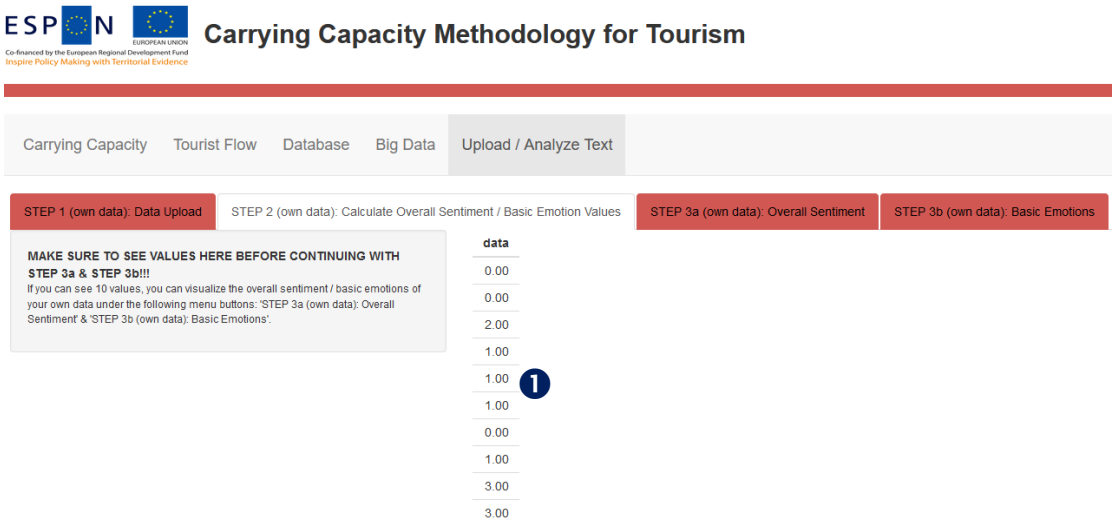
Source: Consortium, 2020.

3.5.2 STEP 2 (own data): Calculate Overall Sentiment/Basic Emotion Values

Figure 3.16 displays a visual test whether the own textual data uploaded was processed and completed accordingly by the sentiment algorithm.

❶ Note: Before continuing with STEP 3a (own data): Overall Sentiment and STEP 3b (own data): Basic Emotions one has to make sure to see 10 values. If this is not the case, one has 1) to wait till the algorithm processed all the data, or 2) to go back to STEP 1 (own data): Data Upload to make sure all specifications have been set properly.

Figure 3.16: STEP 2 (own data): Calculate Overall Sentiment/Basic Emotion Values



Source: Consortium, 2020.

3.5.3 STEP 3a (own data): Overall Sentiment

Figure 3.17 shows the overall sentiment of the uploaded text.

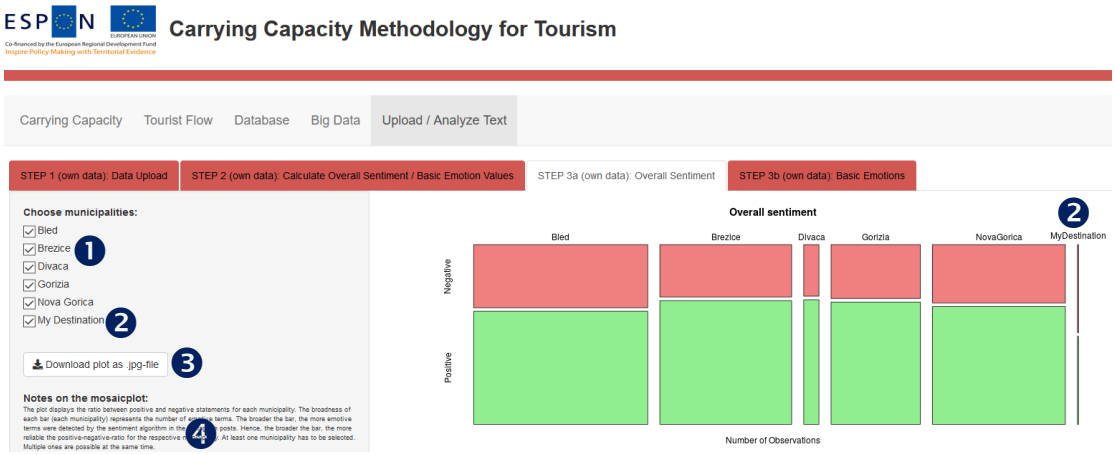
❶ Step 1 (compulsory): Select the municipalities to be displayed.

❷ The overall sentiment of the uploaded text is named with the header “My Destination”.

❸ Download plot in .jpg format.

❹ Note: The plot displays the ratio between positive and negative statements for each municipality. The broadness of each bar (each municipality) represents the number of emotive terms. The broader the bar, the more emotive terms were detected by the sentiment algorithm in the Instagram posts. Hence, the broader the bar, the more reliable the positive-negative-ratio for the respective municipality. At least one municipality has to be selected. Multiple ones are possible at the same time.

Figure 3.17: STEP 3a (own data): Overall Sentiment



Source: Consortium, 2020.

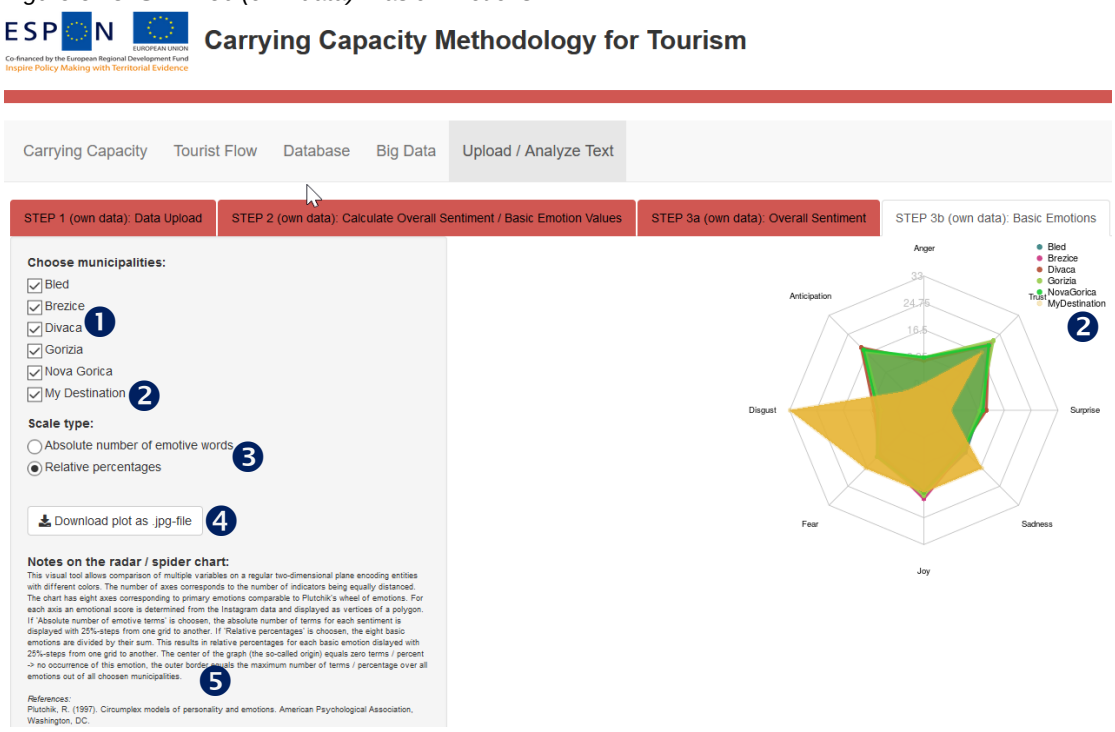
3.5.4 STEP 3b (own data): Basic Emotions

Figure 3.18 shows basic emotions of the uploaded text.

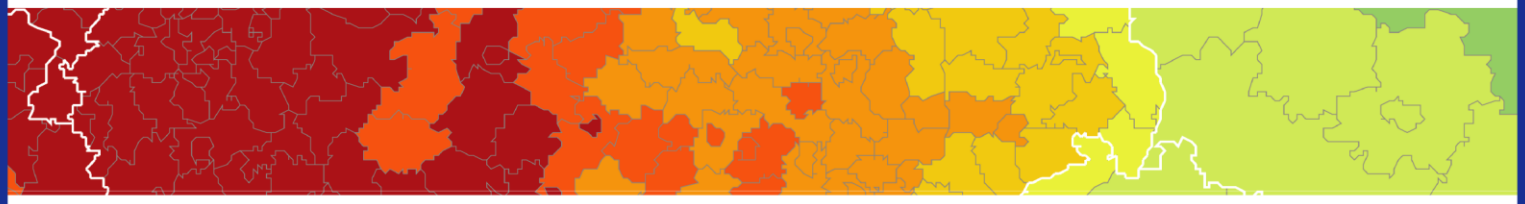
1. Step 1 (compulsory): Select the municipalities to be displayed.
2. Basic emotions of the uploaded text are named with the header “My Destination”.
3. If “Absolute number of emotive terms” is chosen, the absolute number of terms for each sentiment is displayed with 25%-steps from one grid to another. If “Relative percentages” is chosen, the eight basic emotions are divided by their sum. This results in relative percentages for each basic emotion displayed with 25%-steps from one grid to another.
4. Download plot in .jpg format.
5. Note: This visual tool allows comparison of multiple variables on a regular two-dimensional plane encoding entities with different colours. The number of axes corresponds to the number of indicators being equally distanced. The chart has eight axes corresponding to primary emotions comparable to Plutchik's wheel of emotions. For each axis an emotional score is determined from the Instagram data and displayed as vertices of a polygon. The center of the graph (the so-called origin) equals zero terms/percent -> no occurrence of this emotion, the outer border equals the maximum number of terms/percentage over all emotions out of all chosen municipalities.

References: Plutchik, R. (1997). Circumplex models of personality and emotions. American Psychological Association, Washington, DC.

Figure 3.18: STEP 3b (own data): Basic Emotions



Source: Consortium, 2020.



ESPON 2020 – More information

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