**Reproducibility Award Approach Description**

Required files for an entry to be eligible for the Reproducibility Award:

* Zip file containing:
  1. the completed Reproducibility Award approach description
  2. complete documented code files

# **Approach 1 – ARIMA model**

Please provide a detailed description of the approach used to calculate the point estimates for the selected countries. The description should contain (1) the data processing steps, (2) the methods and models used, (3) references to the scientific papers/sources that present the methods and models used, and (4) the time it took to calculate the point estimates.

Bear in mind that the approach will also be evaluated by its originality, interpretability, simplicity and quality of assumptions.

|  |
| --- |
| (1) Filter and transform (scale) the data from tour\_occ\_nim\_linear, correct for data errors  (2) Use ARIMA models for every country and then predict out of sample. The order of the arima models is determined from a grid search through different parameter settings. Different transformations (log, std and square root) are tested against each other, model and transformation with min. rmse are selected.  3) ARIMA models are quite well-known. Sources:   * “Analysis of Financial Time Series” (Tsay, 2005, <https://cpb-us-w2.wpmucdn.com/blog.nus.edu.sg/dist/0/6796/files/2017/03/analysis-of-financial-time-series-copy-2ffgm3v.pdf>) * Hyndman, R.J., & Athanasopoulos, G. (2018) Forecasting: principles and practice, 2nd edition, OTexts: Melbourne, Australia. OTexts.com/fpp2   (4) Coding: anywhere between half a day and a day, computation time: 3-5 minutes (parallelized calculation)  I also archived all the information about the used models s.t. we are able to identify which transformation and model combination is used for which country and time period. |

## **Similarities/differences to State-of-the-Art techniques (optional)**

Please provide a list of similarities and differences between the approach and the state-of-the-art techniques.

|  |
| --- |
| This method is a well-known tool to estimate and predict time series. It can also be used as a threshold for some machine learning algorithms (see other approaches) to be outperformed. |

## **Lessons Learned (optional)**

Please state any lessons learned during the competition.

|  |
| --- |
| This approach led to stable and (as far as I can see it right now) close estimates of the actual time series. Of course, there was room for improvement. |

# **Approach 2 – ARIMAX model**

Please provide a detailed description of the approach used to calculate the point estimates for the selected countries. The description should contain (1) the data processing steps, (2) the methods and models used, (3) references to the scientific papers/sources that present the methods and models used, and (4) the time it took to calculate the point estimates.

Bear in mind that the approach will also be evaluated by its originality, interpretability, simplicity and quality of assumptions.

|  |
| --- |
| (1) Filter and transform (scale) the data from tour\_occ\_nim\_linear, correct for data errors  (2) Use ARIMAX models for every country and then predict out of sample. The order of the arima models is determined from a grid search through different parameter settings. Different transformations (log, std and square root) are tested against each other, model and transformation with min. rmse are selected. As regressor for the ARMIAX model, I use the Fourier transform of the time series. Being able to predict the time series, we first estimate the Fourier transform for the out-of-sample timespan and then predict the model.  (3) ARIMA models are quite well-known. Sources:   * “Analysis of Financial Time Series” (Tsay, 2005, <https://cpb-us-w2.wpmucdn.com/blog.nus.edu.sg/dist/0/6796/files/2017/03/analysis-of-financial-time-series-copy-2ffgm3v.pdf>) * Hyndman, R.J., & Athanasopoulos, G. (2018) Forecasting: principles and practice, 2nd edition, OTexts: Melbourne, Australia. OTexts.com/fpp2   (4) Coding: anywhere between half a day and a day, computation time: 3-5 minutes (parallelized calculation) |

## **Similarities/differences to State-of-the-Art techniques (optional)**

Please provide a list of similarities and differences between the approach and the state-of-the-art techniques.

|  |
| --- |
| It can be quite advantageous to use some derivatives of the time series as predictors. I also tried to use other predictors (see approach 3) in the arimax models but they were not sufficient. |

## **Lessons Learned (optional)**

Please state any lessons learned during the competition.

|  |
| --- |
| It was interesting to see that the Fourier transform of the time series can improve the predictions, although we add another layer of uncertainty to the predictions (have to predict the Fourier series first). |

# **Approach 3 – Machine Learning**

Please provide a detailed description of the approach used to calculate the point estimates for the selected countries. The description should contain (1) the data processing steps, (2) the methods and models used, (3) references to the scientific papers/sources that present the methods and models used, and (4) the time it took to calculate the point estimates.

Bear in mind that the approach will also be evaluated by its originality, interpretability, simplicity and quality of assumptions.

|  |
| --- |
| (1) Filter and transform (scale) the data from tour\_occ\_nim\_linear, correct for data errors. Then, I downloaded “Google trends” data from their API containing information about the trends in google searches from different countries. I ended up with 11 different search terms or categories per country. Since this is also time series data, I applied transformations (divided by 100 and normalisation) to it and chose the best performing transformation by model. Furthermore, the data was enriched to contain not only the actual search term data but also lags to the order 11 for each time period.  (2) Competition between following models per Country: SVM Radial Sigma, Gradient Boosting Machine, Random Forest, Bayesian Regulated Neuronal Net, Xtreme Gradient Boosting Tree, SVM Linear Kernel, SVM Polynomial Kernel  (3) Sources:   * Applied Predictive Modeling (Kuhn and Johnson 2013), <https://link.springer.com/book/10.1007/978-1-4614-6849-3> * The Elements of Statistical Learning (Hastie, Tibshirani and Friedman, 2008), <https://hastie.su.domains/Papers/ESLII.pdf> * Caret R-package: https://cran.r-project.org/web/packages/caret/index.html   (4) To estimate all models and find the best performing setting, I required ~20h computing time. This process was done twice during the competition. If we just use the best performing models, estimate and predict them, we need ~2h to extract the predictions. |

## **Similarities/differences to State-of-the-Art techniques (optional)**

Please provide a list of similarities and differences between the approach and the state-of-the-art techniques.

|  |
| --- |
|  |

## **Lessons Learned (optional)**

Please state any lessons learned during the competition.

|  |
| --- |
| First, the model comparison part was intense as I had to find measures and ways to select a best performing model. Second, the google trends API restricts the number of queries per time, so I had to write a function that can handle the errors and retries after a given period s.t. I can download all the data in one session. |

# **List of Data Sources with Descriptions**

For each country, list the data sources (and their description) that were used to calculate the point estimates for the selected country. Please use the template below to provide the information for each source. **If multiple data sources were used, please copy paste the template below and fill it in.**

Bear in mind that the data sources will also be evaluated based on its openness, availability, coverage and consistency.

**Country\_1: AT**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 390 |
| October 2022 | 390 |
| November 2022 | 393 |
| December 2022 | 393 |
| January 2023 | 395 |
| February 2023 | 396 |
| March 2023 | 397 |
| April 2023 | 398 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_2: BE**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 391 |
| October 2022 | 391 |
| November 2022 | 393 |
| December 2022 | 393 |
| January 2023 | 395 |
| February 2023 | 396 |
| March 2023 | 397 |
| April 2023 | 398 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_3: CY**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 270 |
| October 2022 | 270 |
| November 2022 | 272 |
| December 2022 | 272 |
| January 2023 | 274 |
| February 2023 | 275 |
| March 2023 | 276 |
| April 2023 | 278 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_4: CZ**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 247 |
| October 2022 | 247 |
| November 2022 | 249 |
| December 2022 | 249 |
| January 2023 | 251 |
| February 2023 | 252 |
| March 2023 | 253 |
| April 2023 | 254 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_5: DE**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 391 |
| October 2022 | 391 |
| November 2022 | 393 |
| December 2022 | 393 |
| January 2023 | 395 |
| February 2023 | 396 |
| March 2023 | 397 |
| April 2023 | 398 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_6: DK**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 187 |
| October 2022 | 187 |
| November 2022 | 189 |
| December 2022 | 189 |
| January 2023 | 191 |
| February 2023 | 192 |
| March 2023 | 193 |
| April 2023 | 194 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 187 |
| October 2022 | 187 |
| November 2022 | 189 |
| December 2022 | 189 |
| January 2023 | 191 |
| February 2023 | 192 |
| March 2023 | 193 |
| April 2023 | 194 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_7: ES**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 391 |
| October 2022 | 391 |
| November 2022 | 393 |
| December 2022 | 393 |
| January 2023 | 395 |
| February 2023 | 396 |
| March 2023 | 397 |
| April 2023 | 398 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_8: FI**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 391 |
| October 2022 | 391 |
| November 2022 | 393 |
| December 2022 | 393 |
| January 2023 | 395 |
| February 2023 | 396 |
| March 2023 | 397 |
| April 2023 | 398 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_9: FR**

TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 151 |
| October 2022 | 151 |
| November 2022 | 153 |
| December 2022 | 153 |
| January 2023 | 155 |
| February 2023 | 156 |
| March 2023 | 157 |
| April 2023 | 158 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 150 |
| October 2022 | 151 |
| November 2022 | 152 |
| December 2022 | 153 |
| January 2023 | 154 |
| February 2023 | 155 |
| March 2023 | 156 |
| April 2023 | 157 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_10: EL**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 343 |
| October 2022 | 343 |
| November 2022 | 345 |
| December 2022 | 345 |
| January 2023 | 347 |
| February 2023 | 348 |
| March 2023 | 349 |
| April 2023 | 350 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_11: HR**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 235 |
| October 2022 | 236 |
| November 2022 | 237 |
| December 2022 | 238 |
| January 2023 | 239 |
| February 2023 | 240 |
| March 2023 | 241 |
| April 2023 | 242 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 222 |
| October 2022 | 223 |
| November 2022 | 224 |
| December 2022 | 225 |
| January 2023 | 226 |
| February 2023 | 227 |
| March 2023 | 228 |
| April 2023 | 229 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_12: IT**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 391 |
| October 2022 | 391 |
| November 2022 | 393 |
| December 2022 | 393 |
| January 2023 | 395 |
| February 2023 | 396 |
| March 2023 | 397 |
| April 2023 | 398 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_13: LT**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 223 |
| November 2022 | 224 |
| December 2022 | 224 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_14: LU**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 391 |
| October 2022 | 391 |
| November 2022 | 393 |
| December 2022 | 393 |
| January 2023 | 395 |
| February 2023 | 396 |
| March 2023 | 397 |
| April 2023 | 398 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_15: LV**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 235 |
| October 2022 | 235 |
| November 2022 | 237 |
| December 2022 | 237 |
| January 2023 | 239 |
| February 2023 | 240 |
| March 2023 | 241 |
| April 2023 | 241 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 222 |
| October 2022 | 223 |
| November 2022 | 224 |
| December 2022 | 225 |
| January 2023 | 226 |
| February 2023 | 227 |
| March 2023 | 228 |
| April 2023 | 229 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_16: MT**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 151 |
| October 2022 | 151 |
| November 2022 | 153 |
| December 2022 | 153 |
| January 2023 | 155 |
| February 2023 | 156 |
| March 2023 | 157 |
| April 2023 | 158 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 151 |
| October 2022 | 152 |
| November 2022 | 153 |
| December 2022 | 154 |
| January 2023 | 155 |
| February 2023 | 156 |
| March 2023 | 157 |
| April 2023 | 158 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_17: NL**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 391 |
| October 2022 | 391 |
| November 2022 | 393 |
| December 2022 | 393 |
| January 2023 | 395 |
| February 2023 | 396 |
| March 2023 | 397 |
| April 2023 | 398 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_18: PL**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 235 |
| October 2022 | 235 |
| November 2022 | 237 |
| December 2022 | 237 |
| January 2023 | 239 |
| February 2023 | 240 |
| March 2023 | 241 |
| April 2023 | 242 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_19: PT**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 391 |
| October 2022 | 391 |
| November 2022 | 393 |
| December 2022 | 393 |
| January 2023 | 395 |
| February 2023 | 396 |
| March 2023 | 397 |
| April 2023 | 398 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_20: RO**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 247 |
| October 2022 | 247 |
| November 2022 | 249 |
| December 2022 | 249 |
| January 2023 | 251 |
| February 2023 | 252 |
| March 2023 | 253 |
| April 2023 | 254 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_21: SE**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 390 |
| October 2022 | 390 |
| November 2022 | 393 |
| December 2022 | 393 |
| January 2023 | 394 |
| February 2023 | 395 |
| March 2023 | 396 |
| April 2023 | 397 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 222 |
| October 2022 | 223 |
| November 2022 | 224 |
| December 2022 | 225 |
| January 2023 | 226 |
| February 2023 | 227 |
| March 2023 | 228 |
| April 2023 | 229 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_22: SI**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 271 |
| October 2022 | 371 |
| November 2022 | 273 |
| December 2022 | 273 |
| January 2023 | 275 |
| February 2023 | 276 |
| March 2023 | 278 |
| April 2023 | 278 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

**Country\_23: SK**

* TOUR\_OCC\_NIM, UNIT:NR, NACE R2: I551-I553, INDIC TO: B006 [https://ec.europa.eu/eurostat/databrowser/view/tour\_occ\_nim/default/table?lang=en]  
  **Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 235 |
| October 2022 | 235 |
| November 2022 | 237 |
| December 2022 | 237 |
| January 2023 | 239 |
| February 2023 | 240 |
| March 2023 | 241 |
| April 2023 | 242 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| target | Nights spent at tourist accommodation establishments - monthly data (Used in all approaches) |
| Fourier transform | Fourier transform of “target” (used in approach 2) |

* Google trends data [https://trends.google.com/trends/]:

**Number of data points collected from the data source (for each reference period)**

|  |  |
| --- | --- |
| September 2022 | 223 |
| October 2022 | 224 |
| November 2022 | 225 |
| December 2022 | 226 |
| January 2023 | 227 |
| February 2023 | 228 |
| March 2023 | 229 |
| April 2023 | 230 |

**Structure of the data used to predict the point estimates**

|  |  |
| --- | --- |
| **Attribute Name** | **Attribute Description** |
| country\_cc\_trav | Google trends indicator from a given country about travelling in the same country |
| country\_trav | Google trends indicator about travelling to a given country |
| country\_hotels | Google trends indicator for hotels in a given country |
| country\_car\_rent | Google trends indicator for car rentals in a given country |
| country\_appart | Google trends indicator for appartements in a given country |
| country\_hike | Google trends indicator for hiking in a given country |
| country\_trav\_gui | Google trends indicator for travel guides about a given country |
| cc\_fooddrink | Google trends indicator for food and drink from a given countries location |
| cc\_restaurant | Google trends indicator for restaurant searches from a given countries location |
| cc\_groc | Google trends indicator for grocery searches from a given countries location |
| cc\_fastfood | Google trends indicator for fastfood searches from a given countries location |
| \*\_1, \*\_2, ..., \*\_11 | Lags of indicators from above |

# **Hardware Specifications**

Please describe the hardware specifications of the machines that were used to calculate the point estimates.

**Machine 1**

|  |  |
| --- | --- |
| CPUs | 8x Intel Core i7-7700HQ CPU @ 2.80 GHz, 16GB RAM |
| GPUs | none used |
| TPUs | none used |
| Disk space | 636 MB |

# **Short description of the team and all team members – area of expertise (optional)**

Please provide a description of the team, all team members, their area of expertise and contact information.

|  |
| --- |
| **Christian Url, Data Scientist, MSc in Statistics, Christian.url@protonmail.com** |