Visualization of Data

ML 14

12/3/2020

Datasets The list below contains the list of datasets used for this visualization and their sources.

- Our world in Data (OWID, https://ourworldindata.org/coronavirus-data)
- Oxford Covid policy tracker (CGRT, https://github.com/OxCGRT/covid-policy-tracker)
- Apple mobility report (https://covid19.apple.com/mobility)
- Google mobility report (https://www.google.com/covid19/mobility/)

For simplicity this report focuses on the following countries:

- Germany
- Italy
- The Netherlands
- The United Kingdom
- France
- Austria

Variables of interest (Features and Labels) The following variables of interest were extracted from each of the frames:

- OWID
  - "iso_code"
  - "continent"
  - "date"
  - "location"
  - "new_deaths"
  - "new_cases"
  - "new_tests"
  - "population"
  - "life_expectancy"
- CGRT
  - "C1_School.closing",
  - "C2_Workplace.closing"
  - "C3_Cancel.public.events"
  - "C4_Restrictions.on.gatherings"
  - "C4_Restrictions.on.gatherings"
  - "C5_Close.public.transport"
  - "C6_Stay.at.home.requirements"
  - "C7_Restrictions.on.internal.movement"

  - "C8_International.travel.controls"
  - "H1_Public.information.campaigns"
  - "H6_Facial.Coverings"
  - "E1_Income.support"

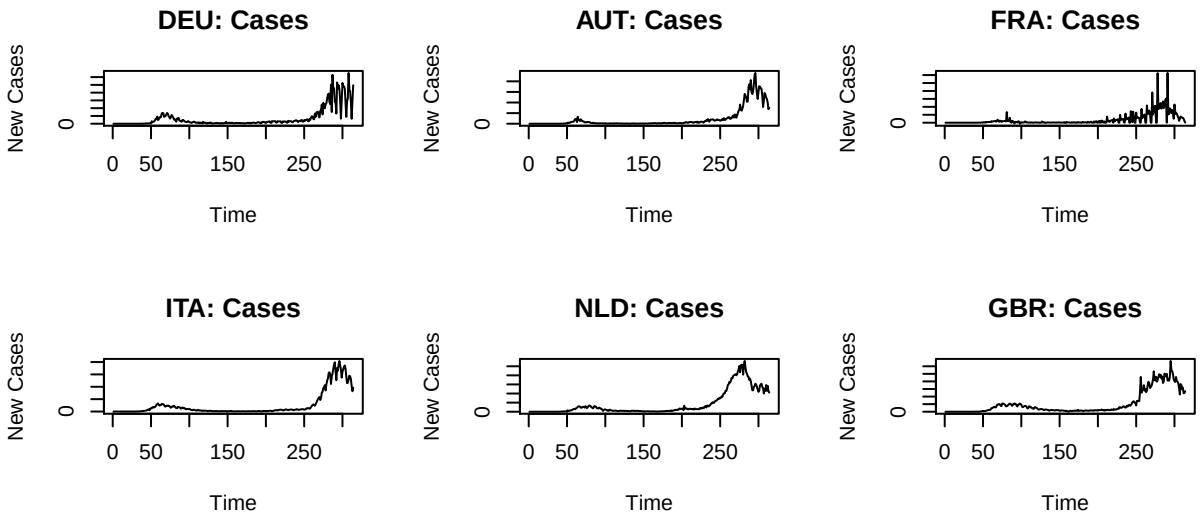
- Apple mobility report
  - "transportation_type"
  - "value"

- Google mobility report
  - "retail_and_recreation_percent_change_from_baseline"
  - "grocery_and_pharmacy_percent_change_from_baseline"
  - "parks_percent_change_from_baseline"
  - "transit_stations_percent_change_from_baseline"
  - "workplaces_percent_change_from_baseline"
  - "residential_percent_change_from_baseline"

Visualization

OWID The OWID data represents multiple time-series for all countries of interest on the variables of interest. Visualization of the "new_cases" series are depicted below.

```
# Plot time series for new_cases
par(mfrow=c(3,3))

for (iso in iso_codes) {
  iso_data <- owid$new_cases[owid$iso_code == iso]
  plot(1:length(iso_data),iso_data,
       type = "l",main=paste0(iso,": Cases"),
       ylab = "New Cases",xlab = "Time")
}
```



CGRT From the CGRT we extract information on containment and closure policies (C1-C8), economic policies (E1), and health system policies (H1, H6). The print statements below list the column sum (over time) for each measure per country. (scales for variables can be found here: https://github.com/OxCGRT/covid-policy-tracker/blob/master/documentation/codebook.md#containment-and-closure-policies)

```
# Print sum of interventions per type per country
for (country in country_names) {
  print(country)

  print(colSums(cgrt[cgrt$CountryName == country,
                     columns_of_interest_cgrt],
                na.rm = TRUE))
}
```

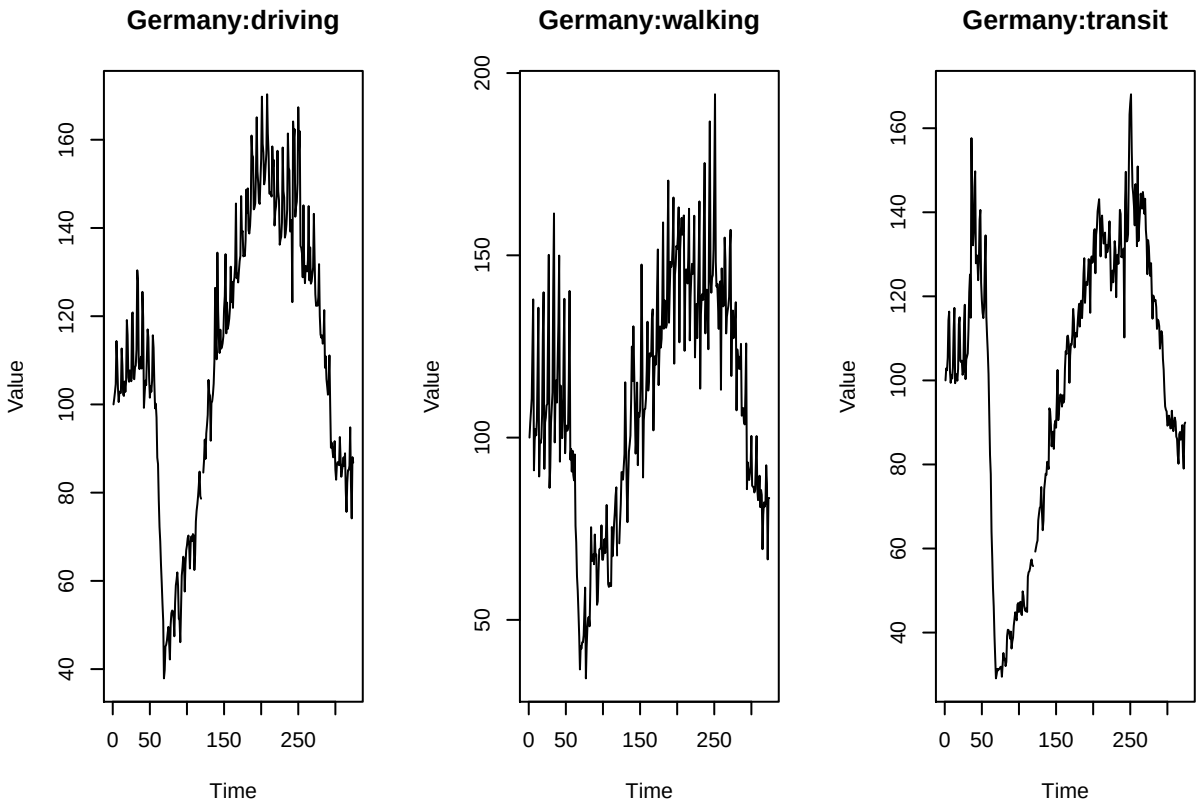
```
## [1] "Germany"
##                    C1_School.closing                C2_Workplace.closing
##                                  505                                 506
##             C3_Cancel.public.events        C4_Restrictions.on.gatherings
##                                  540                                 987
##      C4_Restrictions.on.gatherings.1            C5_Close.public.transport
##                                  987                                   0
##         C6_Stay.at.home.requirements C7_Restrictions.on.internal.movement
##                                  161                                 405
##     C8_International.travel.controls      H1_Public.information.campaigns
##                                  853                                 603
```

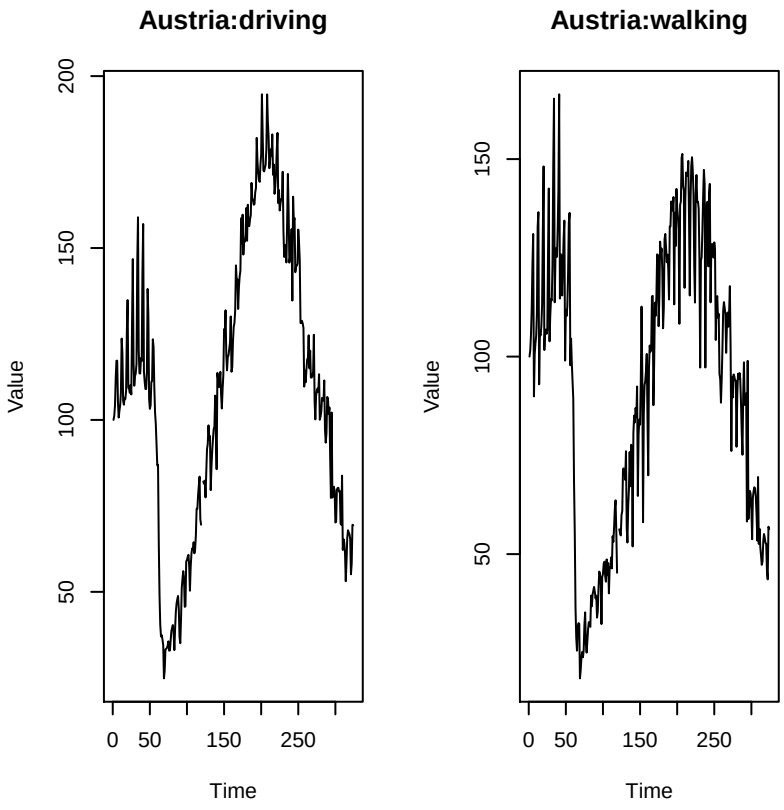
```
##                 H6_Facial.Coverings                   E1_Income.support
##                                 481                                 518
## [1] "Austria"
##                   C1_School.closing                C2_Workplace.closing
##                                 382                                 468
##             C3_Cancel.public.events       C4_Restrictions.on.gatherings
##                                 435                                 807
##     C4_Restrictions.on.gatherings.1           C5_Close.public.transport
##                                 807                                  88
##        C6_Stay.at.home.requirements C7_Restrictions.on.internal.movement
##                                 200                                 179
##     C8_International.travel.controls     H1_Public.information.campaigns
##                                 707                                 562
##                 H6_Facial.Coverings                   E1_Income.support
##                                 561                                 514
## [1] "France"
##                   C1_School.closing                C2_Workplace.closing
##                                 507                                 549
##             C3_Cancel.public.events       C4_Restrictions.on.gatherings
##                                 455                                1104
##     C4_Restrictions.on.gatherings.1           C5_Close.public.transport
##                                1104                                  98
##        C6_Stay.at.home.requirements C7_Restrictions.on.internal.movement
##                                 242                                 371
##     C8_International.travel.controls     H1_Public.information.campaigns
##                                 777                                 624
##                 H6_Facial.Coverings                   E1_Income.support
##                                 676                                 520
## [1] "Italy"
##                   C1_School.closing                C2_Workplace.closing
##                                 719                                 615
##             C3_Cancel.public.events       C4_Restrictions.on.gatherings
##                                 554                                 753
##     C4_Restrictions.on.gatherings.1           C5_Close.public.transport
##                                 753                                 118
##        C6_Stay.at.home.requirements C7_Restrictions.on.internal.movement
##                                 315                                 258
##     C8_International.travel.controls     H1_Public.information.campaigns
##                                 818                                 600
##                 H6_Facial.Coverings                   E1_Income.support
##                                 893                                 254
## [1] "Netherlands"
##                   C1_School.closing                C2_Workplace.closing
##                                 411                                 600
##             C3_Cancel.public.events       C4_Restrictions.on.gatherings
##                                 394                                 849
##     C4_Restrictions.on.gatherings.1           C5_Close.public.transport
##                                 849                                  62
##        C6_Stay.at.home.requirements C7_Restrictions.on.internal.movement
##                                 319                                 162
##     C8_International.travel.controls     H1_Public.information.campaigns
##                                 771                                 534
##                 H6_Facial.Coverings                   E1_Income.support
##                                 366                                 518
```

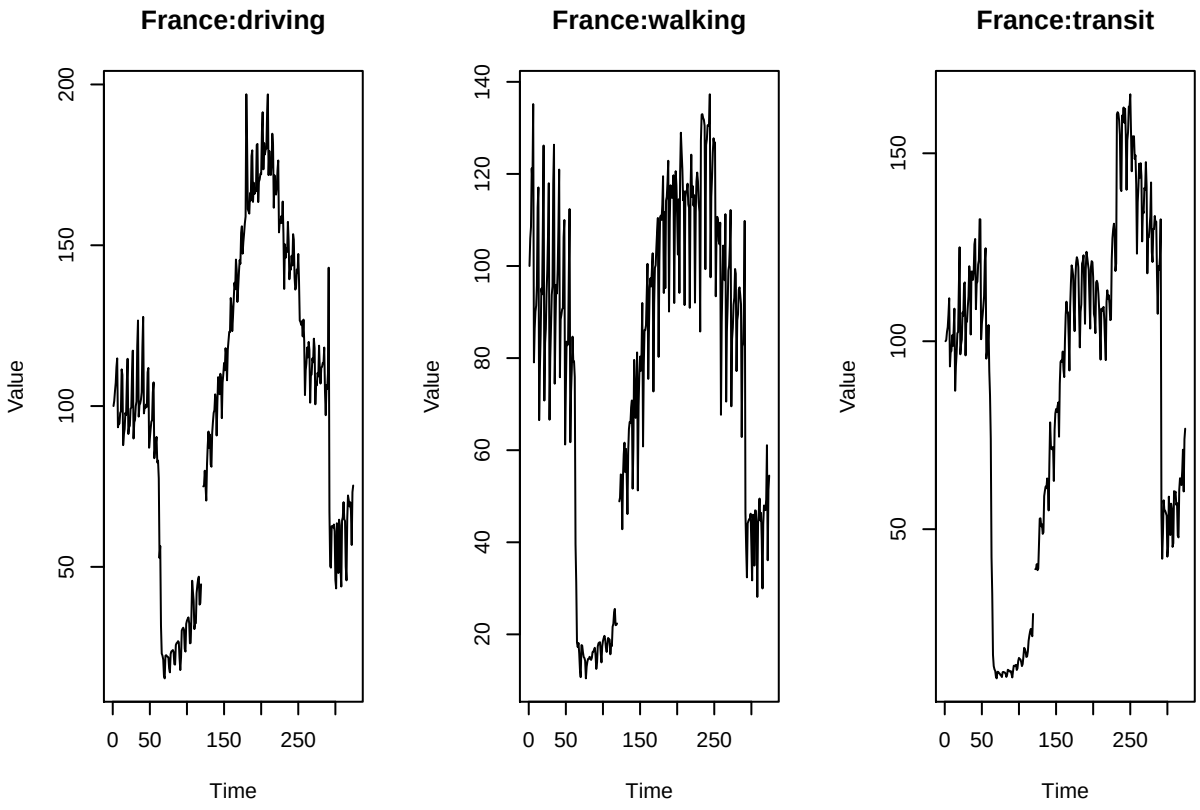
```
## [1] "United Kingdom"
##                     C1_School.closing                 C2_Workplace.closing
##                                  2807                                 2896
##              C3_Cancel.public.events        C4_Restrictions.on.gatherings
##                                  2571                                 5072
##      C4_Restrictions.on.gatherings.1            C5_Close.public.transport
##                                  5072                                 1280
##         C6_Stay.at.home.requirements C7_Restrictions.on.internal.movement
##                                  1449                                 1790
##     C8_International.travel.controls      H1_Public.information.campaigns
##                                  1785                                 3099
##                  H6_Facial.Coverings                    E1_Income.support
##                                  1421                                 2562
```

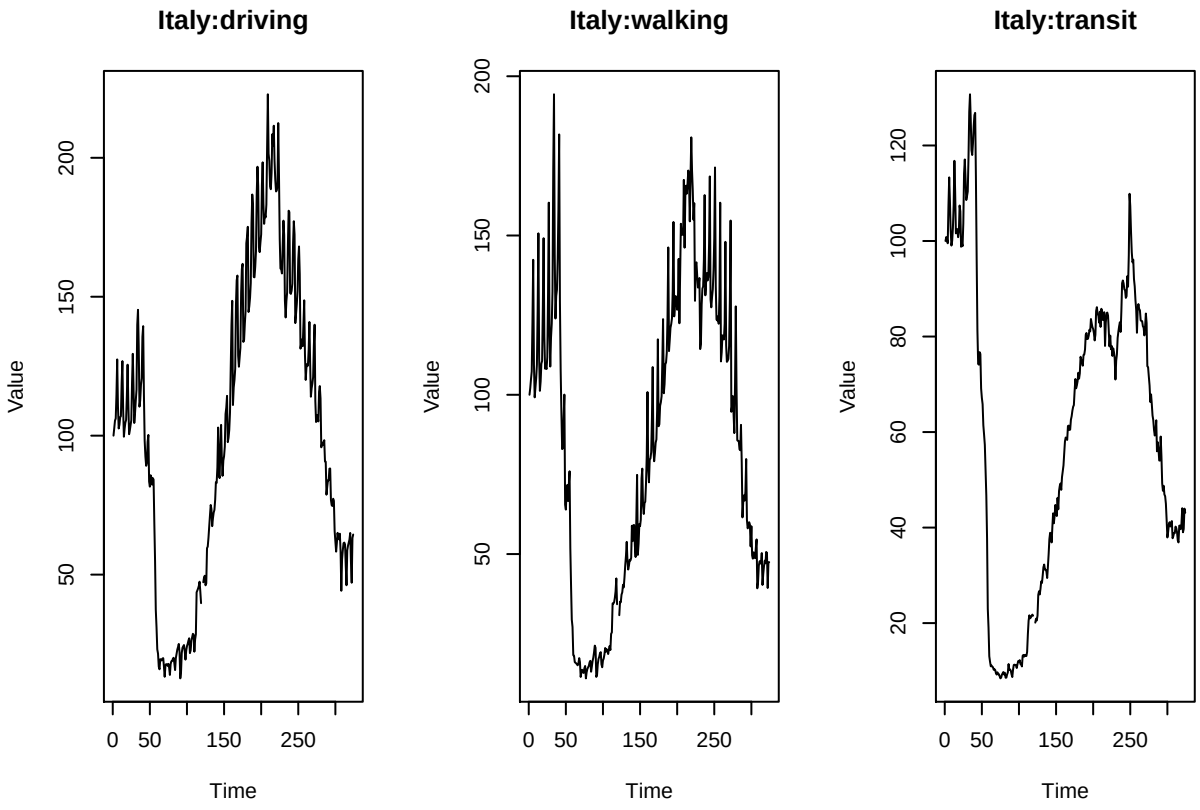
Apple mobility report The Apple mobility report contains again time-series data, reflecting the change in percentage (a value of 100 reflects baseline) with regard to use of three different transportation types. Visualizations per country are depicted below.

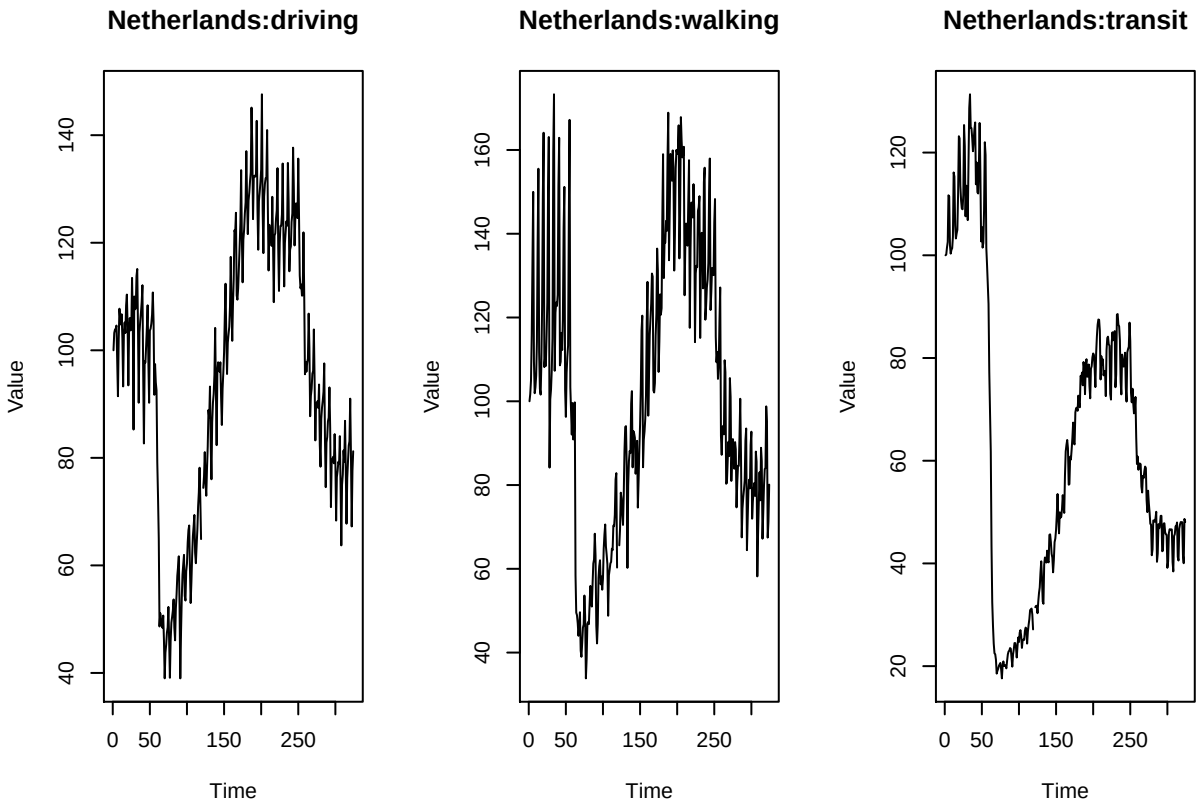
```
# Plot mobility series per transport type from Apple

mobility_types = unique(mobility_apple$transportation_type)

for (country in country_names) {
  country_data <- mobility_apple[mobility_apple$region == country,]
  par(mfrow=c(1,3))
  for (mobility_type in mobility_types) {
    mobility_data <- country_data$value[country_data$transportation_type == mobility_type]
    if (length(mobility_data) > 1) {
      plot(country_data$value[country_data$transportation_type == mobility_type],
           type = "l",main = paste0(country, ":",mobility_type),
           ylab="Value",xlab = "Time")
    }
  }
}
```

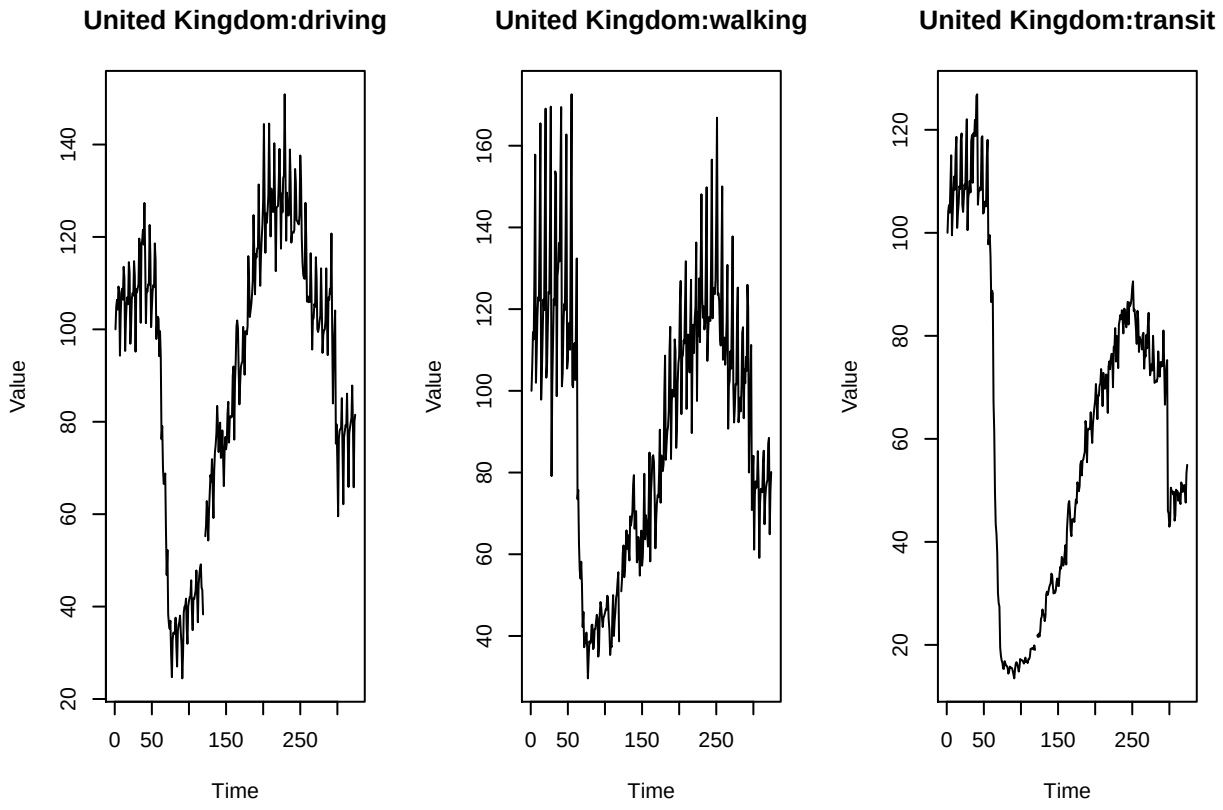

Germany:driving
Germany:walking
Germany:transit
Value
Time
0
50
150
250
40
60
80
100
120
140
160
50
100
150
200


Austria:driving
Austria:walking
Value
Time
0
50
150
250
50
100
150
200


France:driving
France:walking
France:transit
Value
Time
0
50
150
250
20
40
60
80
100
120
140
50
100
150
200

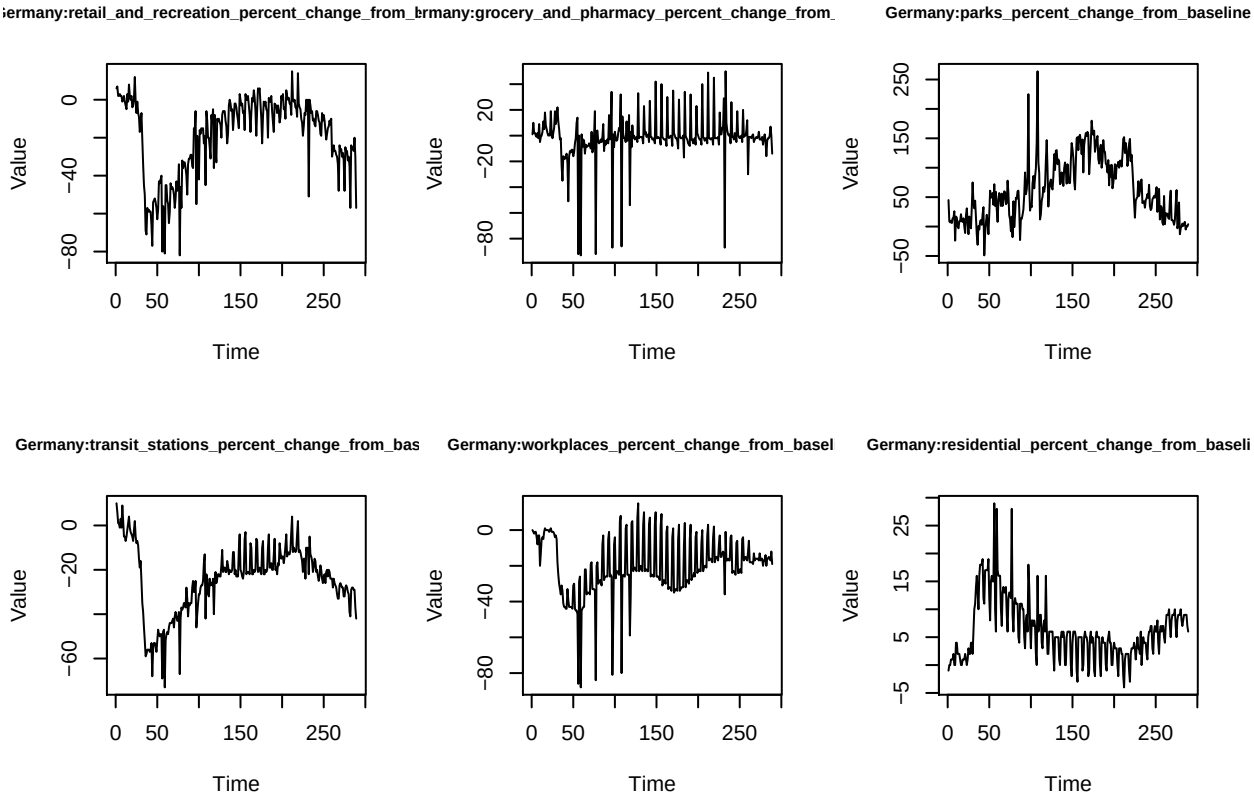

Italy:driving
Italy:walking
Italy:transit
Value
Time
0
50
150
250
50
100
150
200
20
40
60
80
100
120


Netherlands:driving
Netherlands:walking
Netherlands:transit
Value
Time
0
50
150
250
40
60
80
100
120
140
160
20



Google mobility report The Google mobility report contains again time-series data, reflecting the change in percentage (a value of 0 reflects baseline) with regard to the amount of traffic in six different type of areas. Visualizations per country are depicted below.

```
# Plot mobility series per area type from Google
for (country in country_names) {
  country_data <- mobility_google[mobility_google$country_region==country,]
  par(mfrow=c(2,3))
  for (area in areas_of_interest) {
    area_data <- country_data[,area]
    if (length(area_data) > 0) {
      plot(area_data,
           type = "l",main = paste0(country, ":",area),
           ylab="Value",xlab = "Time",cex.main=0.7)
    }
  }
}
```


ermany:retail_and_recreation_percent_change_from_b
rmany:grocery_and_pharmacy_percent_change_from_
Germany:parks_percent_change_from_baseline
Germany:transit_stations_percent_change_from_bas
Germany:workplaces_percent_change_from_basel
Germany:residential_percent_change_from_baseli
Value
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250
−80
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20
−50
50
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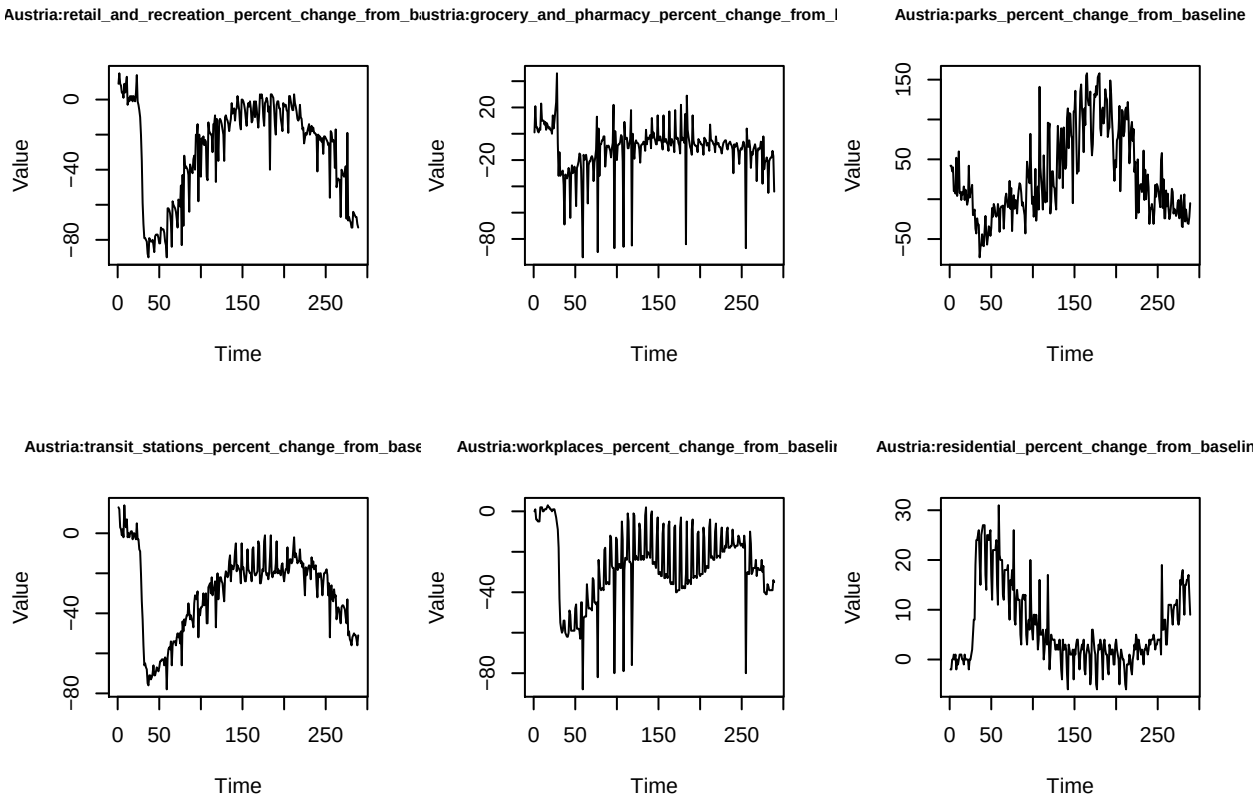
−5
5
15
25


Austria:retail_and_recreation_percent_change_from_b
Austria:grocery_and_pharmacy_percent_change_from_
Austria:parks_percent_change_from_baseline
Austria:transit_stations_percent_change_from_base
Austria:workplaces_percent_change_from_baseli
Austria:residential_percent_change_from_baselin
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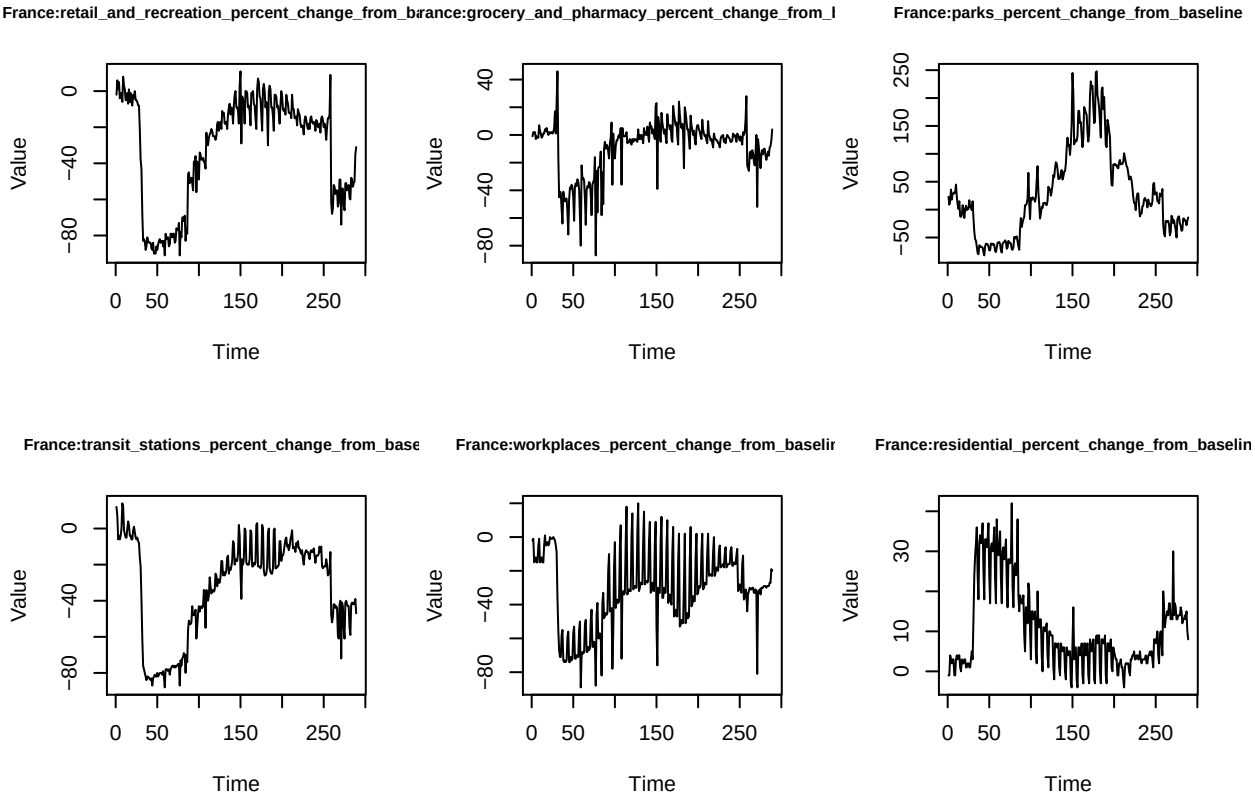
France:retail_and_recreation_percent_change_from_ba
France:grocery_and_pharmacy_percent_change_from_l
France:parks_percent_change_from_baseline
France:transit_stations_percent_change_from_base
France:workplaces_percent_change_from_baselir
France:residential_percent_change_from_baselin
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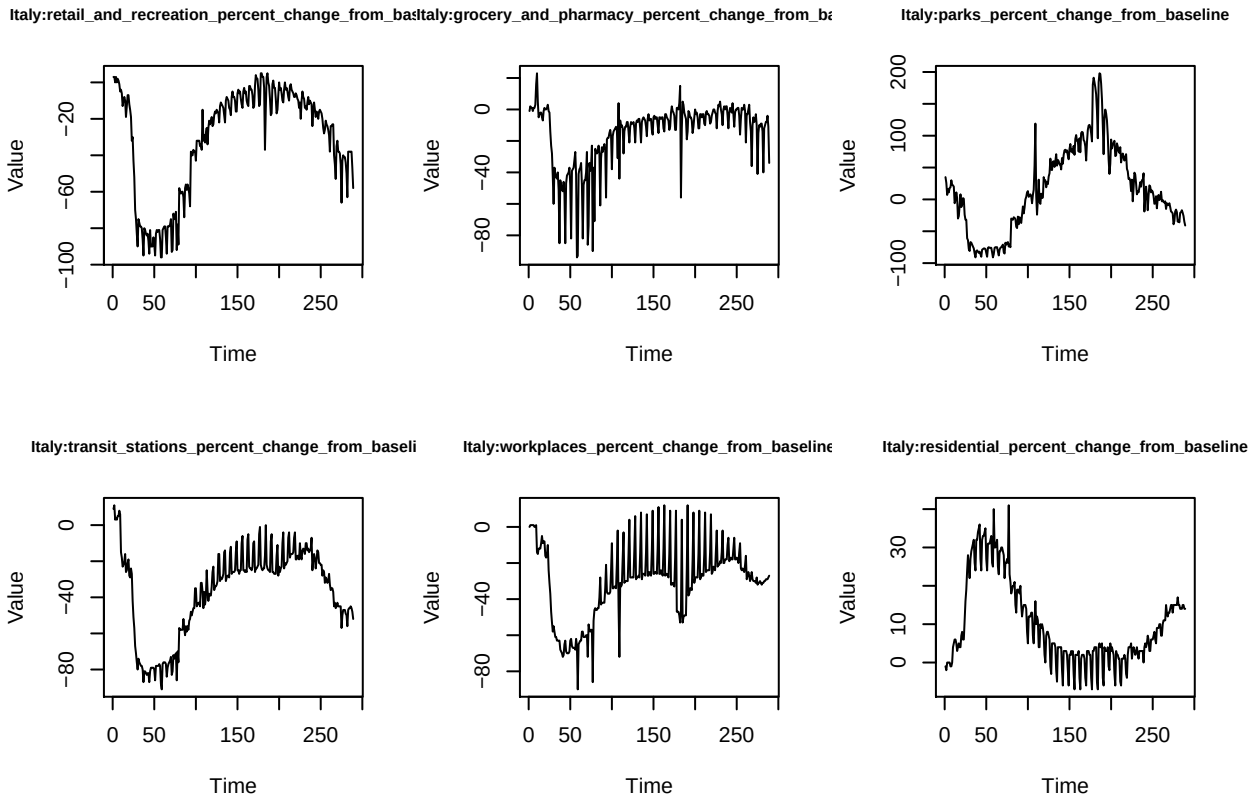
−50
10
30


Italy:retail_and_recreation_percent_change_from_ba
Italy:grocery_and_pharmacy_percent_change_from_ba
Italy:parks_percent_change_from_baseline
Italy:transit_stations_percent_change_from_baseli
Italy:workplaces_percent_change_from_baseline
Italy:residential_percent_change_from_baseline
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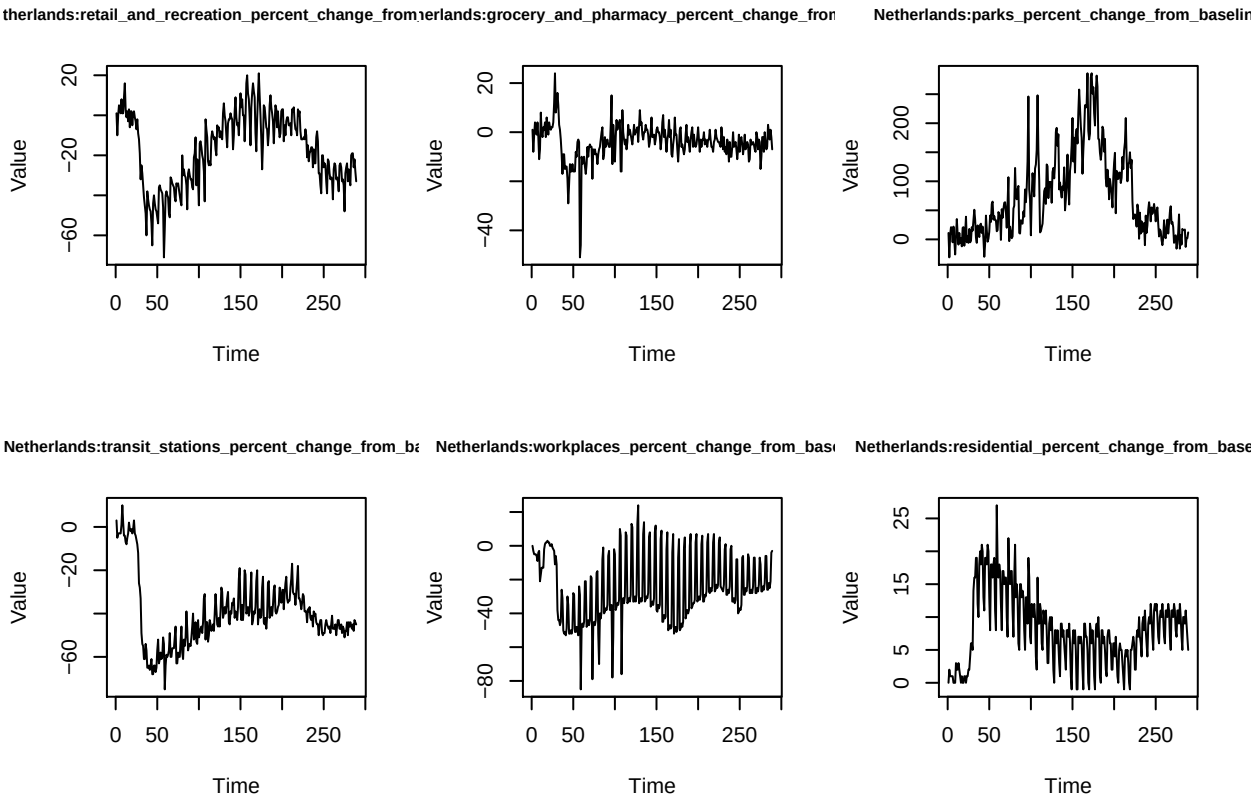
therlands:retail_and_recreation_percent_change_from
erlands:grocery_and_pharmacy_percent_change_fro
Netherlands:parks_percent_change_from_baselir
Netherlands:transit_stations_percent_change_from_ba
Netherlands:workplaces_percent_change_from_bas
Netherlands:residential_percent_change_from_base
Value
Time
0
50
150
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−20
20
−40
0
100
200
−80
5
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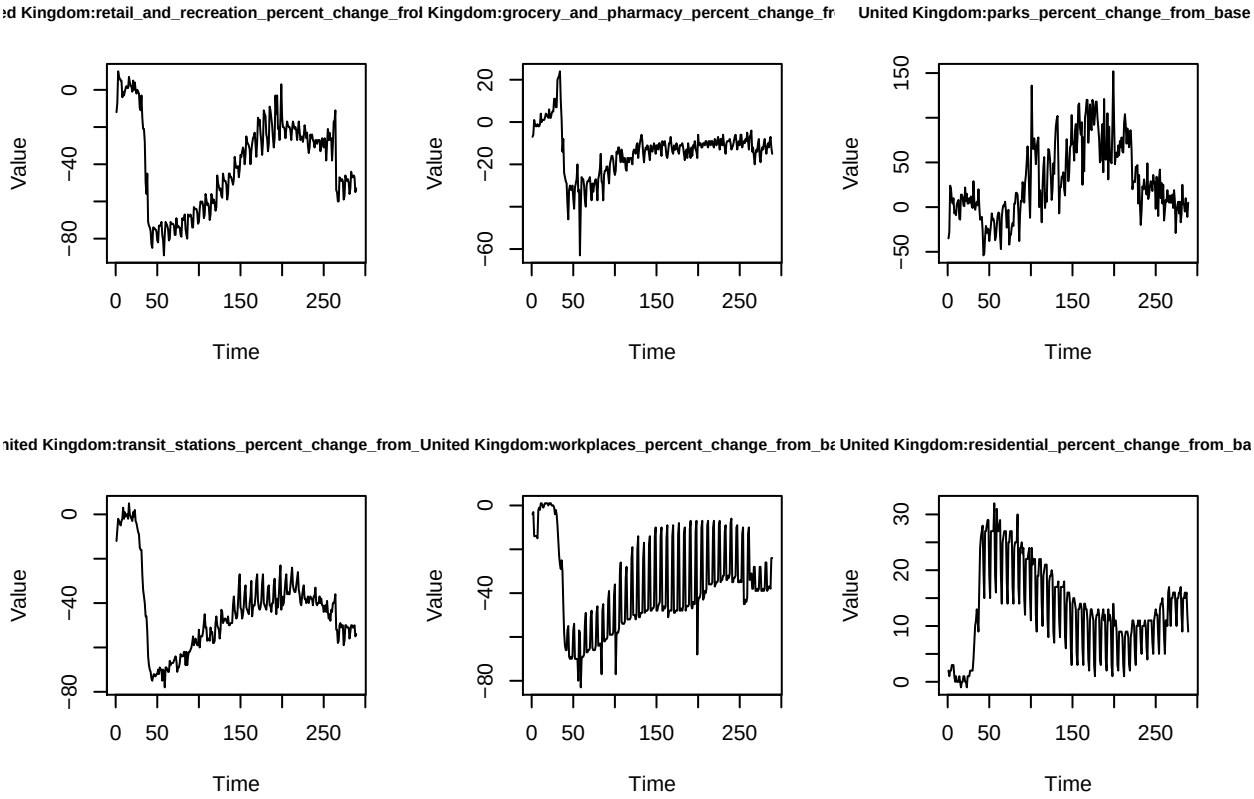
ed Kingdom:retail_and_recreation_percent_change_fro
Kingdom:grocery_and_pharmacy_percent_change_fr
United Kingdom:parks_percent_change_from_base
Value
Time
0
50
150
250
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−60
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20
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150
nited Kingdom:transit_stations_percent_change_from_
United Kingdom:workplaces_percent_change_from_ba
United Kingdom:residential_percent_change_from_ba
10
30