Tile map to show demographic transition in South East Asia

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This is a reproducible example to produce a tile map that shows demographic transition (with birth rates and death rates) in the South East Asia region. We use the `grids.R` script to load custom grids to align the tiles corresponding to each country's graph. These are all region based and we will be using the `sea_grid` grid for the plot produced in this analysis.

Libraries

```
library(tidyverse)
library(geofacet)
library(kani)

source("../grids.R")
options(scipen = 99)
```

Note: I have used a library called `kani` which has some theme aesthetics for plotting. It can be installed by using `devtools::install_github("kanishkamisra/kani")` in your R console.

Data import

We use data from that contains aggregated birth and death rates (5 years aggregation) from 1950-1955 to 2010-2015

```
birth_rates <- read_csv("Birth_rates.csv")
death_rates <- read_csv("Death_rates.csv")

birth_rates <- birth_rates %>%
  gather(`1950-1955`:`2010-2015`, key = "year", value = "birth_rate")

death_rates <- death_rates %>%
  gather(`1950-1955`:`2010-2015`, key = "year", value = "death_rate")

demographic_transition <- birth_rates %>%
  inner_join(death_rates)

demographic_transition
```

```
## # A tibble: 3,133 x 5
##    Country                              `Country ~ year     birth_~ death_~
##    <chr>                                     <int> <chr>      <dbl>   <dbl>
##  1 WORLD                                       900 1950-19~    36.9    19.1
##  2 More developed regions                      901 1950-19~    22.3    10.6
##  3 Less developed regions                      902 1950-19~    43.6    23.0
##  4 Least developed countries                   941 1950-19~    48.3    28.1
##  5 Less developed regions, excluding ~         934 1950-19~    43.0    22.4
```

```
##  6 Less developed regions, excluding ~        948 1950-19~    44.4    23.4
##  7 High-income countries                     1503 1950-19~    22.5    10.6
##  8 Middle-income countries                   1517 1950-19~    41.6    21.6
##  9 Upper-middle-income countries             1502 1950-19~    40.1    19.4
## 10 Lower-middle-income countries             1501 1950-19~    43.4    24.3
## # ... with 3,123 more rows
```

Wrangling

Since the years are formatted in 5 year intervals, we use the year at the mid point, rounded to the next whole number to indicate year (makes it easy to add labels to axis). For example, 1952.5 becomes 1953 for 1950-1955

```
get_year <- function(years) {
  return(ceiling(mean(as.numeric(str_split(years, "-")[[1]]))))
}

demographic_transition <- demographic_transition %>%
  mutate(
    year = map_dbl(year, get_year)
  )

demographic_transition
```

```
## # A tibble: 3,133 x 5
##    Country                                `Country c~  year birth_~ death_~
##    <chr>                                        <int> <dbl>   <dbl>   <dbl>
##  1 WORLD                                          900  1953    36.9    19.1
##  2 More developed regions                         901  1953    22.3    10.6
##  3 Less developed regions                         902  1953    43.6    23.0
##  4 Least developed countries                      941  1953    48.3    28.1
##  5 Less developed regions, excluding le~          934  1953    43.0    22.4
##  6 Less developed regions, excluding Ch~          948  1953    44.4    23.4
##  7 High-income countries                         1503  1953    22.5    10.6
##  8 Middle-income countries                       1517  1953    41.6    21.6
##  9 Upper-middle-income countries                 1502  1953    40.1    19.4
## 10 Lower-middle-income countries                 1501  1953    43.4    24.3
## # ... with 3,123 more rows
```

Plotting demographic transition for one country

We can take the example of Thailand's birth and death rates as an example to show demographic transition in the country.

```
thailand_dt <- demographic_transition %>%
  filter(Country == "Thailand") %>%
  gather(birth_rate:death_rate, key = "Trend", value = "Rate") %>%
  mutate(Trend = str_to_title(str_replace(Trend, "_", " "))) %>%
  ggplot(aes(year, Rate, color = Trend, group = Trend)) +
  geom_line(size = 1) +
  geom_hline(yintercept = 0, size = 1) +
  scale_x_continuous(breaks = seq(1950, 2010, by = 10)) +
  theme_kani() +
```

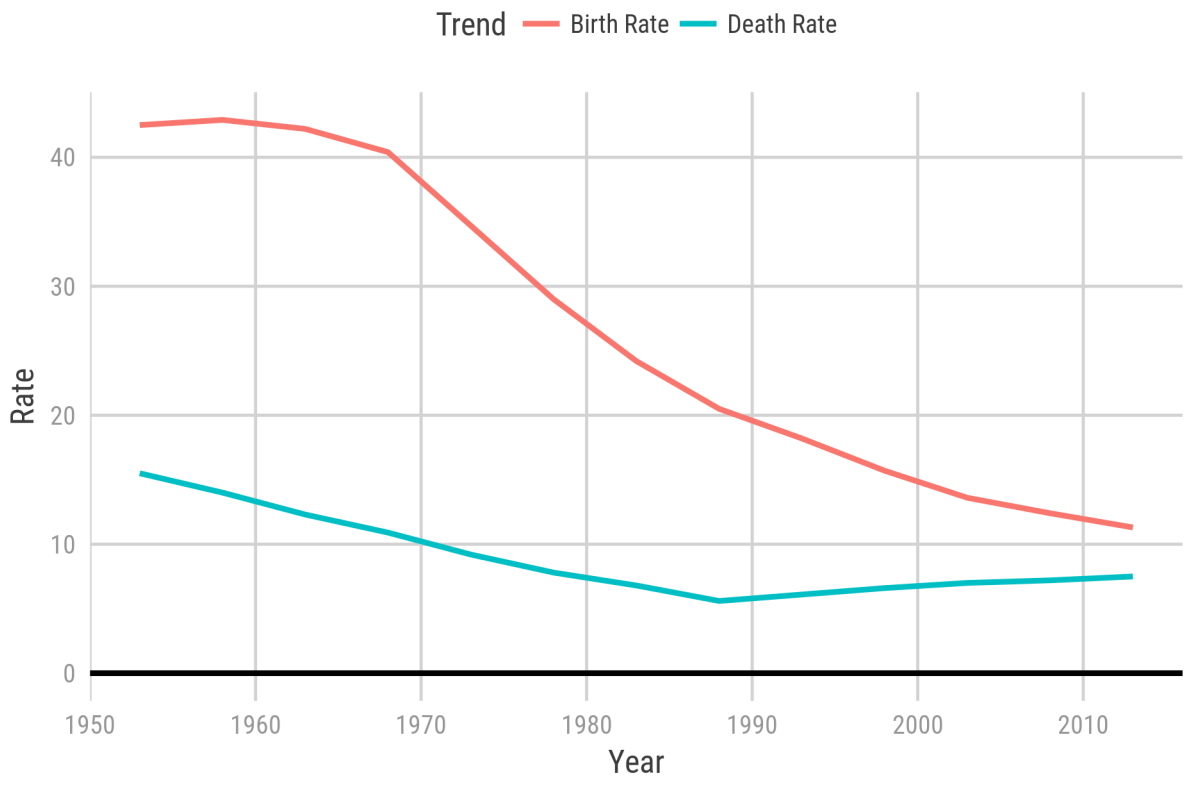

Figure 1: Demographic Transition in Thailand - Birth and Death Rates from 1950-2015

```
  theme(
    legend.position = "top",
    plot.background = element_rect(fill = "white"),
    panel.background = element_rect(fill = "white"),
    legend.background = element_rect(fill = "white"),
    legend.key = element_rect(fill = "white"),
    strip.background = element_rect(fill = "white"),
    strip.text.x = element_text(face = "bold")
  ) +
  labs(
    x = "Year"
  )

ggsave("thailand_dt.png", thailand_dt)
```

Plotting Demographic Transition in SEA

We now use the `geofacet` package to plot birth and death rates in the South East Asia region. The `sea_grid` in `grids.R` helps us make a grid for the region which can fit any static, 2D plot as tiles that represent countries in SEA.

```
regional_plot <- function(region_grid) {
  plot <- demographic_transition %>%
    filter(Country %in% region_grid$name) %>%
    gather(birth_rate:death_rate, key = "Trend", value = "Rate") %>%
    mutate(Trend = str_to_title(str_replace(Trend, "_", " "))) %>%
    ggplot(aes(year, Rate, color = Trend, group = Trend)) +
    geom_line(size = 1) +
    geom_hline(yintercept = 0, size = 1) +
    facet_geo(~Country, grid = region_grid, label = "code") +
    scale_x_continuous(breaks = seq(1950, 2010, by = 20), limits = c(1950, 2015)) +
    theme_kani() +
    theme(
      legend.position = "top",
      plot.background = element_rect(fill = "white"),
      panel.background = element_rect(fill = "white"),
      legend.background = element_rect(fill = "white"),
      legend.key = element_rect(fill = "white"),
      strip.background = element_rect(fill = "white"),
      strip.text.x = element_text(face = "bold")
    )

  return(plot)
}

ggsave("sea_dt.png", regional_plot(sea_grid), height = 11, width = 9)
```

This produces the plot:

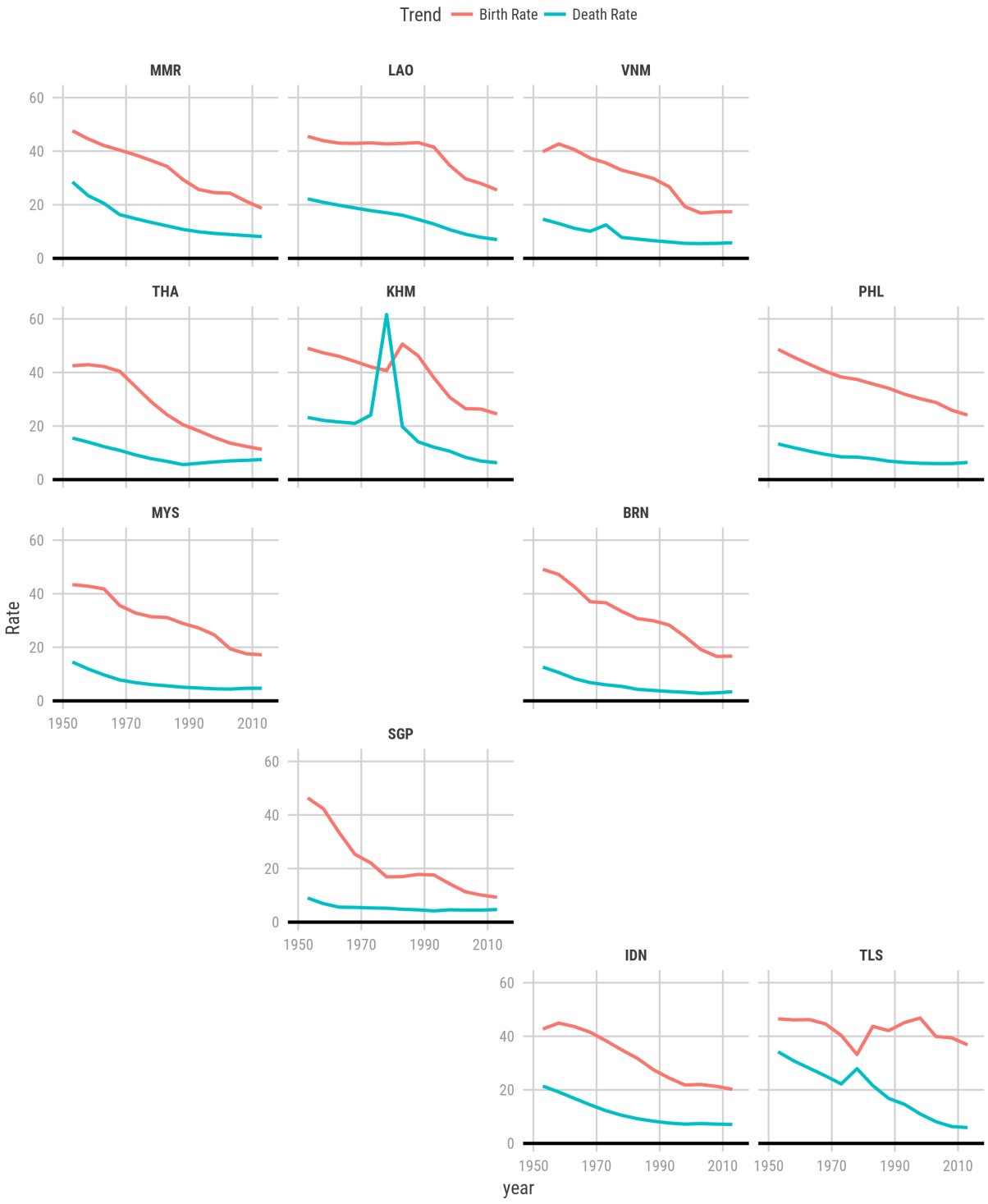

Figure 2: Demographic Transition in SEA - Birth and Death Rates from 1950-2015