Tile map to show demographic transition in South East Asia from 1950 to 2015

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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
##                                                      <chr>
##  1                                                   WORLD
##  2                                  More developed regions
##  3                                  Less developed regions
##  4                               Least developed countries
##  5 Less developed regions, excluding least developed countries
```

```
##  6                     Less developed regions, excluding China
##  7                                       High-income countries
##  8                                     Middle-income countries
##  9                                 Upper-middle-income countries
## 10                                 Lower-middle-income countries
## # ... with 3,123 more rows, and 4 more variables: `Country code` <int>,
## #   year <chr>, birth_rate <dbl>, death_rate <dbl>
```

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
##                                                         <chr>
##  1                                                      WORLD
##  2                                   More developed regions
##  3                                   Less developed regions
##  4                                 Least developed countries
##  5 Less developed regions, excluding least developed countries
##  6                     Less developed regions, excluding China
##  7                                       High-income countries
##  8                                     Middle-income countries
##  9                                 Upper-middle-income countries
## 10                                 Lower-middle-income countries
## # ... with 3,123 more rows, and 4 more variables: `Country code` <int>,
## #   year <dbl>, birth_rate <dbl>, death_rate <dbl>
```

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) +
```

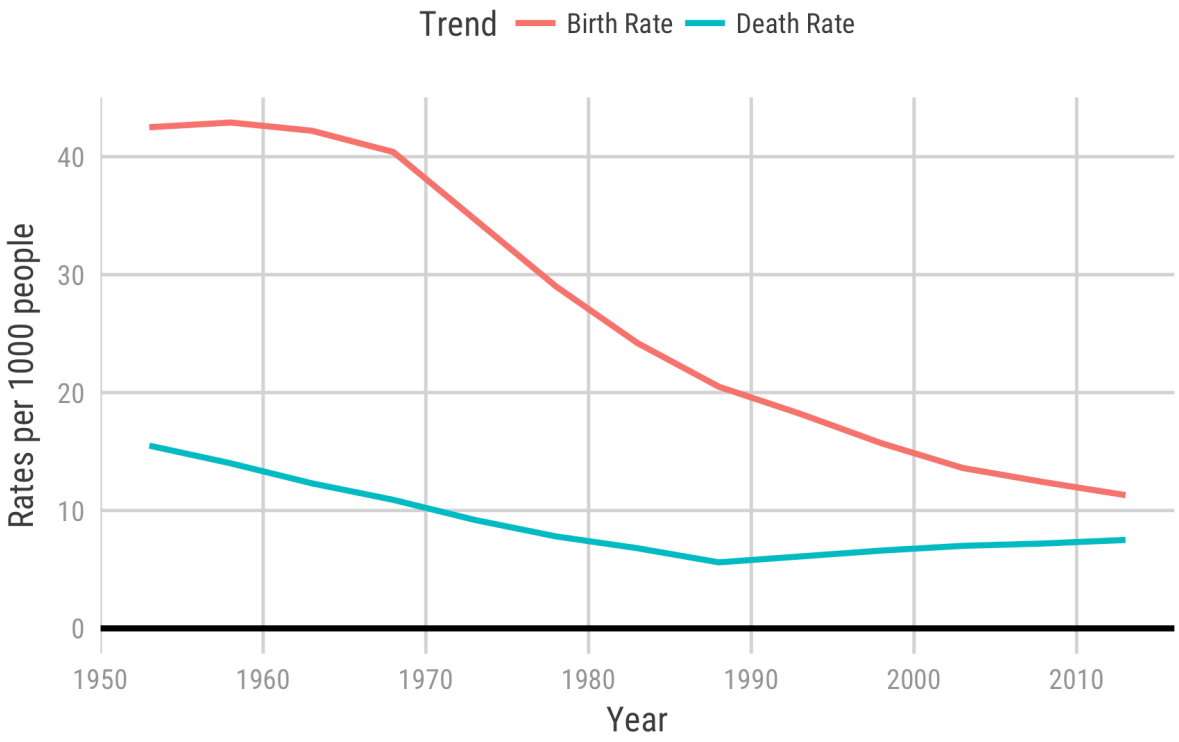

Figure 1: Demographic Transition in Thailand - Birth and Death Rates from 1950-2015

```
  scale_x_continuous(breaks = seq(1950, 2010, by = 10)) +
  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")
  ) +
  labs(
    y = "Rates per 1000 people",
    x = "Year"
  )

ggsave("thailand_dt.png", thailand_dt, height = 4, width = 6)
```

South East Asia grid data

The `sea_grid` in `grids.R` helps us make a grid to represent plots for countries in SEA. We use the `grid_design()` function to design the grid this function call opens a new window where the following values can be added in a comma separated format.

name	code	row	col
Lao People's Democratic Republic	LAO	1	2
Myanmar	MMR	1	1
Viet Nam	VNM	1	3
Thailand	THA	2	1
Cambodia	KHM	2	2
Philippines	PHL	2	4
Brunei Darussalam	BRN	3	3
Malaysia	MYS	3	1
Singapore	SGP	4	2
Timor-Leste	TLS	5	4
Indonesia	IDN	5	3

Grid Preview

```
grid_prev <- grid_preview(sea_grid) + theme_minimal()
ggsave("sea_grid.png", grid_prev, height = 4, width = 6)
```

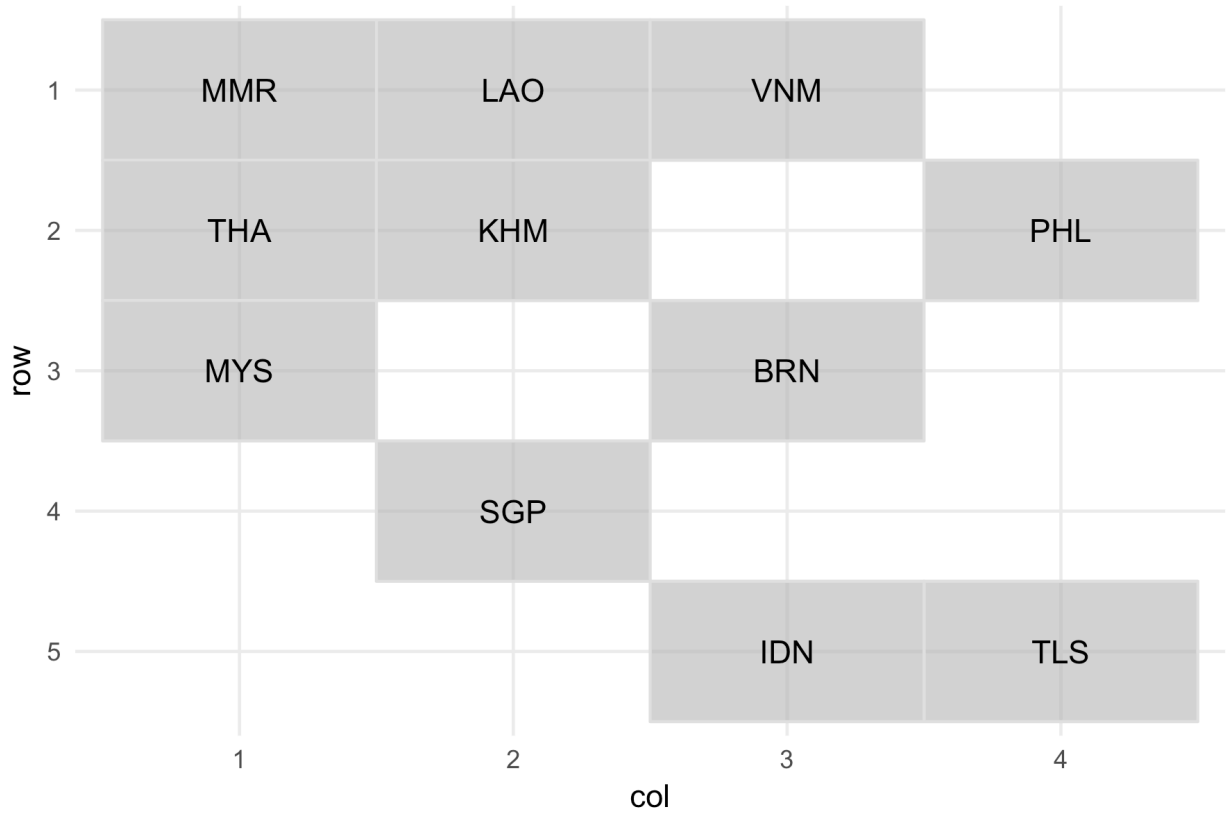

Figure 2: Countries shown as tiles in the SEA grid

Plotting Demographic Transition in SEA

We now use the `geofacet` package to plot birth and death rates in the South East Asia region as defined by `sea_grid`.

```
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")
    ) +
    labs(
      y = "Rates per 1000 people",
      x = "Year"
    )

  return(plot)
}

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

This produces the plot:

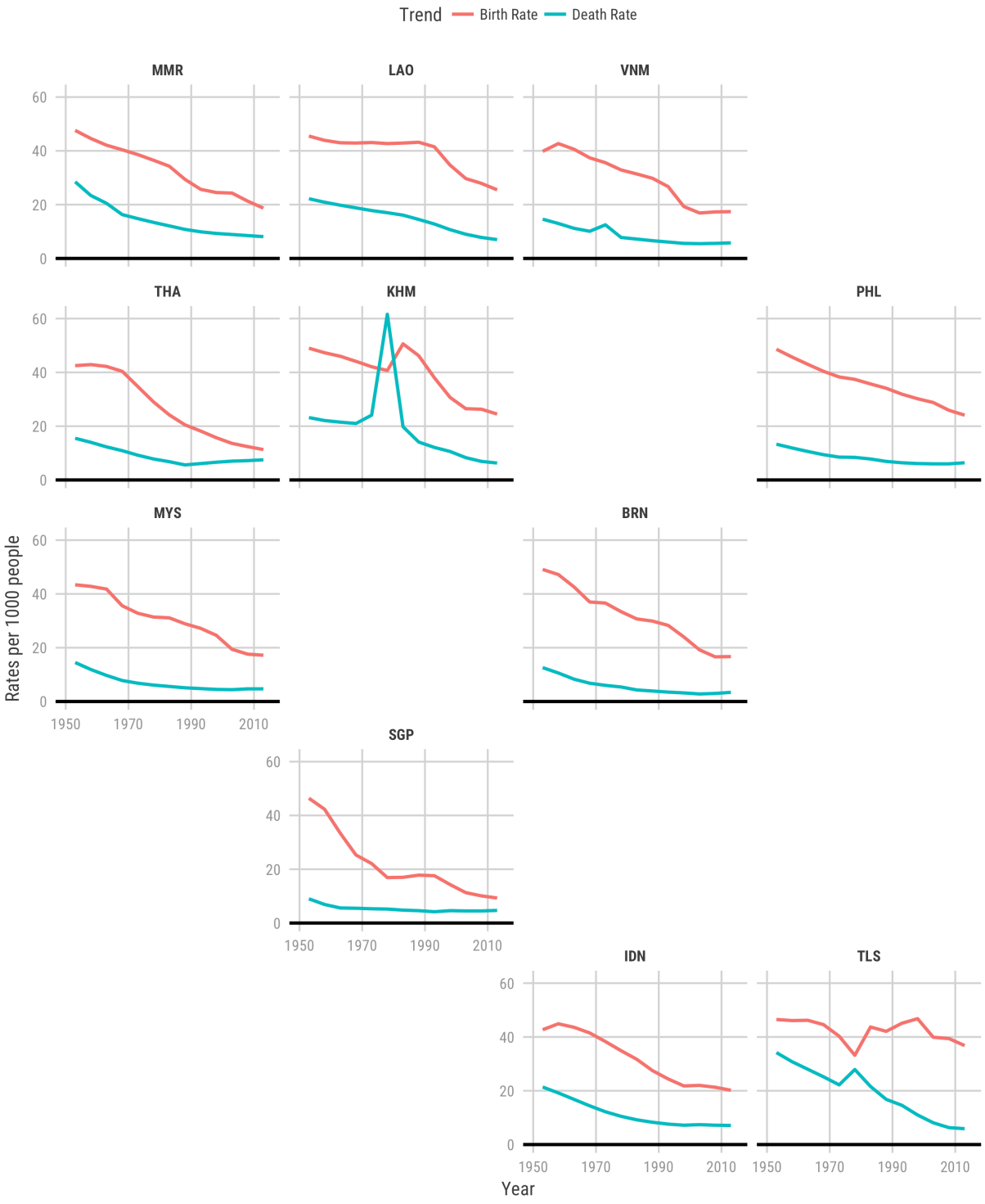

Figure 3: Demographic Transition in SEA - Birth and Death Rates from 1950-2015