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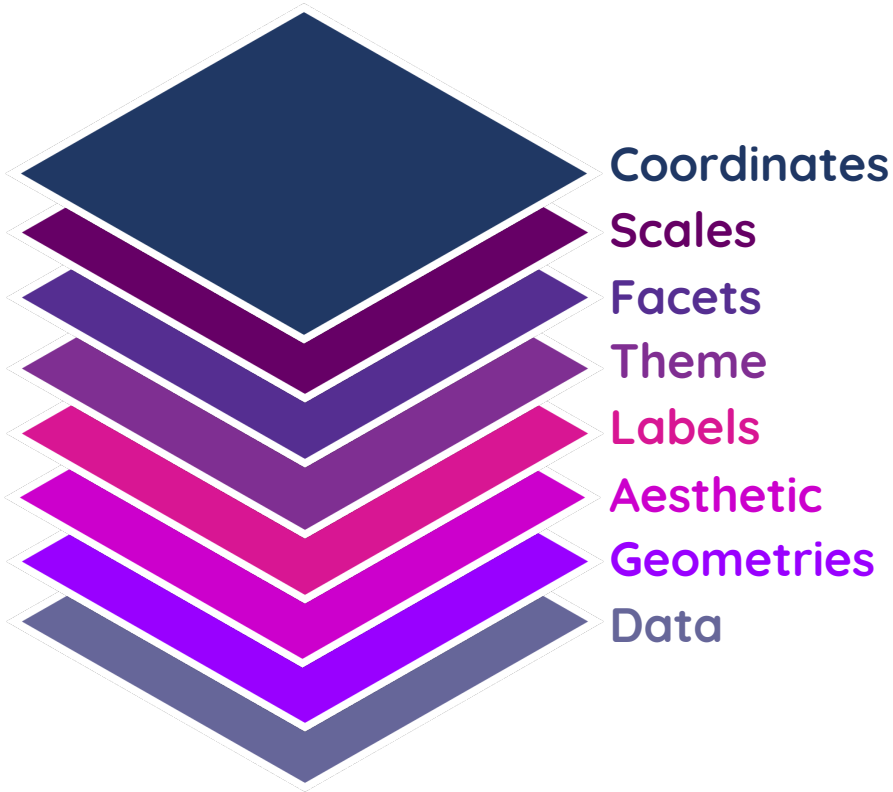
Customizing Graphics –

ggplot2 tuneup

University of St Andrews | School of Geography and Sustainable Development

Plotting in Layers



WorldBank: https://www.youtube.com/watch?v=LYIvh0oATeU

Customising your graphics

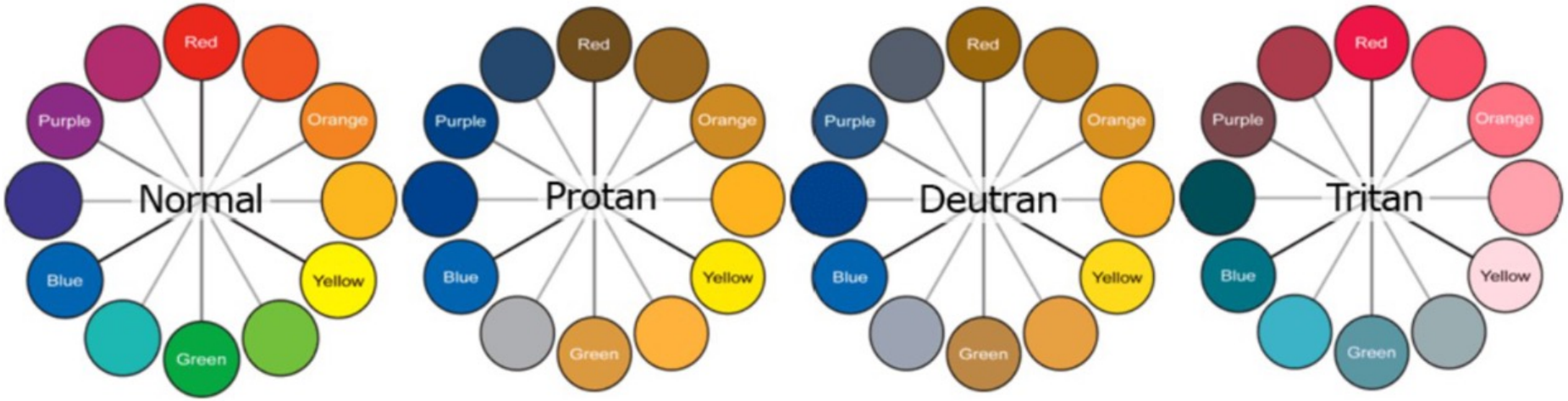
Fonts: Size matters


```
library (showtext)
library (extrafont)

font_add_google("Barlow
Condensed", regular.wt = 200,
family = "barlow")

font_add_google("Special
Elite", family = "special")

font_add_google("Alegreya SC",
family = "alegreya_sc")

showtext_auto()
```

Image source: https://www.appletoncreative.com/

Customising your graphics

Colors: Use them to your advantage (1/4)



Red weakness

8% of men
0.5% of women
are affected

Green weakness

Blue/Yellow weakness

Image source: https://theiagd.org/color-vision-deficiency-cvd/

Customising your graphics

Colors: Use them to your advantage (2/4)

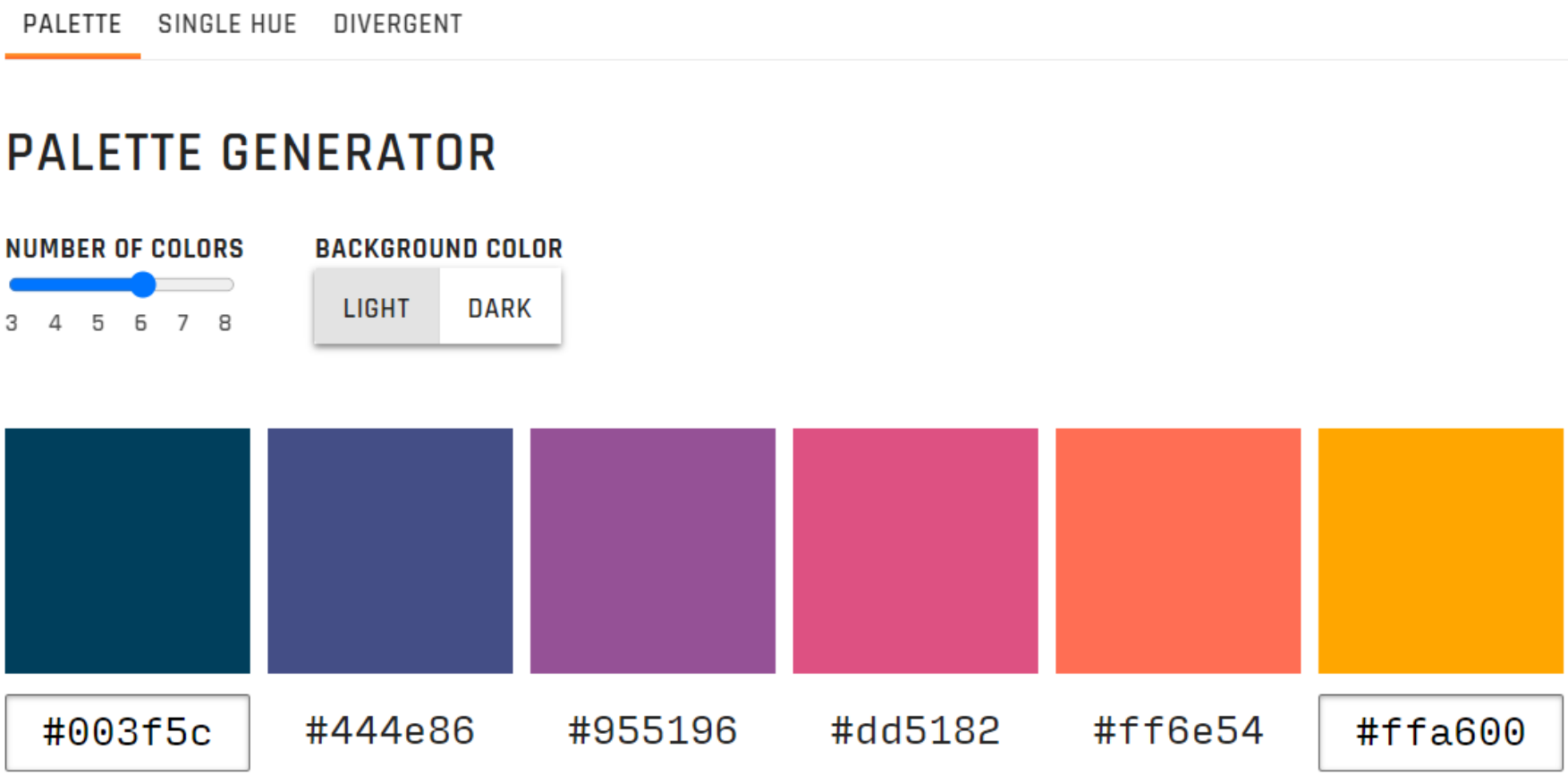


Image source: https://www.learnui.design/tools/data-color-picker.html/

Customising your graphics

Colors: Use them to your advantage (3/4)

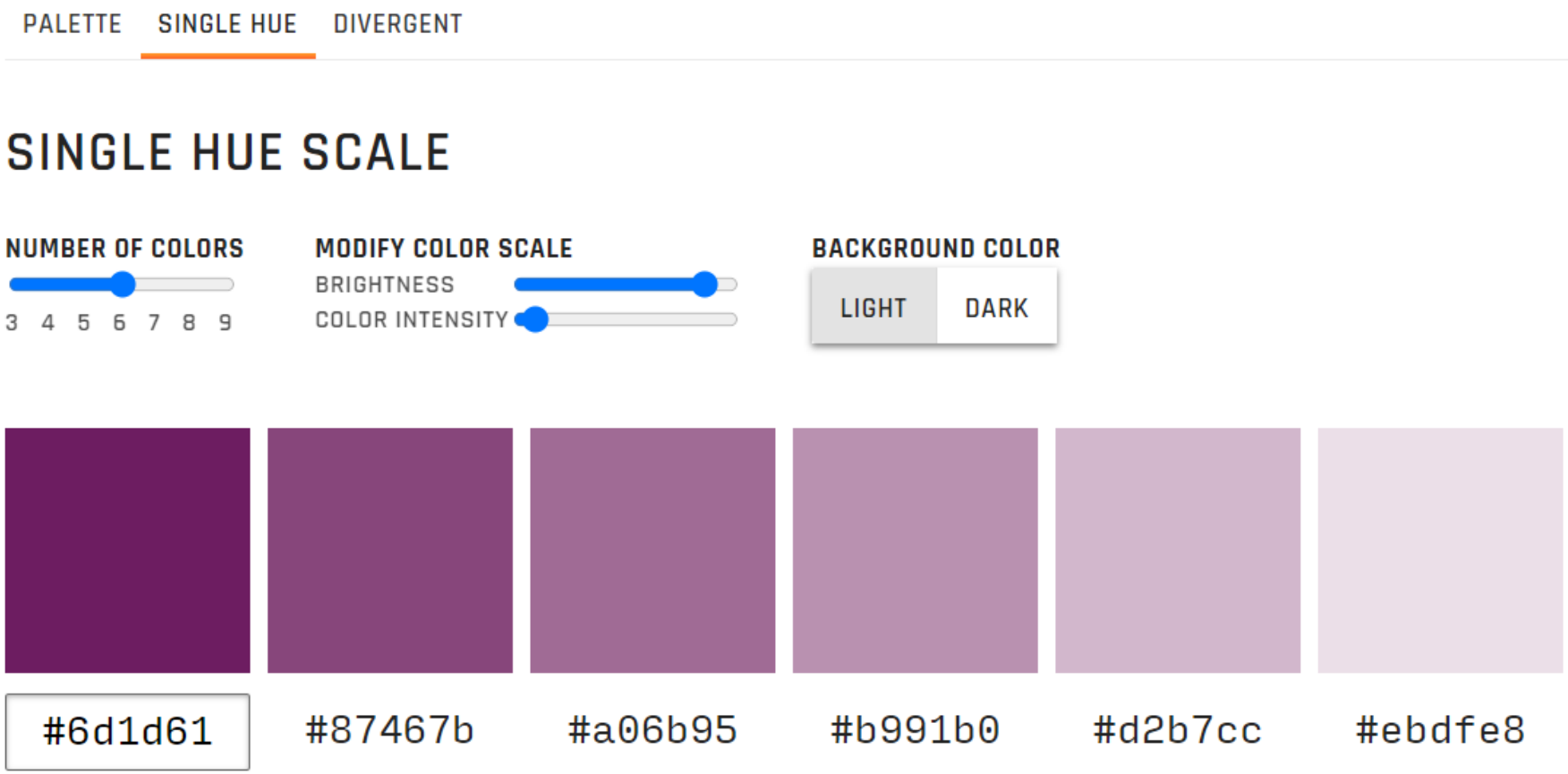
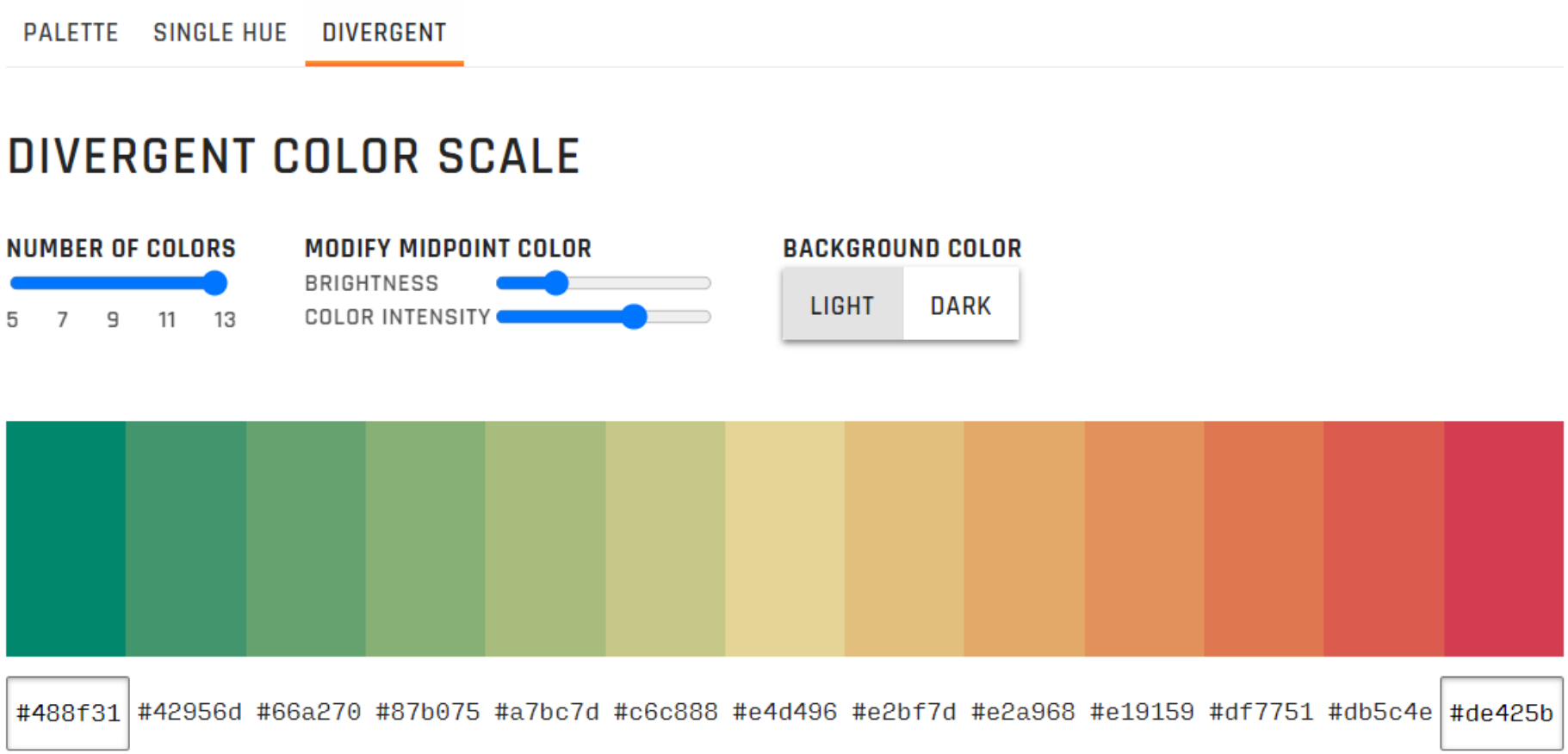


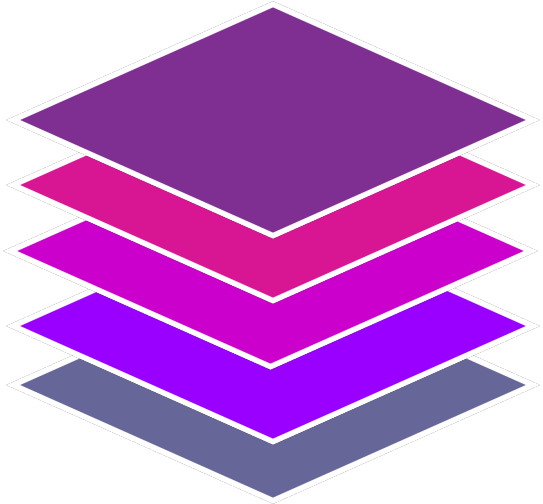
Image source: https://www.learnui.design/tools/data-color-picker.html/

Customising your graphics

Colors: Use them to your advantage (4/4)



Mapping: Data → Aesthetics → Graphics (in R)



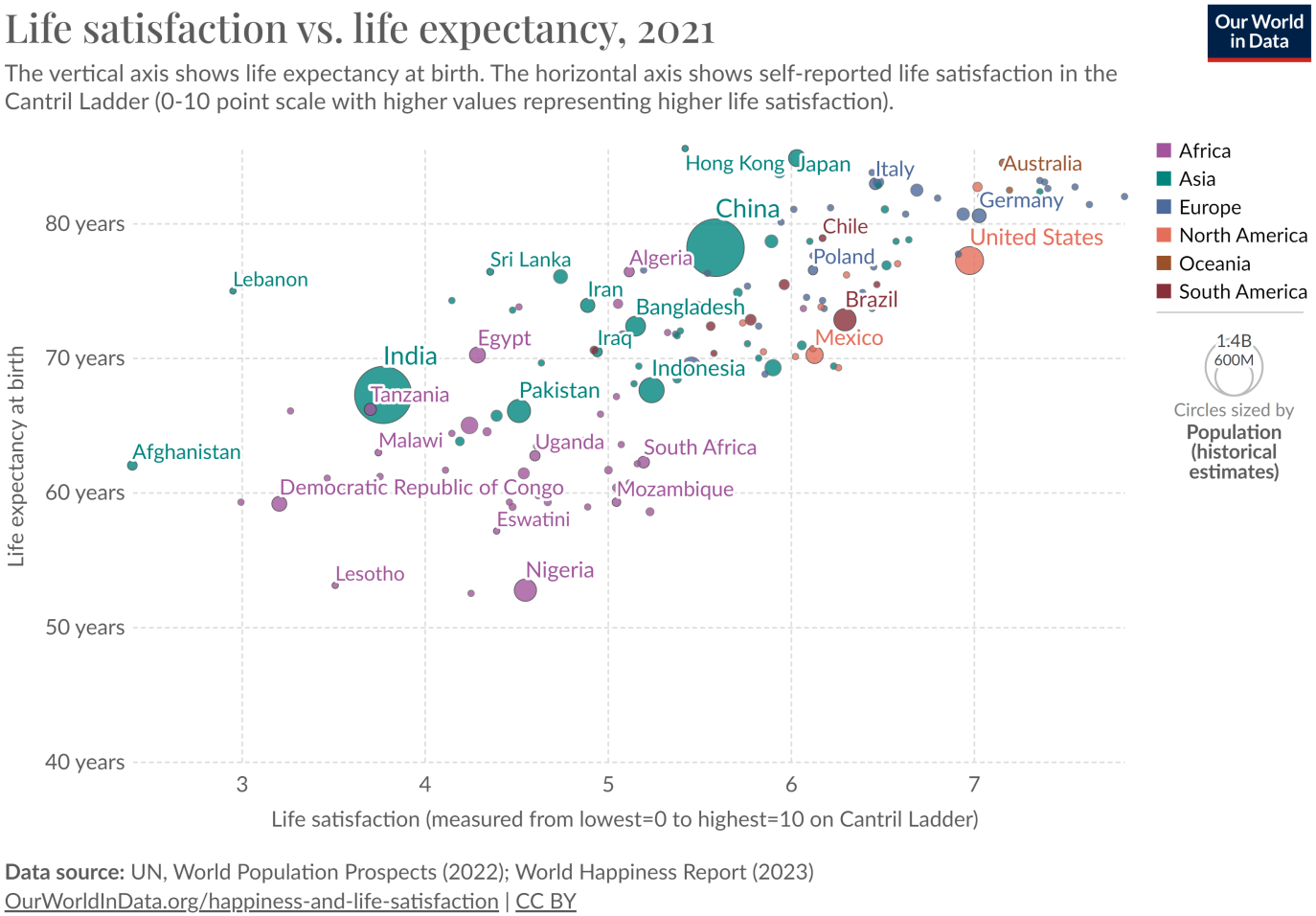

```
install.packages("ggplot")
library(ggplot)

Data %>% ggplot () +
geom_* (mapping = aes()) +
labs () +
theme_* ()
```

- theme_bw()
- theme_minimal()
- theme_light()
- theme_dark()
- theme_gray()
- theme_classic()

READ MORE: https://ourworldindata.org/grapher/unadjusted-gender-wage-gap-including-unemployed

Customising your graphics

theme(): Style It Right, Shine Bright (1/2)



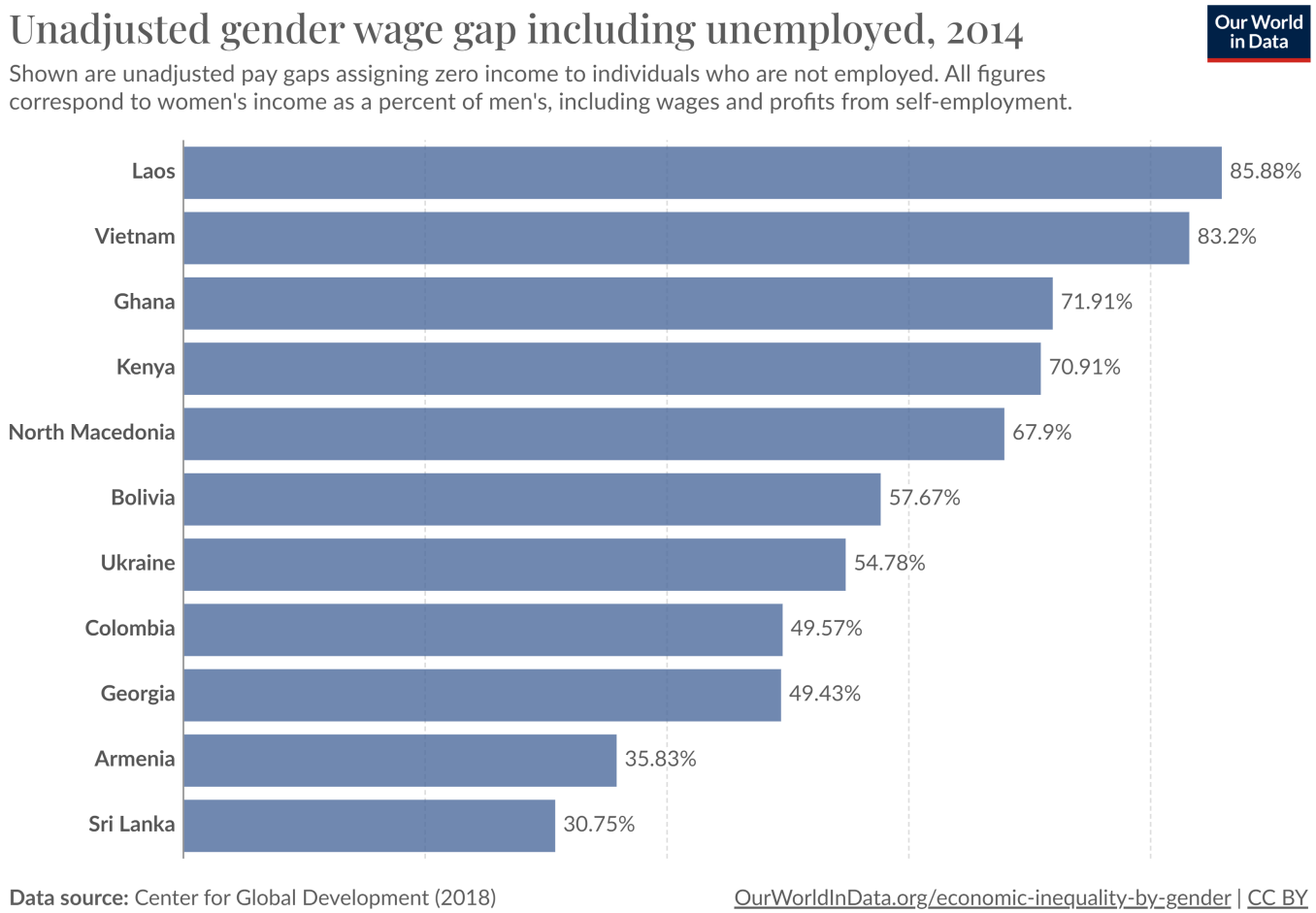
Data source: UN, World Population Prospects (2022); World Happiness Report (2023)
OurWorldInData.org/happiness-and-life-satisfaction | CC BY

- *Plot title text:* `plot.title`
- *Plot sub-title text:* `plot.subtitle`
- *Plot caption:* `plot.caption`
- *Axis-title:* `axis.title`
- *Axis-text:* `axis.text`
- *Axis-ticks:* `axis.ticks`
- *Panel grid lines:* `panel.grid`
- *Panel background:* `panel.background`
- *Legend text:* `legend.text`
- *Legend key size:* `legend.key.size`

READ MORE: https://ourworldindata.org/grapher/life-satisfaction-vs-life-expectancy?time=2021

Customising your graphics

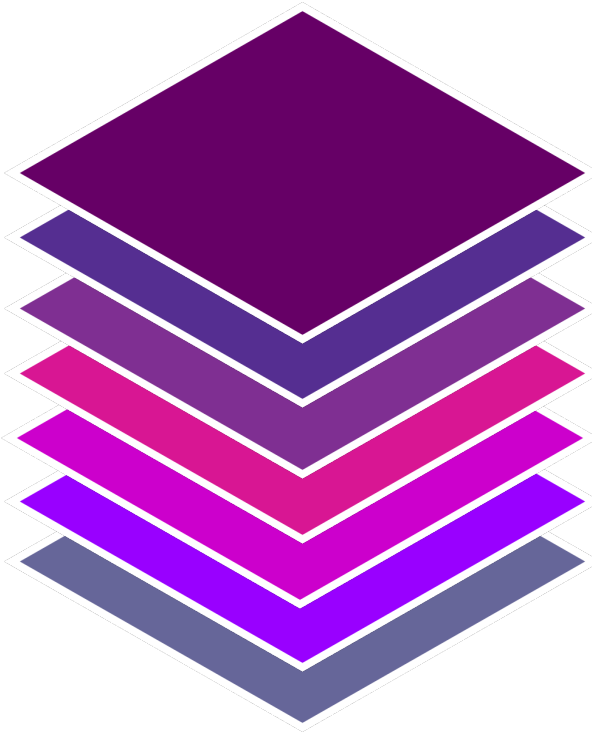
theme(): Style It Right, Shine Bright (2/2)



- *Plot title text:* `plot.title`
- *Plot sub-title text:* `plot.subtitle`
- *Plot caption:* `plot.caption`
- *Axis-title:* `axis.title`
- *Axis-text:* `axis.text`
- *Axis-ticks:* `axis.ticks`
- *Panel grid lines:* `panel.grid`
- *Panel background:* `panel.background`
- *Legend text:* `legend.text`
- *Legend key size:* `legend.key.size`

READ MORE: https://ourworldindata.org/grapher/unadjusted-gender-wage-gap-including-unemployed

Plotting in Layers – Scales (2/2)



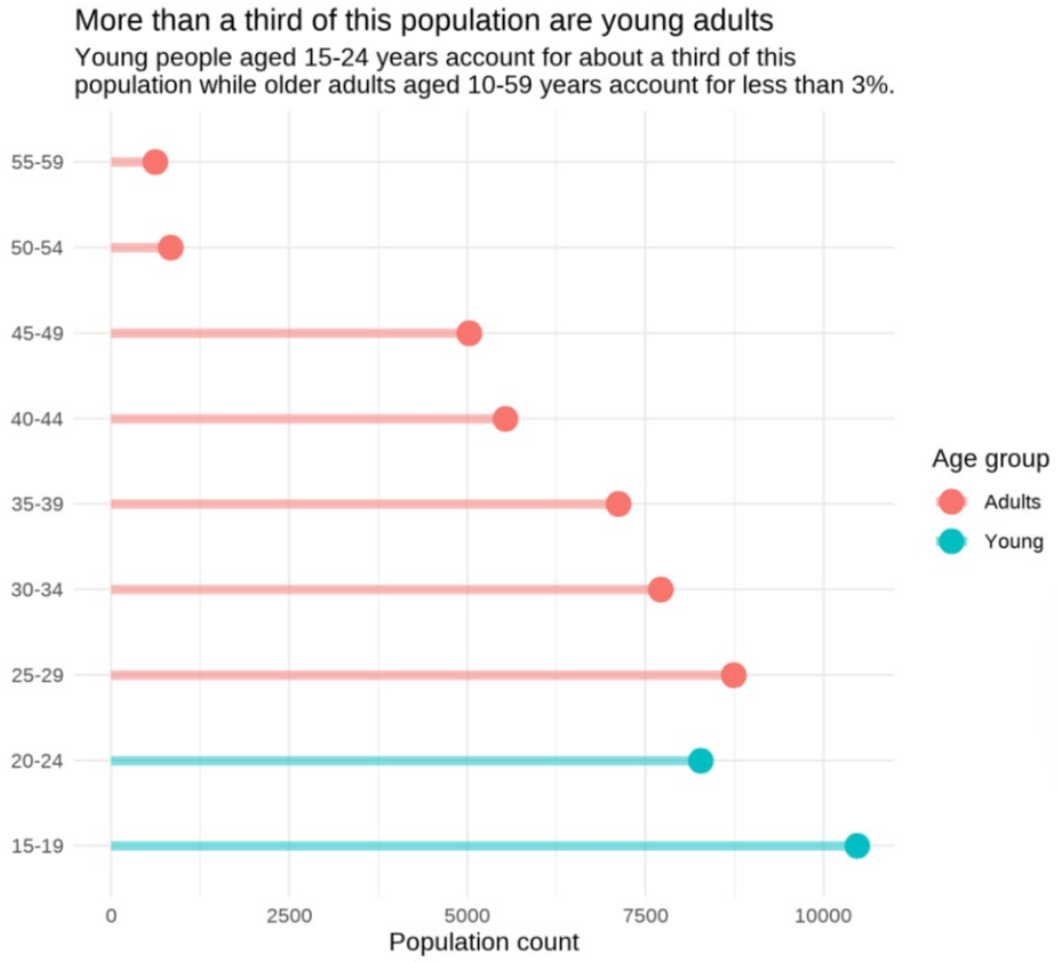

```
install.packages("ggplot")
library(ggplot)

Data %>% ggplot () +
geom_* (mapping = aes()) +
labs () +
theme_* () +
scale_* ()
```

- `scale_x_continuous()`
- `scale_fill_manual()`
- `scale_color_manual()`
- `scale_x_discrete()`

READ MORE: https://ggplot2.tidyverse.org/reference/#scales

Visualising distributions with lollipop plots (1/5): geom_segment ()

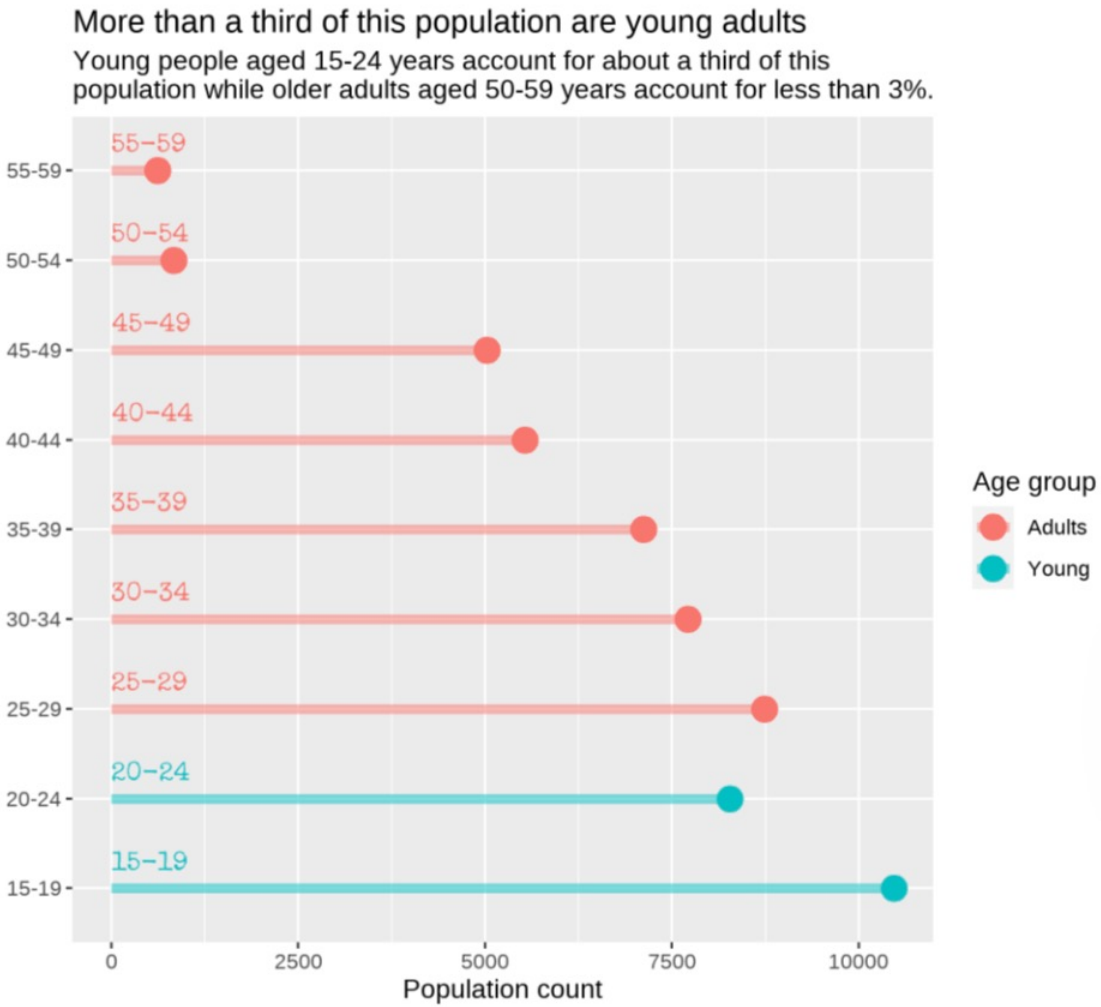
```
new_graph <- study_dta %>%
ggplot () +
geom_point(aes(x = n, y = age_grp,
        color = factor(ifelse((age_grp == "15-19" |
        age_grp == "20-24"), "Young", "Adults"))),
        size = 5) +
geom_segment(aes(y=age_grp,
        yend = age_grp, x=0, xend=n, color =
        factor(ifelse((age_grp == "15-19" | age_grp
        == "20-24"), "Young", "Adults"))),
        size = 2, alpha = 0.5) +
labs (y = "", x = "Population count", color = "Age
        group", title = "More than a third of this
        population are young adults", subtitle =
        "Young people aged 15-24 years account for
        about a third of this \npopulation while
        older adults aged 10-59 years account for
        less than 3%.") + theme_minimal()
```



READ MORE: https://ggplot2.tidyverse.org/

Visualising distributions with lollipop plots (2/5): geom_segment ()

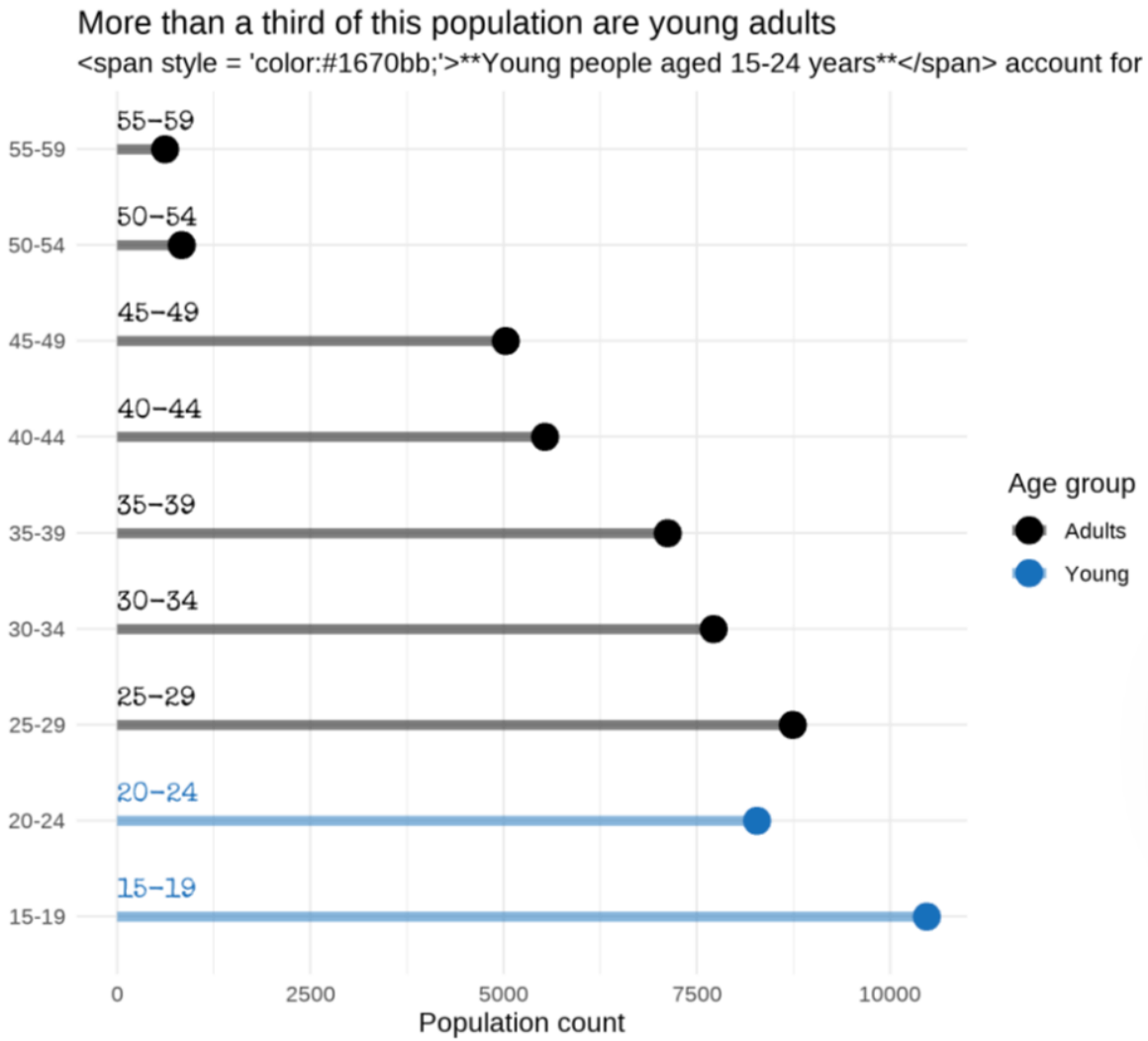
```
new_graph2 <- new_graph +
    geom_text(aes (y = age_grp, x = 0,
    label = age_grp, color =
       factor(ifelse((age_grp == "15-19" |
       age_grp == "20-24"), "Young",
       "Adults"))), vjust = -1, hjust = 0,
    family = "special") + labs (y = "",
    x = "Population count", color = "Age
       group, title = "More than a third of
       this population are young adults",
    subtitle = "Young people aged 15-24
       years account for about a third of
       this \npopulation while older adults
       aged 50-59 years account for less
       than 3%.")
new_graph2
```



READ MORE: https://ggplot2.tidyverse.org/

Visualising distributions with lollipop plots (3/5): geom_segment ()

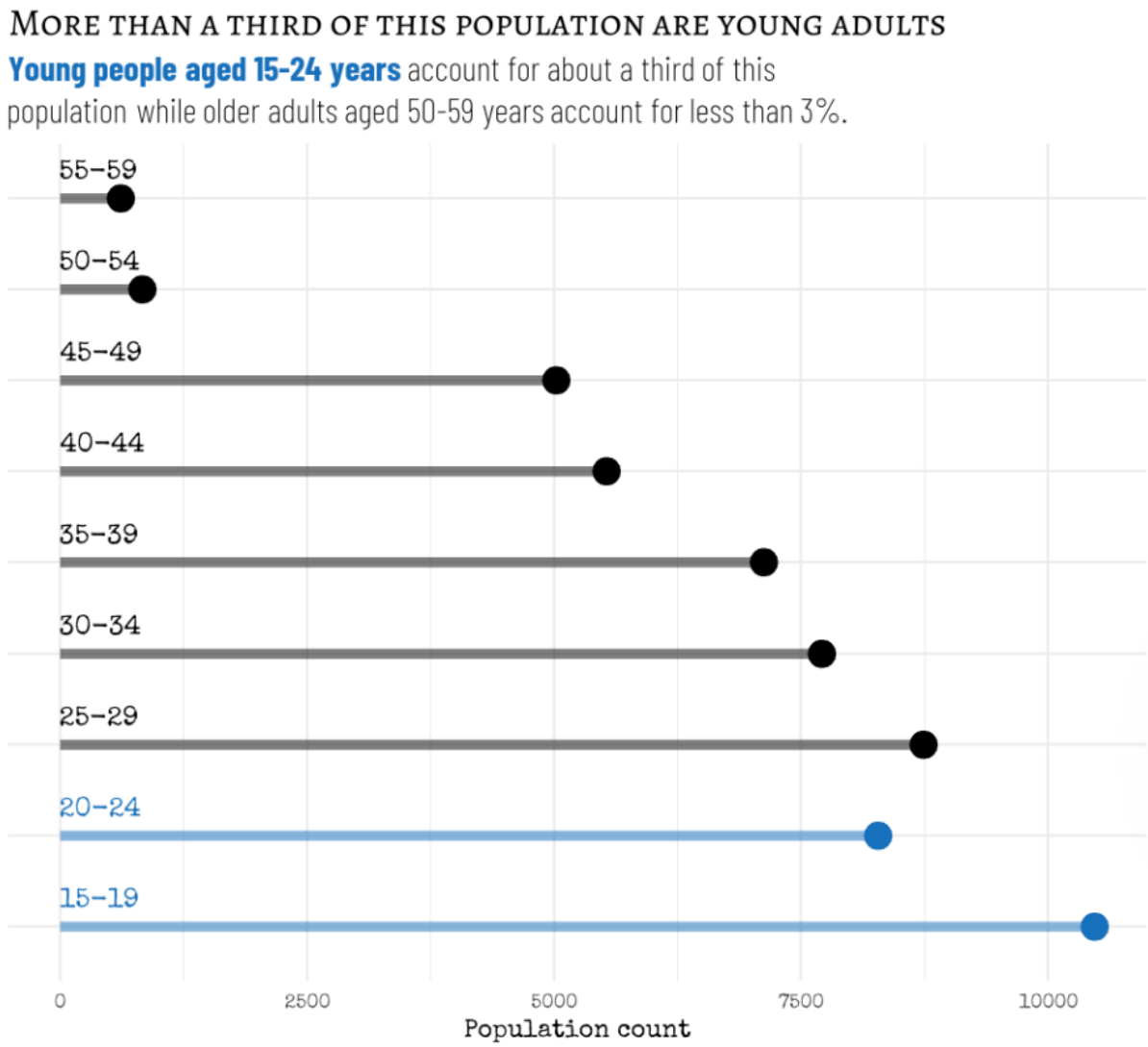
```
new_graph3 <-
       new_graph2 +
         scale_color_manual(values =
           c("#000000", "#1670bb")) +
         theme_minimal()

new_graph3
```



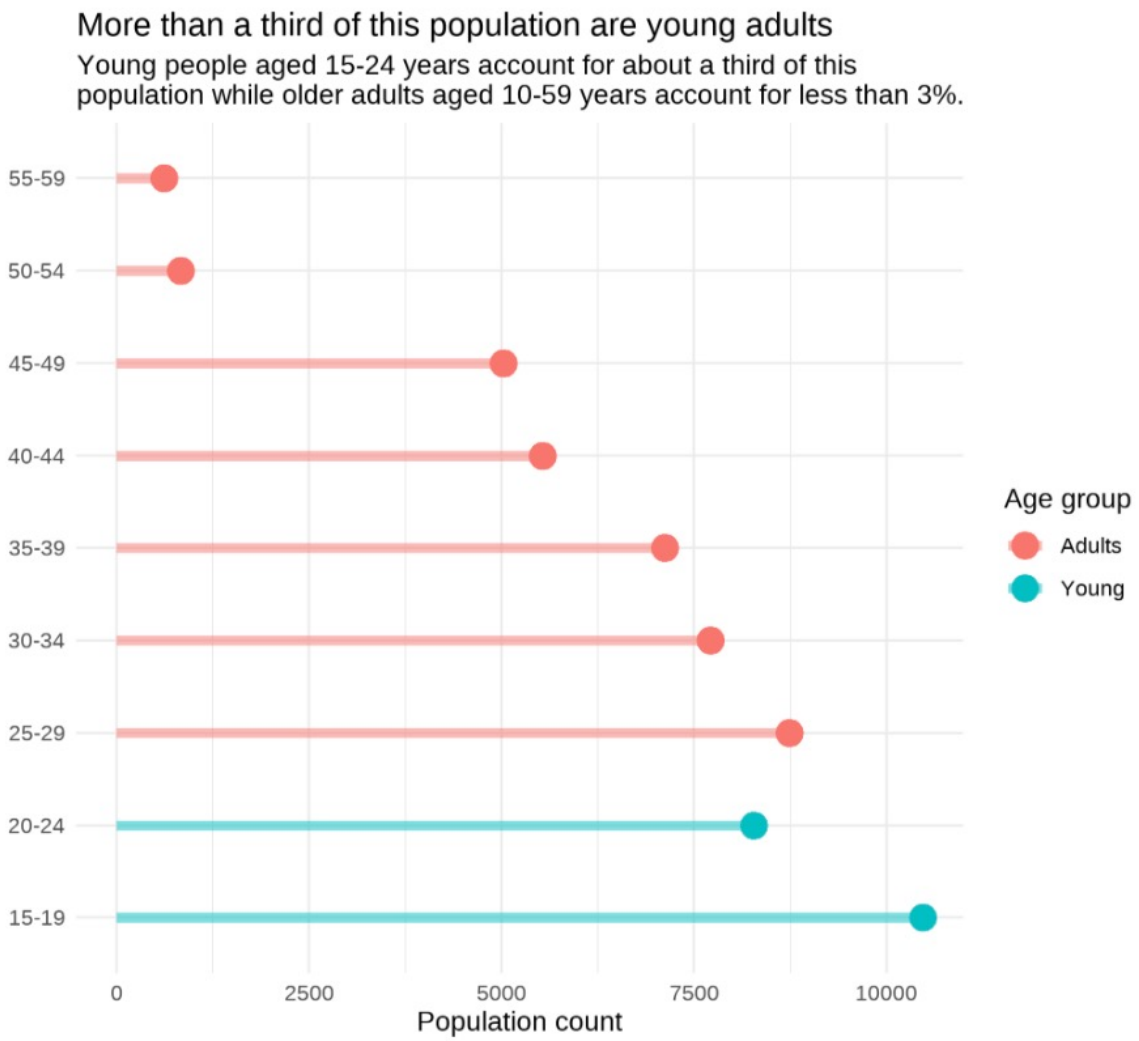
Visualising distributions with lollipop plots (4/5): geom_segment ()

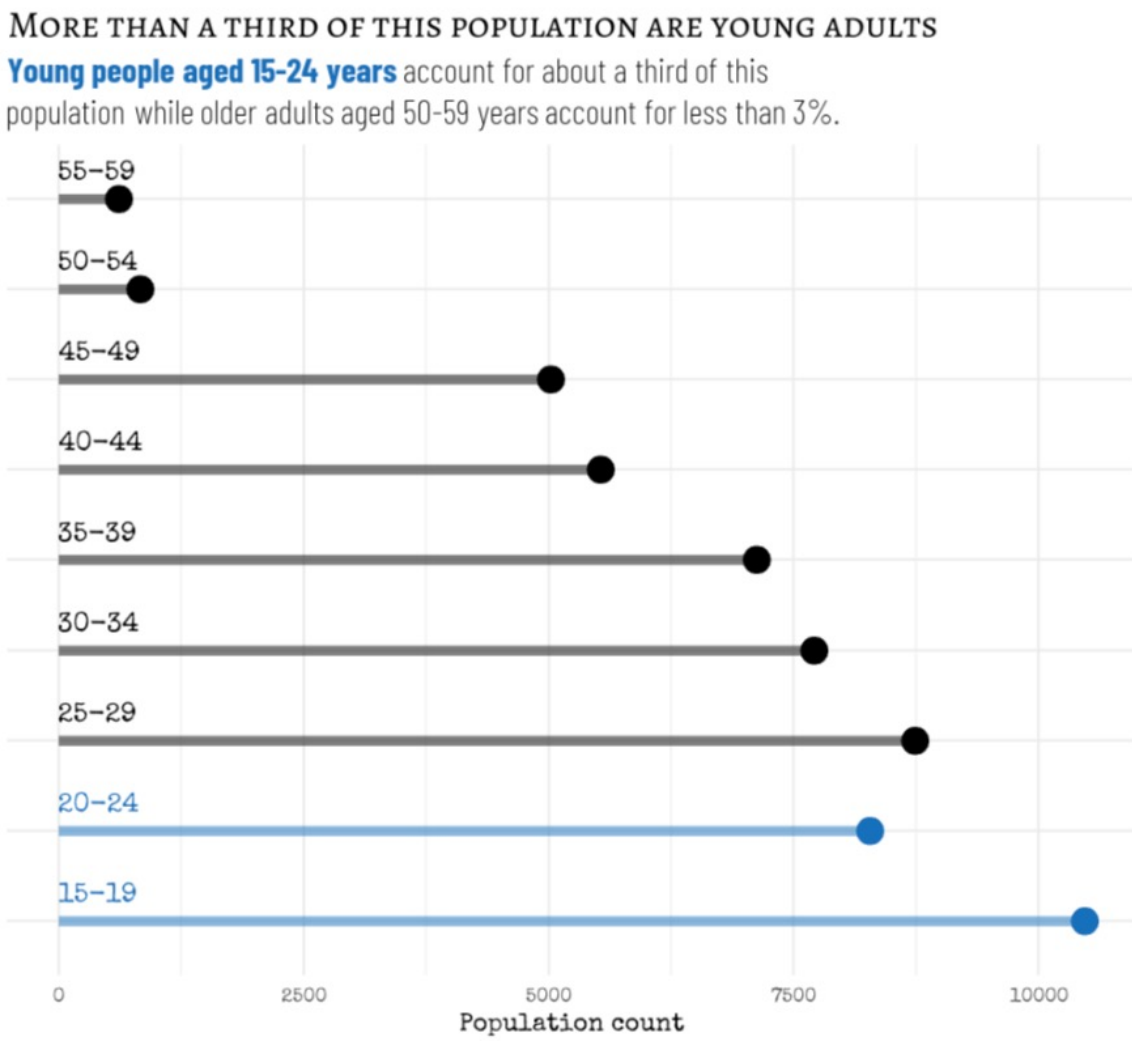
```
new_graph4 <-
    new_graph3 +
    theme (axis.text.y = element_blank(),
           axis.ticks.y = element_blank(),
           axis.ticks.y.left = element_blank(),
           plot.subtitle = element_markdown
              (hjust = 0, family = "barlow",
                lineheight = unit(1.2, "pt"),
              size = 14),
           plot.title = element_text(family =
              "alegreya_sc", size = 15),
           axis.text = element_text(family =
              "special", size = 8),
           axis.title = element_text(family =
              "special", size = 10),
           legend.position = "none")
```

```
new_graph4
```



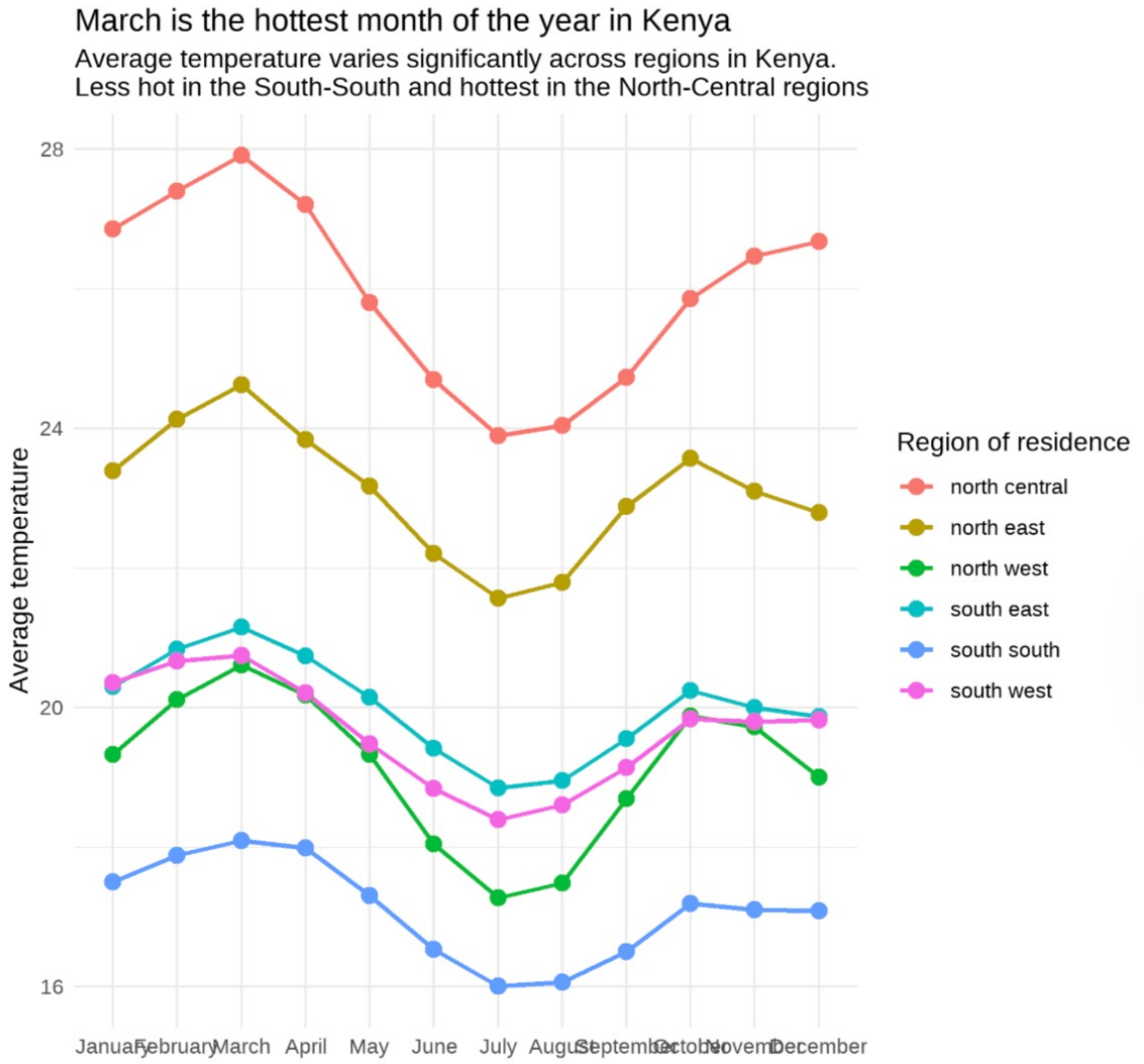
Visualising distributions with lollipop plots (4/5): geom_segment ()





Visualising trends with lineplots (1/9): geom_line() & geom_point ()

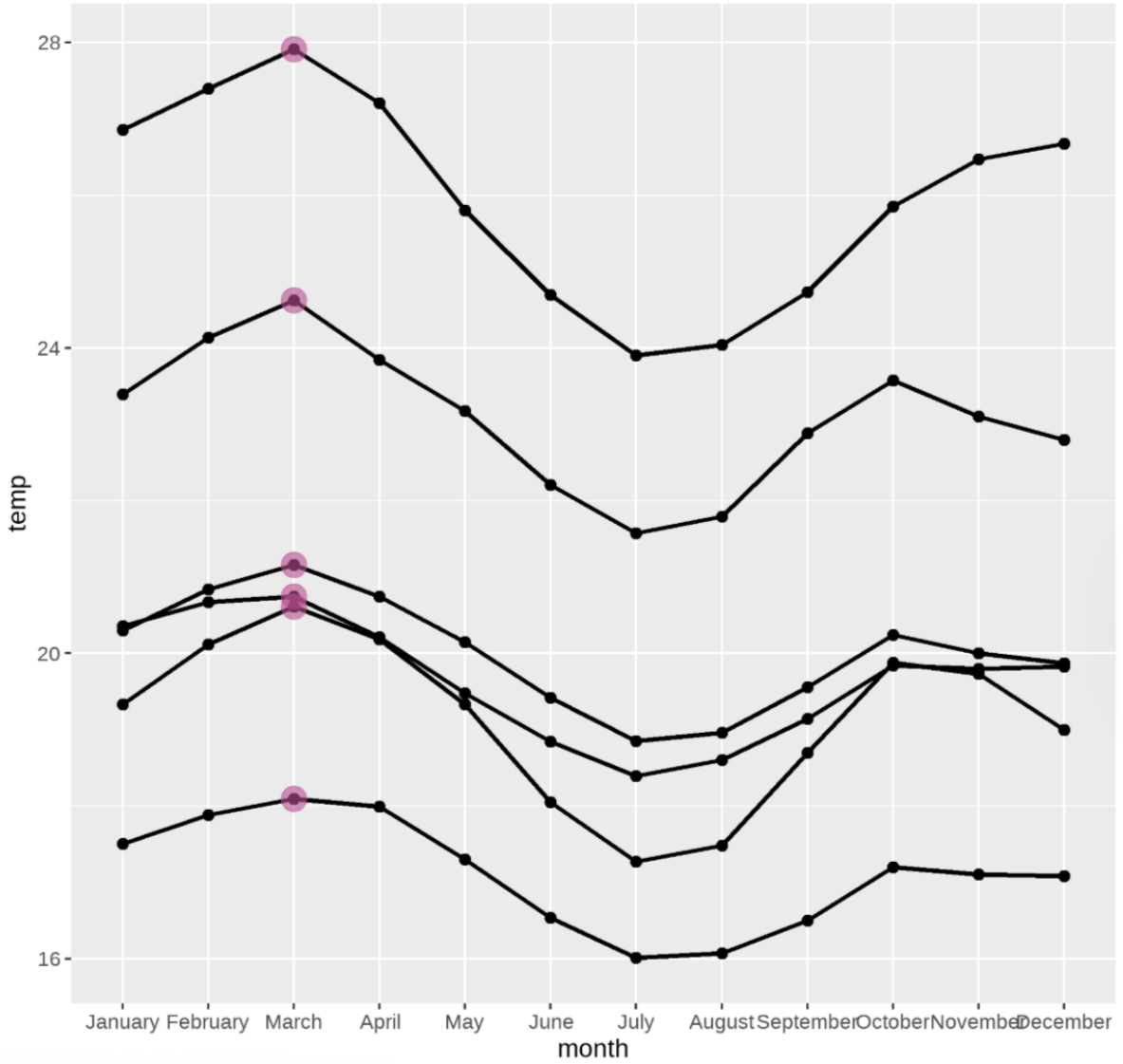
```
study_dta %>%
        ggplot (aes(x = month, y = temp, color =
          region, group = region)) +
        geom_line (size = 0.9) +
        geom_point(size = 3) +
        labs (y = "Average temperature",
          x = "", color= "Region of residence",
          title = "March is the hottest month of
          the year in Kenya",
          subtitle = "Average temperature varies
          significantly across regions in Kenya.
          \nLess hot in the South-South and hottest
          in the North-Central regions") +
theme_minimal()
```



READ MORE: https://ggplot2.tidyverse.org/

Visualising trends with lineplots (2/9): geom_line() & geom_point ()

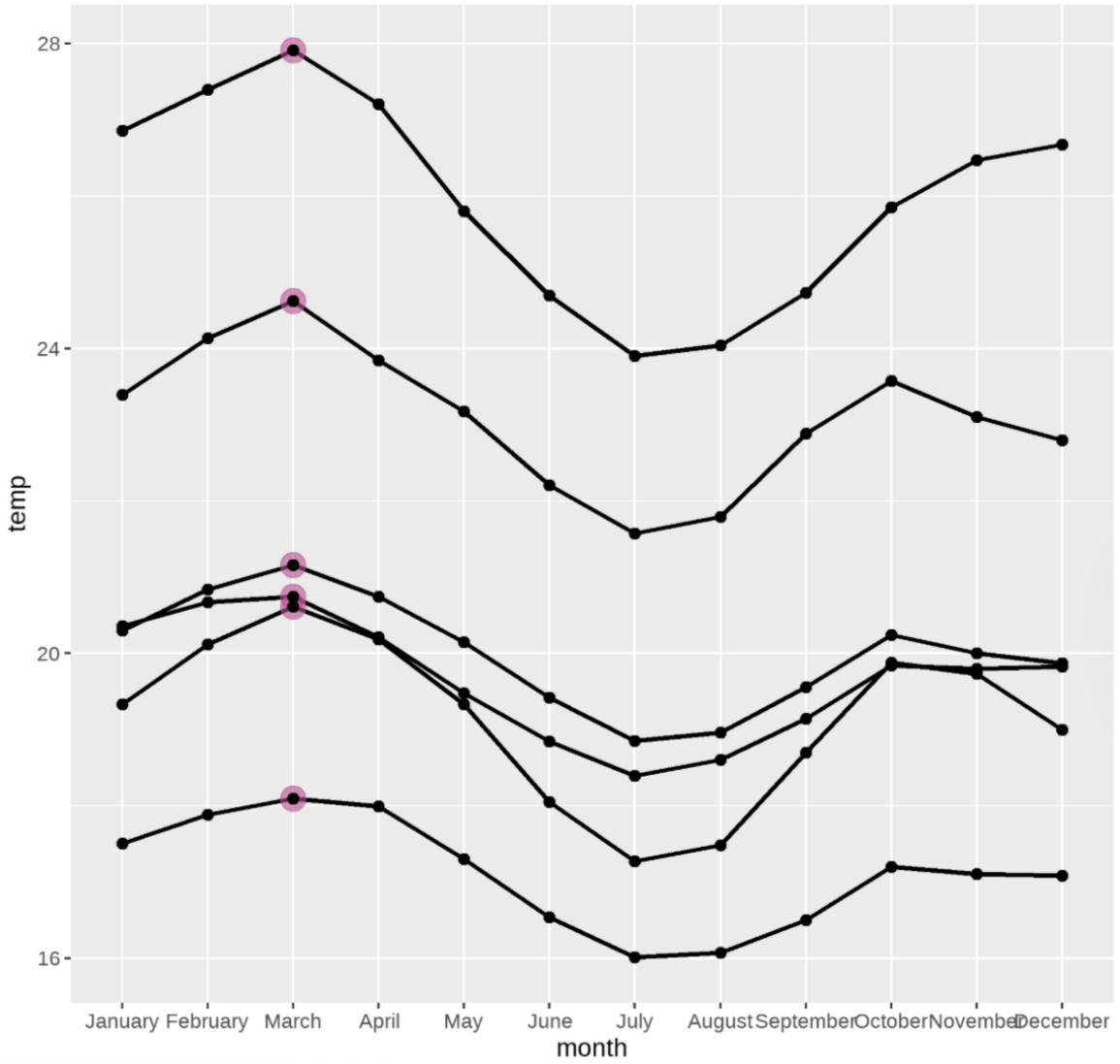
```
temp_graph_1 <- study_dta %>%
        ggplot (aes(x = month, y = temp,
                group = region)) +
        geom_point(size = 2) +
        geom_point(data = filter(new_data,
                        month == "March"),
                aes(x = month, y = temp,
                        group = region),
                        color = "#b84e90",
                        size = 5, alpha = 0.6)

temp_graph_1
```



READ MORE: https://ggplot2.tidyverse.org/

Visualising trends with lineplots (3/9): geom_line() & geom_point ()

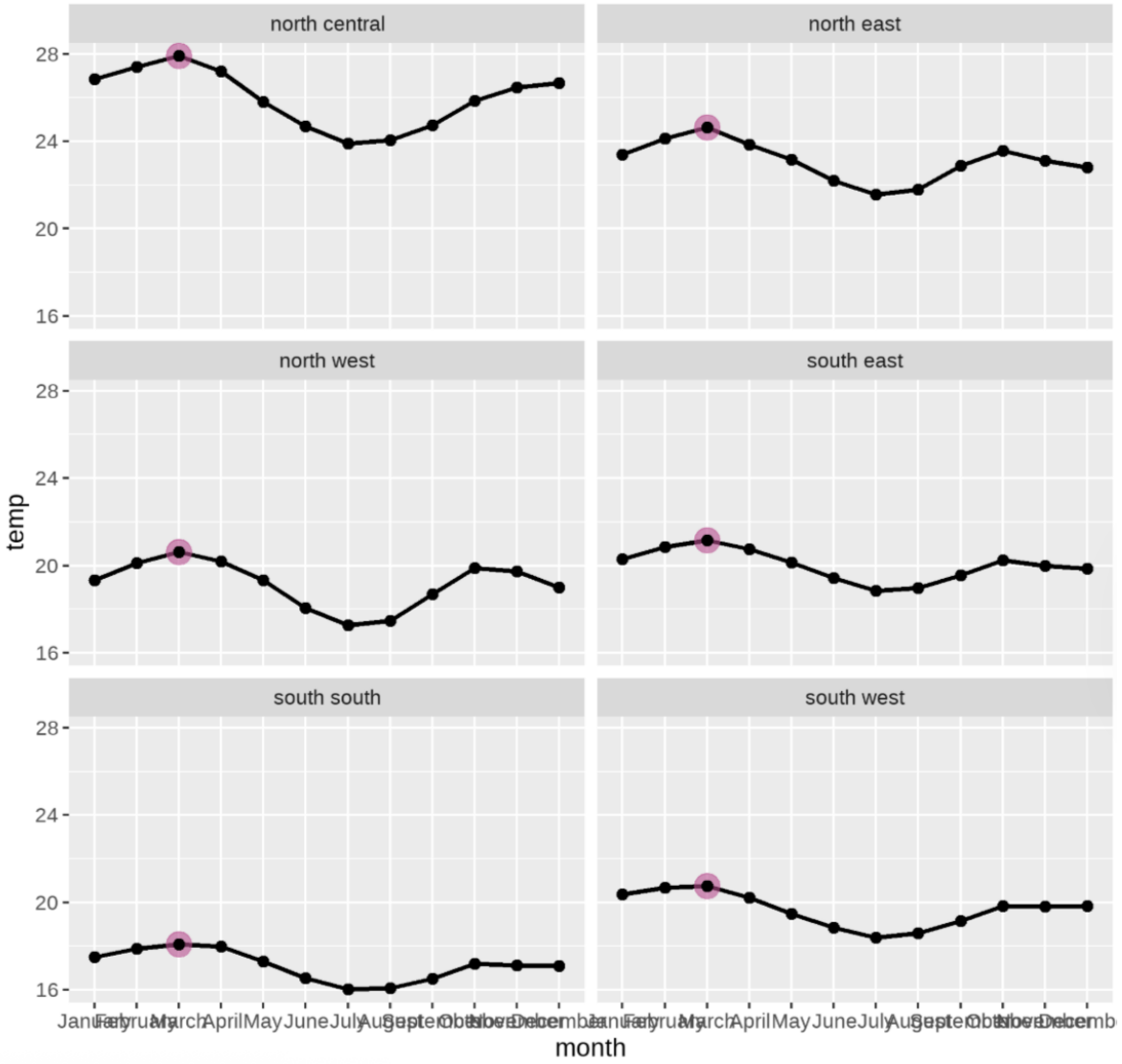
```
temp_graph_1 <- study_dta %>%
        ggplot (aes(x = month, y = temp,
                group = region)) +
        geom_point(data = filter(new_data,
                         month == "March"),
                  aes(x = month, y = temp,
                        group = region),
                        color = "#b84e90",
                        size = 5, alpha = 0.6) +
        geom_point(size = 2)

temp_graph_1
```



READ MORE: https://ggplot2.tidyverse.org/

Visualising trends with lineplots (4/9): geom_line() & geom_point ()

```
temp_graph_2 <- temp_graph_1 +
        facet_wrap(~ region, nrow = 3)


temp_graph_2
```



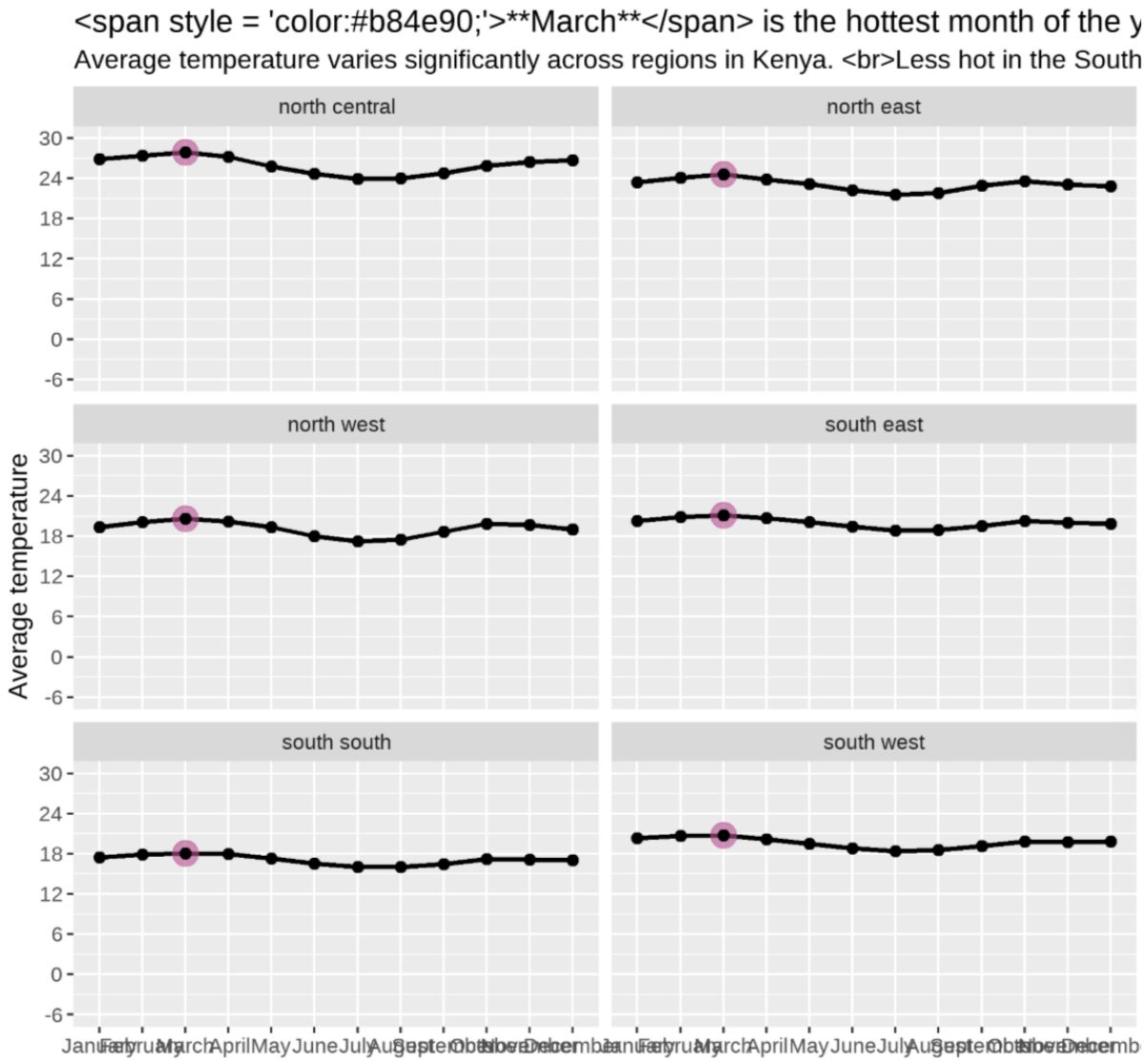
READ MORE: https://ggplot2.tidyverse.org/

Visualising trends with lineplots (5/9): geom_line() & geom_point ()

```
temp_graph_3 <- temp_graph_2 +
    scale_y_continuous(breaks = c(seq(-6,
        32, 6)), limits = c(-6, 30)) +
    labs (y = "Average temperature",
          x = "", color= "Region of
           residence",
         title = "<span style =
          'color:#b84e90;'>**March**</span>
          is the hottest month of the year
          in Kenya",
         subtitle = "Average temperature
          varies significantly across
          regions in Kenya. <br>Less hot in
          the South-South and hottest in the
          North-Central regions")
```

```
temp_graph_3
```

READ MORE: https://ggplot2.tidyverse.org/

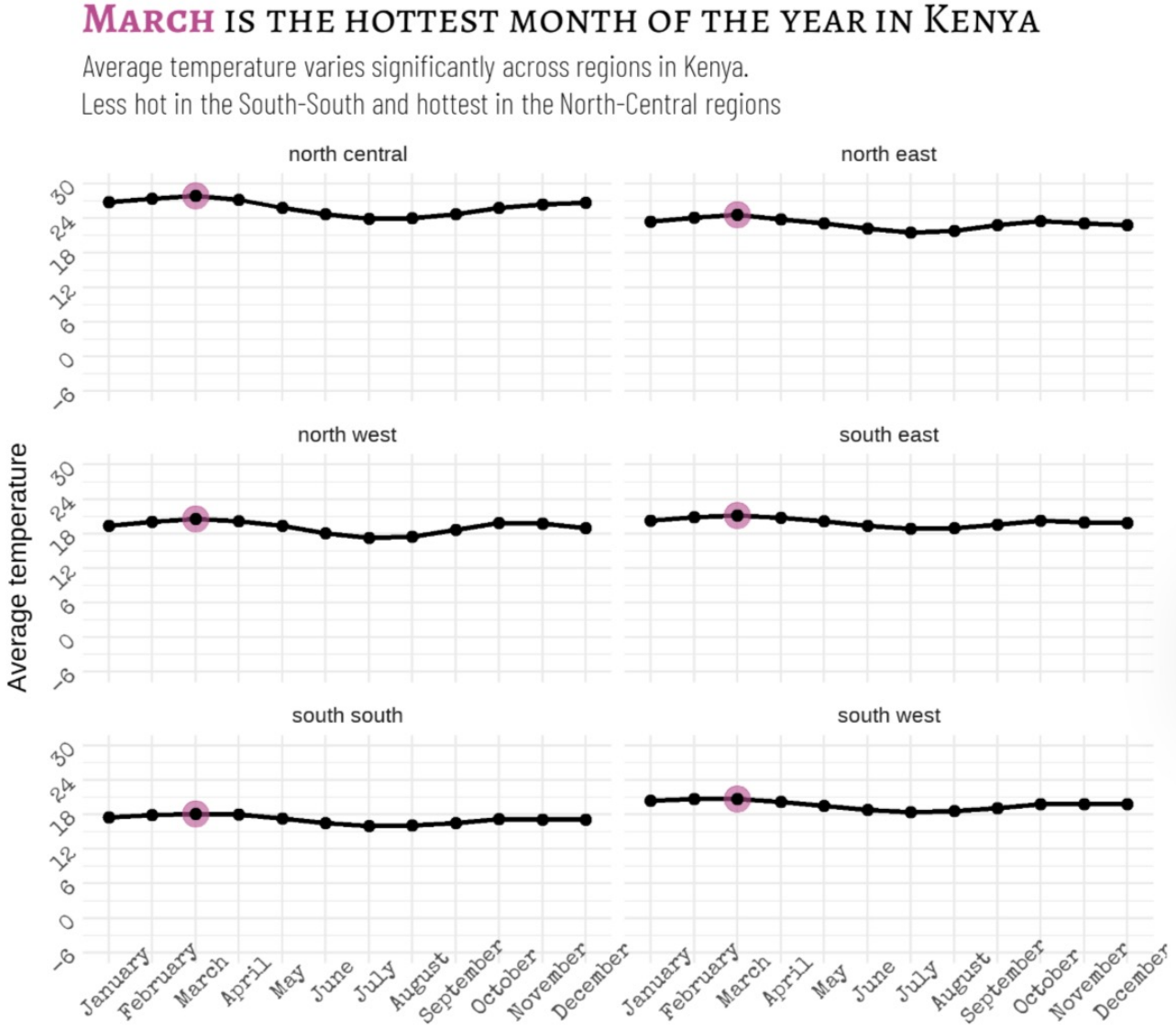


Visualising trends with lineplots (6/9): geom_line() & geom_point ()

```
temp_graph_4 <- temp_graph_3 +
      theme_minimal() +
      theme(plot.subtitle =
         element_markdown(hjust = 0,
         family = "barlow",
         lineheight = unit(1.2, "pt"),
         size = 13),
         plot.title =
         element_markdown(family =
         "alegreya_sc", size = 18),
         axis.text =
         element_text(family =
         "special", angle = 45,
         size = 9))
```

```
temp_graph_4
```

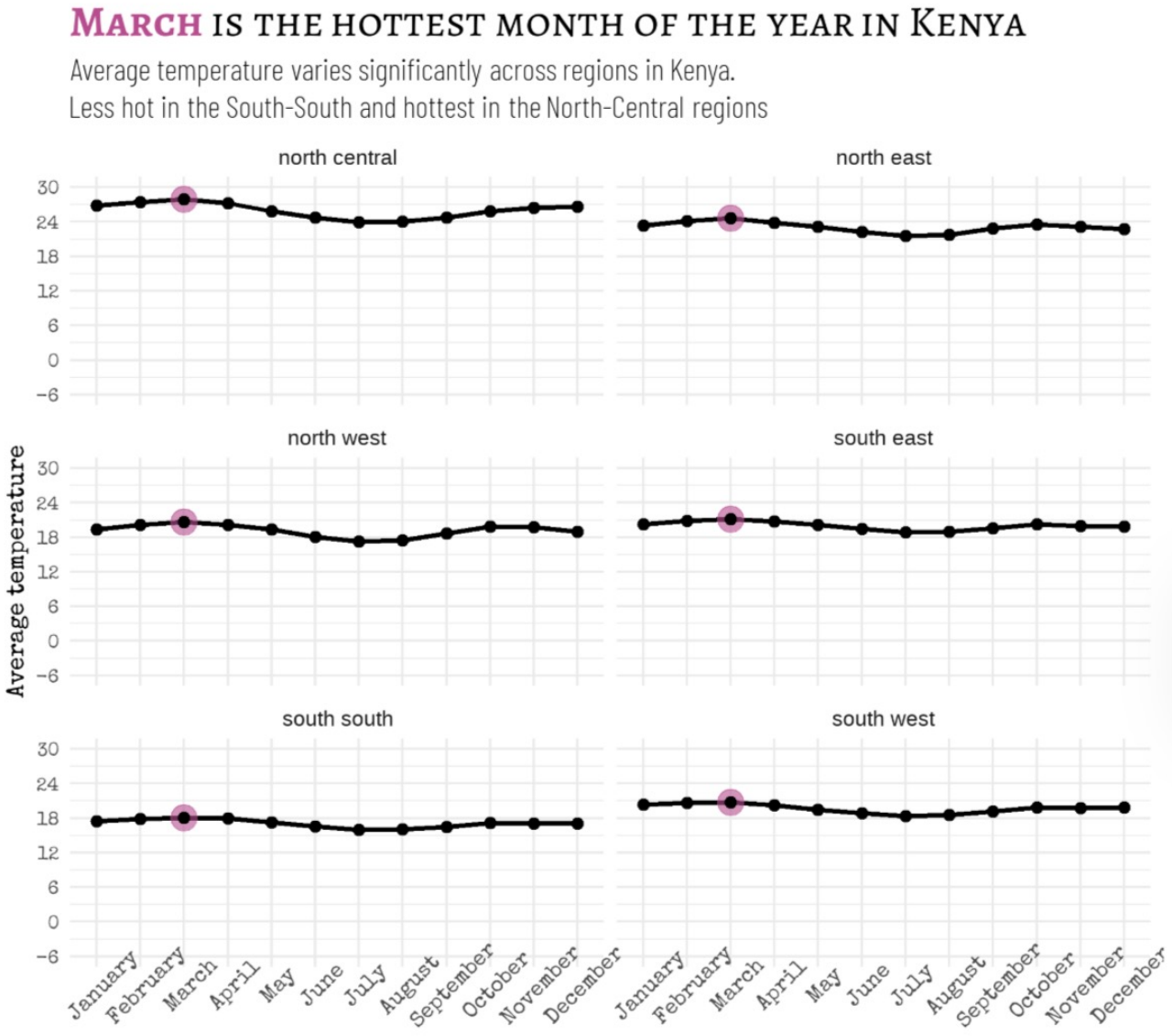
READ MORE: https://ggplot2.tidyverse.org/



Visualising trends with lineplots (7/9): geom_line() & geom_point ()

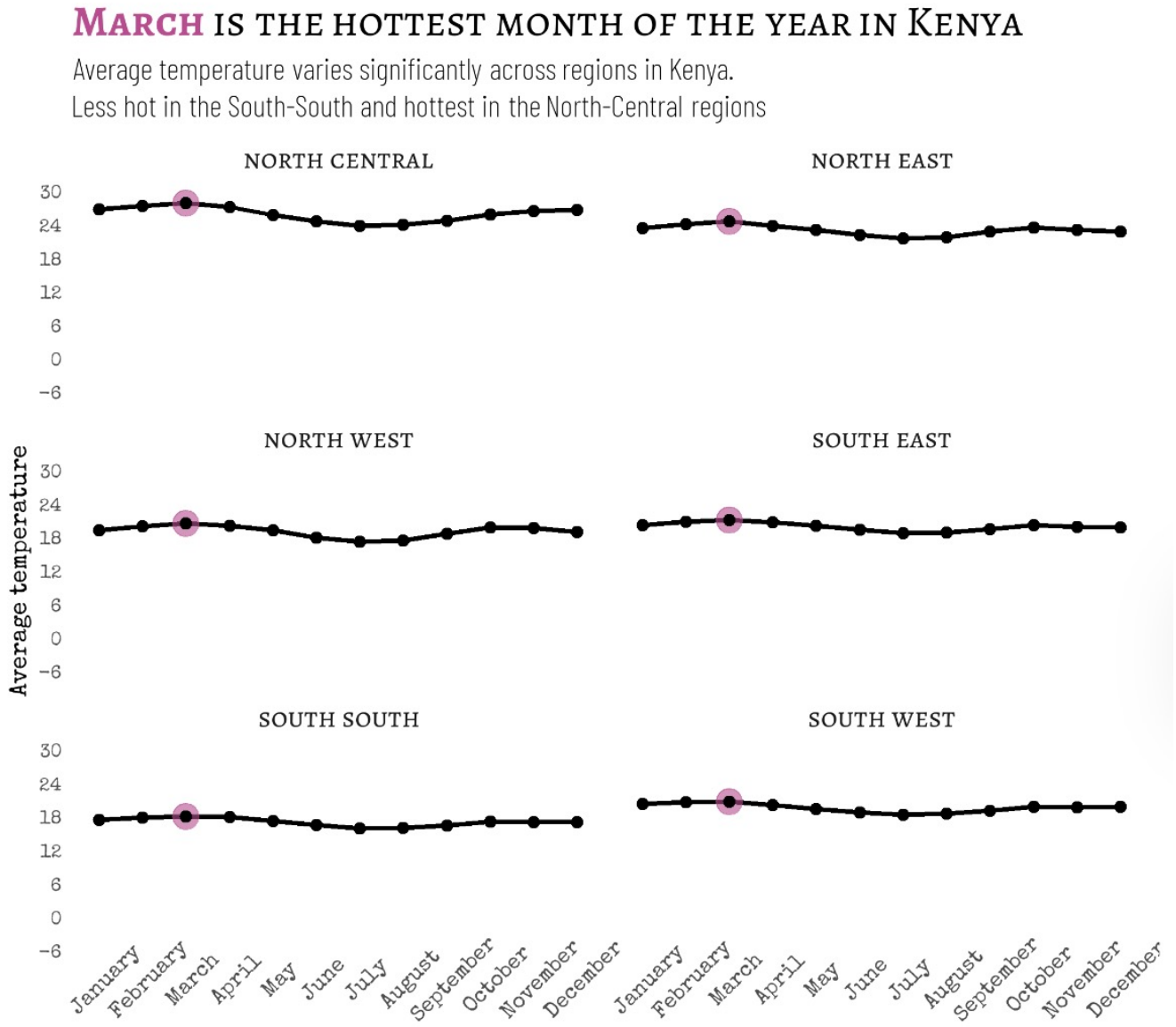
```
temp_graph_4 <- temp_graph_3 +
      theme_minimal() +
      theme(plot.subtitle =
         element_markdown(hjust = 0, family
         "barlow",
         lineheight = unit(1.2, "pt"), size
         13),
         plot.title = element_markdown(famil
         = "alegreya_sc", size = 18),
         axis.text.x = element_text(family =
         "special", angle = 45, size = 9),
         axis.text.y = element_text(family =
         "special", size = 8), axis.title =
         element_text(family = "special", si
         = 10)


temp_graph_4
```

READ MORE: https://ggplot2.tidyverse.org/



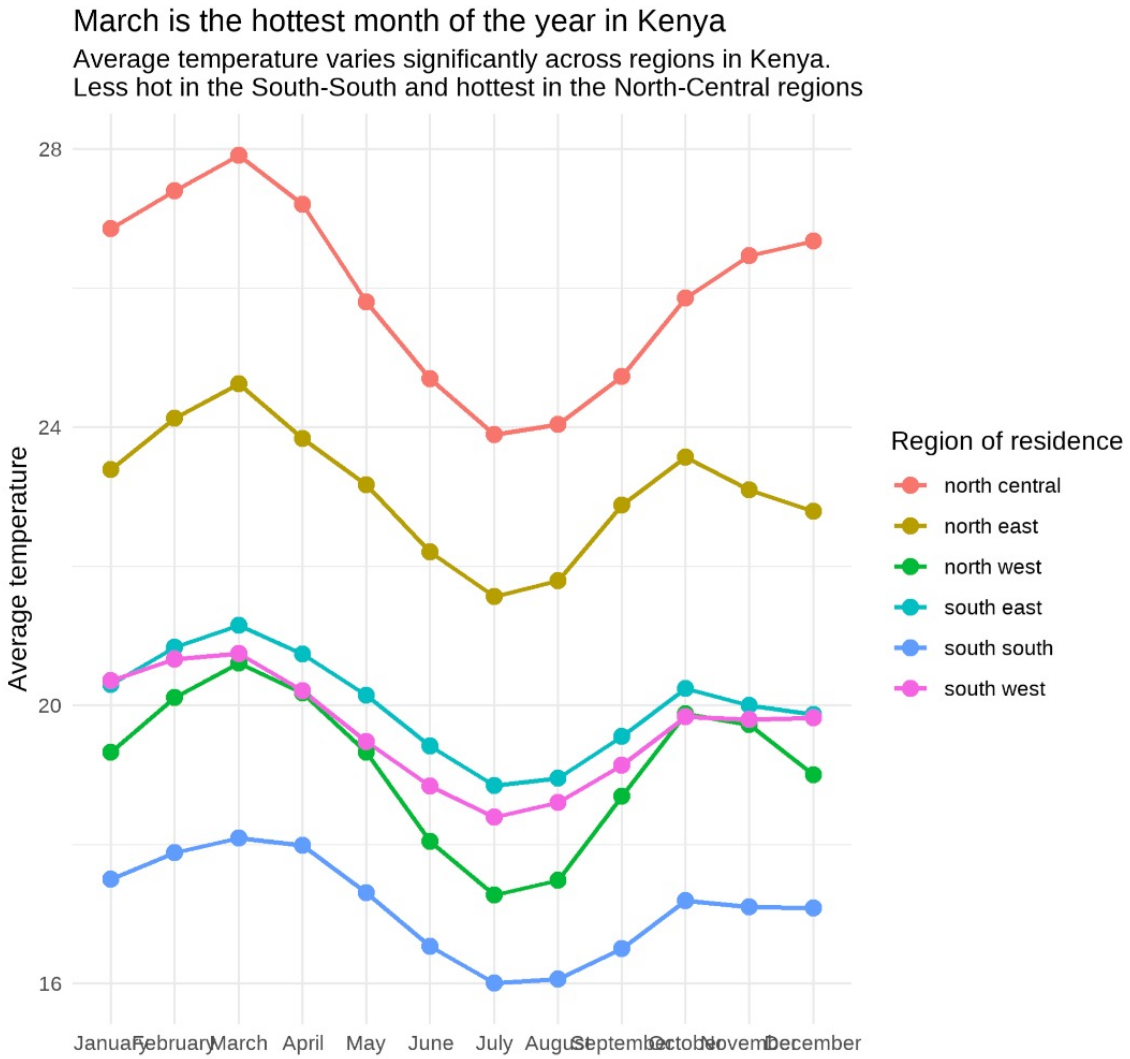
Visualising trends with lineplots (8/9): geom_line() & geom_point ()

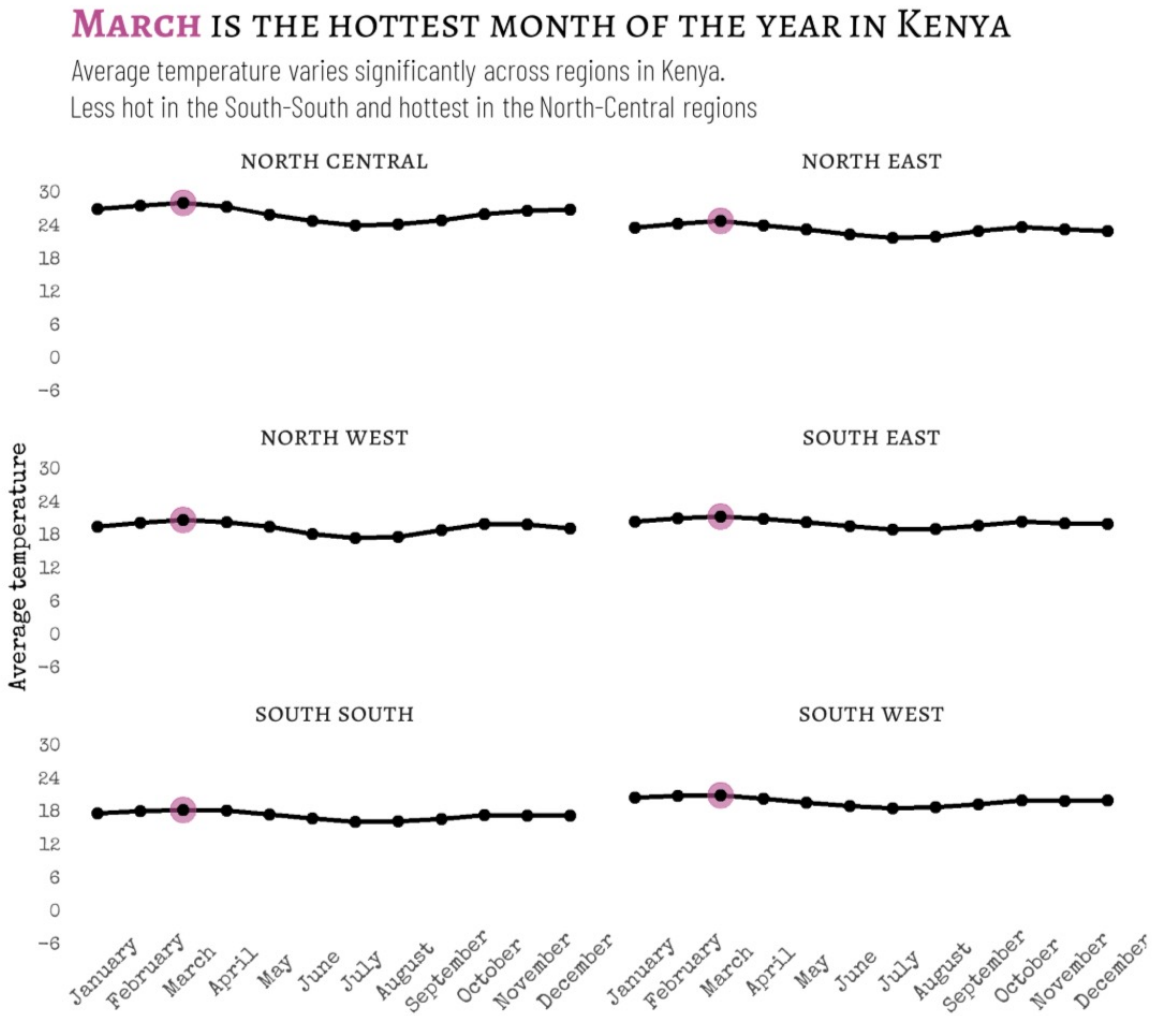
```
temp_graph_5 <- temp_graph_4 +
      theme_minimal() +
      theme(axis.title =
         element_text(family =
         "special", size = 10),
         panel.grid = element_blank(),
         strip.text =
         element_text(family =
         "alegreya_sc", size = 12)

temp_graph_5
```



READ MORE: https://ggplot2.tidyverse.org/

Visualising trends with lineplots (9/9): geom_line() & geom_point ()





READ MORE: https://ggplot2.tidyverse.org/

Your Turn

Open the file

`intermediate_ggplot.Rmd`

in `04-practicals`

Got questions?

Email me: *e.olamijuwon@st-andrews.ac.uk*