R for cytometry - plotting

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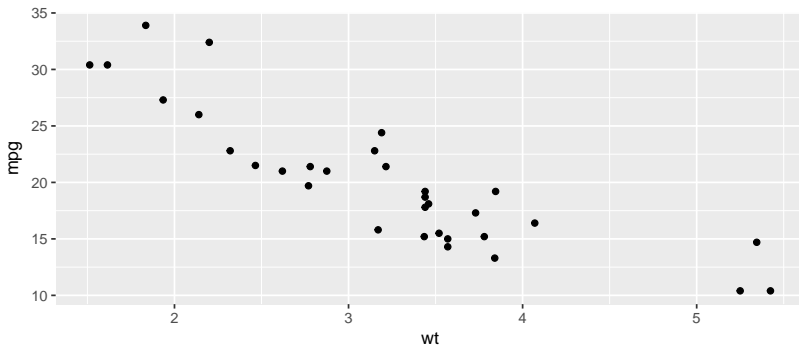
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plotting with R

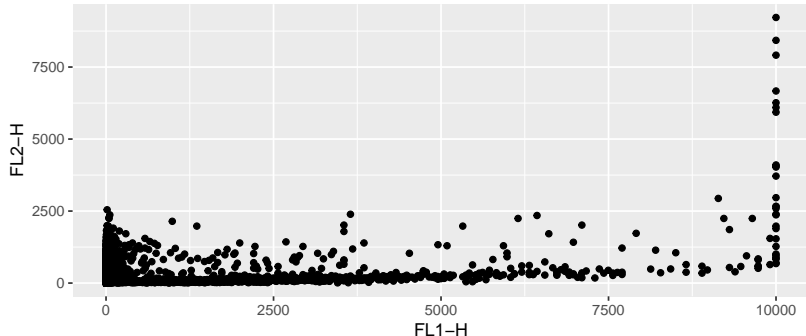- ▶ Plotting commands from different algorithms

- ▶ `ggplot`

ggplot simple example

```
require(ggplot2)
ggplot(mtcars, aes(x = wt, y = mpg)) +
  geom_point()
```
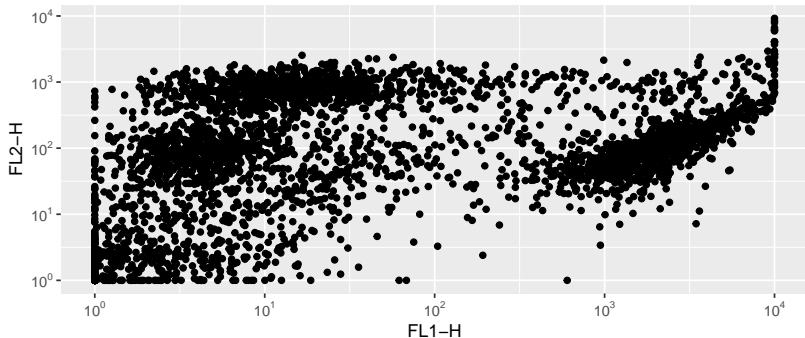
ggplot with flow data

```r
require(flowCore)
data(GvHD)
frame <- GvHD[[1]]
df <- as.data.frame(frame@exprs)
ggplot(df, aes(x = `FL1-H`, y = `FL2-H`)) +
  geom_point()
```
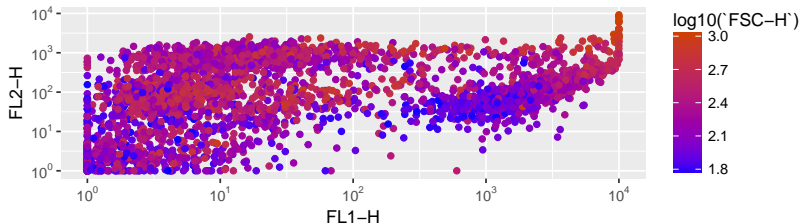
log scales

```r
require(scales)
ggplot(df, aes(x = `FL1-H`, y = `FL2-H`)) +
  geom_point() +
  scale_x_log10(breaks = 10^(0:5),
    labels = trans_format("log10", math_format(10^.x))) +
  scale_y_log10(breaks = 10^(0:5),
    labels = trans_format("log10", math_format(10^.x)))
```

colors

```
require(scales)
ggplot(df, aes(x = `FL1-H`, y = `FL2-H`,
               color = log10(`FSC-H`))) +
  geom_point() +
  scale_x_log10(breaks = 10^(0:5),
    labels = trans_format("log10", math_format(10^.x))) +
  scale_y_log10(breaks = 10^(0:5),
    labels = trans_format("log10", math_format(10^.x))) +
  scale_color_gradient(low = "#0000FF", high = "#CD4000")
```
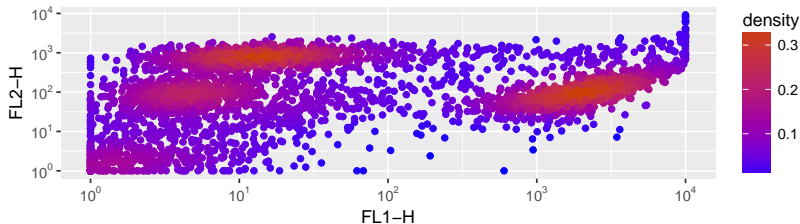
density

```
require(MASS)
get_density <- function(x, y, n = 100){
  dens <- kde2d(x = x, y = y, n = n)
  ix <- findInterval(x, dens$x)
  iy <- findInterval(y, dens$y)
  dens$z[cbind(ix, iy)]
}
```

density colors

```r
ggplot(df, aes(x = `FL1-H`, y = `FL2-H`,
    color = get_density(log10(`FL1-H`), log10(`FL2-H`))))+
  geom_point() +
  scale_x_log10(breaks = 10^(0:5),
    labels = trans_format("log10", math_format(10^.x))) +
  scale_y_log10(breaks = 10^(0:5),
    labels = trans_format("log10", math_format(10^.x))) +
  scale_color_gradient(name = "density",
    low = "#0000FF", high = "#CD4000")
```

multiple plots at same time

```r
require(reshape2)
require(dplyr)
df_melt <- melt(df, id.vars = "FL1-H")
df_melt <- mutate(group_by(df_melt, variable),
  density = get_density(log10(`FL1-H` + 1),
                        log10(value + 1)))
p <- ggplot(df_melt, aes(x = `FL1-H`, y = value,
                         color = density))+
  geom_point() +
  scale_x_log10(breaks = 10^(0:5),
    labels = trans_format("log10", math_format(10^.x))) +
  scale_y_log10(breaks = 10^(0:5),
    labels = trans_format("log10", math_format(10^.x))) +
  scale_color_gradient(name = "density",
    low = "#0000FF", high = "#CD4000") +
  facet_wrap(~variable) +
  theme_bw()
```

multiple plots at same time

```
print(p)
```
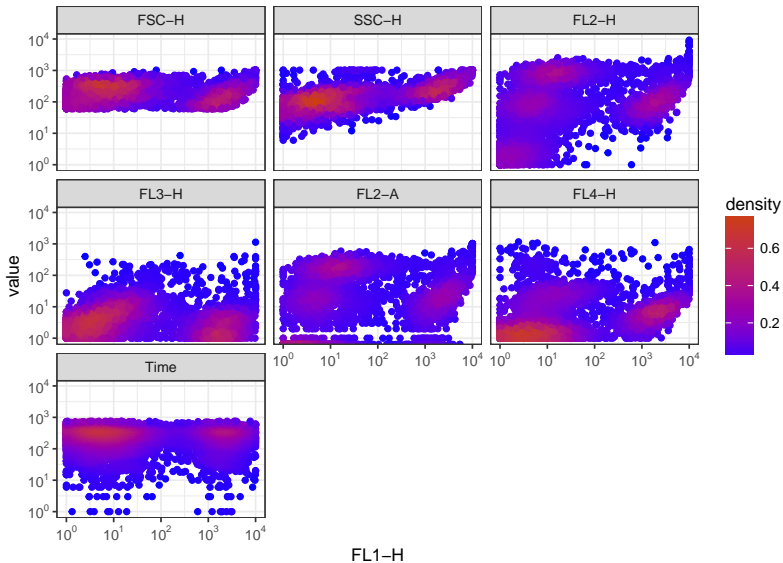
further reading

Have a look at the following:

```
?geom_line
?geom_abline
?geom_smooth
?geom_linerange
?geom_boxplot
?geom_histogram
?geom_text
```

Also this tutorial.

additional stuff from class

```
df_asinh <- as.data.frame(asinh(frame@exprs/5))
df_asinh$density <- get_density(df_asinh$`FL1-H`,
                                df_asinh$`FL2-H`)
df_asinh$density[df_asinh$density < 0.02] <- NA

p <- ggplot(df_asinh,
            aes(x = `FL1-H`, y = `FL2-H`,
                color = density))+
  geom_point() +
  scale_x_continuous(name = "CD45") +
  scale_y_continuous(name = "CD33") +
  scale_color_gradient(name = "density",
                       low = "blue", high = "red",
                       limits = c(0, 0.2),
                       na.value = "black")
```

additional stuff from class

```
print(p)
```