STAT 1378: A Thomas Fung Appreciation Society

Assignment 3

28 October 2021

Intro

Slide with bullets

MACQUARIE University SYDNEY·AUSTRALIA

- Bullet 1

Use `\alert` to **highlight** some text

Some enumeration

Slide with bullets

- Bullet 1
- Bullet 2

Use `\alert` to **highlight** some text

Some enumeration

Slide with bullets

- Bullet 1
- Bullet 2
- Bullet 3

Use `\alert` to **highlight** some text

Some enumeration

Slide with bullets

- Bullet 1
- Bullet 2
- Bullet 3

Use `\alert` to **highlight** some text

Some enumeration

1. The first item

Slide with bullets

- Bullet 1
- Bullet 2
- Bullet 3

Use `\alert` to **highlight** some text

Some enumeration

1. The first item
2. Stuff

Slide with bullets

- Bullet 1
- Bullet 2
- Bullet 3

Use `\alert` to **highlight** some text

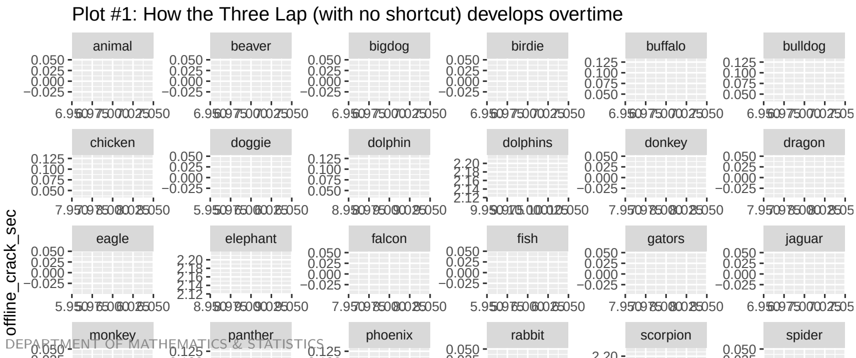
Some enumeration

1. The first item
2. Stuff
3. Nonsense

Using R

Slide with R output

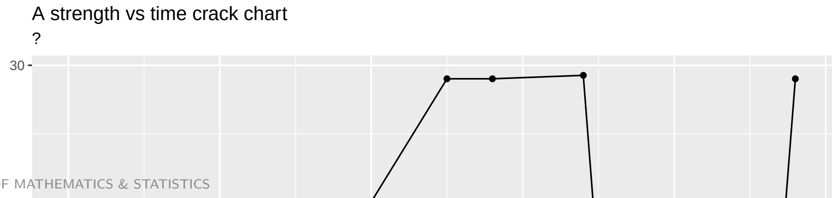

```
plot1 <- passwords %>%
filter(category == "animal")
ggplot(data = plot1) +
geom_line(mapping = aes(x = strength, y = offline_crack_sec)) +
facet_wrap(~plot1$password, scales = "free") +
labs(title = "Plot #1: How the Three Lap (with no shortcut) develops overtime")
```



Slide with graphics

```
plot2 <- passwords %>%
    filter(time_unit == "years") %>%
    group_by(interaction(strength,offline_crack_sec)) %>%
    # mutate(Banana = paste(type,ifelse(shortcut == "Yes", "With Shourtcut","With
    # ggplot(aes(x = date, y = time, color = Race)) +
    ggplot(aes(x = strength, y = offline_crack_sec)) +
    geom_point() +
    geom_line() +
    labs(title = "A strength vs time crack chart", subtitle = "?", x = "Strength"

plot2
```



Slide with mathematics

Suppose $X_1, X_2, \ldots, X_n$ are independent and identitically distributed random variables with common cumulative distribution function F_X with support on $\mathbb{R}$. The empirical cumulative distribution function is defined with,

$$F_n(x) = \frac{1}{n} \sum_{i=1}^{n} I_{(-\infty,x]}(X_i)$$

where $I_A(x)$ denotes the indicator function for the set A. The following theorem provides uniform covergence for F_n

Glivenko-Cantelli Theorem

If X_i are i.i.d. with common cdf F then,

$$\|F_n - F\| = \sup_{x \in \mathbb{R}} |F_n(x) - F(x)| \xrightarrow{n \to \infty} 0 \quad \text{almost surely.}$$

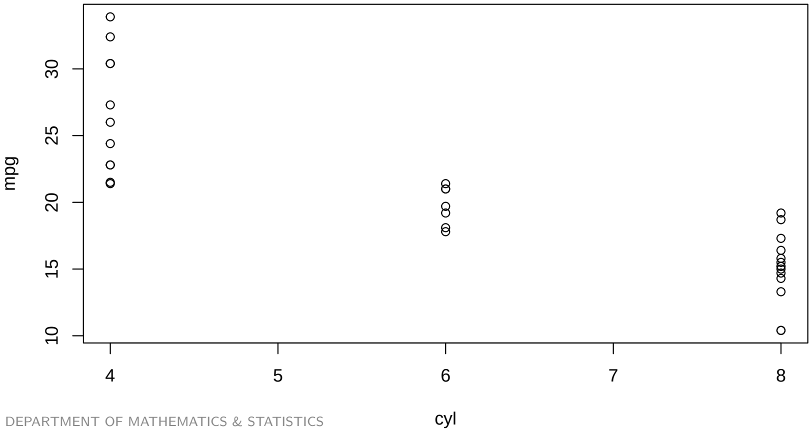
- See Vaart and Wellner (1996) for more information on Empirical processes.

A slide with no header if you need more space.

RMarkdown Examples

R Figure

```
plot(mpg ~ cyl, data = mtcars)
```



R Table

A simple `knitr::kable` example:

```
knitr::kable(head(mtcars),
      caption="First few observations of the mtcars dataset")
```

Table 1: First few observations of the mtcars dataset

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21.0	6	160	110	3.90	2.620	16.46	0	1	4	4
Mazda RX4 Wag	21.0	6	160	110	3.90	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108	93	3.85	2.320	18.61	1	1	4	1
Hornet 4 Drive	21.4	6	258	110	3.08	3.215	19.44	1	0	3	1
Hornet Sportabout	18.7	8	360	175	3.15	3.440	17.02	0	0	3	2
Valiant	18.1	6	225	105	2.76	3.460	20.22	1	0	3	1

Resources

- See the RMarkdown repository for more on RMarkdown

Resources

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- Also the

References

Vaart, Aad W. van der, and Jon A. Wellner. 1996. *Weak Convergence and Empirical Processes*. Springer Series in Statistics. Springer-Verlag, New York. https://doi.org/10.1007/978-1-4757-2545-2.