R For Data Science *Cheat Sheet*

Tidyverse for Beginners

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Tidyverse

The **tidyverse** is a powerful collection of R packages that are actually data tools for transforming and visualizing data. All packages of the tidyverse share an underlying philosophy and common APIs.

The core packages are:

- **ggplot2**, which implements the grammar of graphics. You can use it to visualize your data.
- **dplyr** is a grammar of data manipulation. You can use it to solve the most common data manipulation challenges.
- **tidyr** helps you to create tidy data or data where each variable is in a column, each observation is a row end each value is a cell.
- **readr** is a fast and friendly way to read rectangular data.
- **purrr** enhances R's functional programming (FP) toolkit by providing a complete and consistent set of tools for working with functions and vectors.
- **tibble** is a modern re-imaginging of the data frame.
- **stringr** provides a cohesive set of functions designed to make working with strings as easy as posssible
- **forcats** provide a suite of useful tools that solve common problems with factors.

You can install the complete tidyverse with:

```
> install.packages("tidyverse")
```

Then, load the core tidyverse and make it available in your current R session by running:

```
> library(tidyverse)
```

Note: there are many other tidyverse packages with more specialised usage. They are not loaded automatically with library(tidyverse), so you'll need to load each one with its own call to `library()`.

Useful Functions

`> tidyverse_conflicts()`	Conflicts between tidyverse and other packages
`> tidyverse_deps()`	List all tidyverse dependencies
`> tidyverse_logo()`	Get tidyverse logo, using ASCII or unicode characters
`> tidyverse_packages()`	List all tidyverse packages
`> tidyverse_update()`	Update tidyverse packages

Loading in the data

`> library(datasets)`	Load the datasets package
`> library(gapminder)`	Load the gapminder package
`> attach(iris)`	Attach iris data to the R search path

dplyr

Filter

`filter()` allows you to select a subset of rows in a data frame.

```
> iris %>%
    filter(Species=="virginica")
> iris %>%
    filter(Species=="virginica",
           Sepal.Length > 6)
```

Select iris data of species "virginica"
Select iris data of species "virginica" and sepal length greater than 6.

Arrange

`arrange()` sorts the observations in a dataset in ascending or descending order based on one of its variables.

```
> iris %>%
    arrange(Sepal.Length)
> iris %>%
    arrange(desc(Sepal.Length))
```

Sort in ascending order of sepal length
Sort in descending order of sepal length

Combine multiple `dplyr` verbs in a row with the pipe operator `%>%`:

```
> iris %>%
   filter(Species=="virginica") %>%
   arrange(desc(Sepal.Length))
```

Filter for species "virginica" then arrange in descending order of sepal length

Mutate

`mutate()` allows you to update or create new columns of a data frame.

```
> iris %>%
   mutate(Sepal.Length=Sepal.Length*10)
> iris %>%
   mutate(SLMm=Sepal.Length*10)
```

Change Sepal.Length to be in millimeters
Create a new column called SLMm

Combine the verbs `filter()`, `arrange()`, and `mutate()`:

```
> iris %>%
   filter(Species=="Virginica") %>%
   mutate(SLMm=Sepal.Length*10) %>%
   arrange(desc(SLMm))
```

Summarize

`summarize()` allows you to turn many observations into a single data point.

```
> iris %>%
   summarize(medianSL=median(Sepal.Length))
> iris %>%
   filter(Species=="virginica") %>%
   summarize(medianSL=median(Sepal.Length))
```

Summarize to find the median sepal length
Filter for virginica then summarize the median sepal length

You can also summarize multiple variables at once:

```
> iris %>%
   filter(Species=="virginica") %>%
   summarize(medianSL=median(Sepal.Length),
             maxSL=max(Sepal.Length))
```

`group_by()` allows you to summarize within groups instead of summarizing the entire dataset:

```
> iris %>%
   group_by(Species) %>%
   summarize(medianSL=median(Sepal.Length),
             maxSL=max(Sepal.Length))
> iris %>%
   filter(Sepal.Length>6) %>%
   group_by(Species) %>%
   summarize(medianPL=median(Petal.Length),
             maxPL=max(Petal.Length))
```

Find median and max sepal length of each species

Find median and max petal length of each species with sepal length > 6

ggplot2

Scatter plot

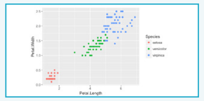
Scatter plots allow you to compare two variables within your data. To do this with ggplot2, you use `geom_point()`

```
> iris_small <- iris %>%
   filter(Sepal.Length > 5)
> ggplot(iris_small, aes(x=Petal.Length,
                         y=Petal.Width)) +
    geom_point()
```

Compare petal width and length

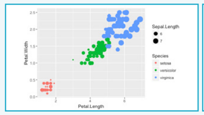
Additional Aesthetics

- Color



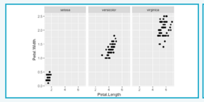
```
> ggplot(iris_small, aes(x=Petal.Length,
                         y=Petal.Width,
                         color=Species)) +
    geom_point()
```

- Size



```
> ggplot(iris_small, aes(x=Petal.Length,
                         y=Petal.Width,
                         color=Species,
                         size=Sepal.Length)) +
    geom_point()
```

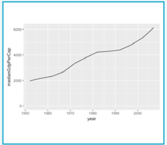
Faceting



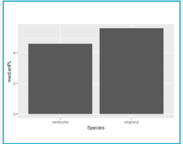
```
> ggplot(iris_small, aes(x=Petal.Length,
                         y=Petal.Width)) +
    geom_point()+
    facet_wrap(~Species)
```

Line Plots

```
> by_year <- gapminder %>%
   group_by(year) %>%
   summarize(medianGdpPerCap=median(gdpPercap))
> ggplot(by_year, aes(x=year,
                      y=medianGdpPerCap))+
   geom_line()+
   expand_limits(y=0)
```



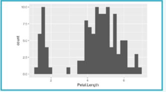
Bar Plots



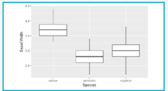
```
> by_species <- iris %>%
   filter(Sepal.Length>6) %>%
   group_by(Species) %>%
   summarize(medianPL=median(Petal.Length))
> ggplot(by_species, aes(x=Species,
                         y=medianPL)) +
   geom_col()
```

Histograms

```
> ggplot(iris_small, aes(x=Petal.Length))+
   geom_histogram()
```



Box Plots



```
> ggplot(iris_small, aes(x=Species,
                         y=Sepal.Width))+
   geom_boxplot()
```