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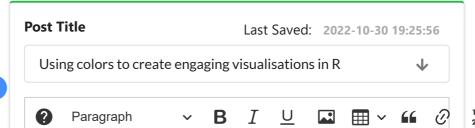
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Using colors to create engaging visualisations in R

Paragraph

Introduction

R programming is a functional programming language which offers a wide variety of built-in functions and with their respective libraries. R is so different from many programming languages. The syntax of R, is very difficult to read. R studios provides integrated development environment (IDE) for R programming. Data analysts use R language as a programming tool since it is useful for data importing, cleaning and creating visuals.

Use colors to create engaging visuals in R

We have to use colors to create good quality visuals so, that make sense to the viewer. It helps viewer and stack holders to understand the information faster and effectively. Color plays a significant role in data visualization. Viewers need to understand the report easily so, if we highlight certain pieces of information and promote information recall it will be easy for viewers to understand report created by analyst. Using colors strategically can aid pattern recognition and attract attention to important information.

Some rules to follow while using colors

-> Use single color to represent continuous data.

-> Use contrasting colors to represent comparison between columns.

-> Use colors to make important data stand out.

-> Use limited colors. To many colors in single dashboard leads to ambiguity.

-> Use the correct graph style and coloring for your data.

Using colors to create visuals need good knowledge on aesthetics, It is defined as the metrics onto which we plot our data. To know more about aesthetics refer https://www.geeksforgeeks.org/data-visualization-with-r-and-ggplot2/

Dataset used

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about penguins body

R

```r
#install packages
install.packages("dplyr")
#load packages
library(dplyr)
#summary of penguins dataset
summary(penguins)
```
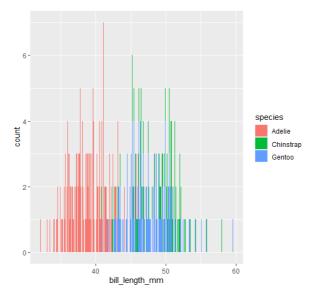
Output

```
      species            island    bill_length_mm  bill_depth_mm   flipper_length_mm  body_mass_g        sex
Adelie    :152   Biscoe   :168   Min.   :32.10   Min.   :13.10   Min.   :172.0    Min.   :2700    female:165
Chinstrap: 68   Dream    :124   1st Qu.:39.23   1st Qu.:15.60   1st Qu.:190.0    1st Qu.:3550    male  :168
Gentoo    :124   Torgersen: 52   Median :44.45   Median :17.30   Median :197.0    Median :4050    NA's  : 11
                                 Mean   :43.92   Mean   :17.15   Mean   :200.9    Mean   :4202
                                 3rd Qu.:48.50   3rd Qu.:18.70   3rd Qu.:213.0    3rd Qu.:4750
                                 Max.   :59.60   Max.   :21.50   Max.   :231.0    Max.   :6300
                                 NA's   :2       NA's   :2       NA's   :2        NA's   :2
      year
Min.   :2007
1st Qu.:2007
Median :2008
Mean   :2008
3rd Qu.:2009
Max.   :2009
```

summary of penguins dataset

R

```r
#load packages
library(ggplot2)
#data layer + Geometric layer + Aesthetics layer
ggplot(data = penguins) + geom_bar(mapping = aes(x=b
```


No clarity in data

If we use bar chart to each penguin of different bill_length and bill_depth we cannot get clear data so, using of right graph is important along with colors below is the example for good usage of suitable graph and colors
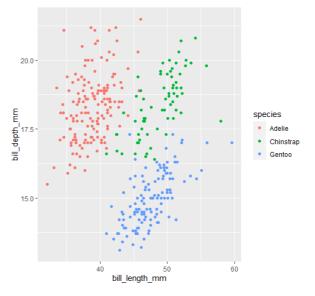
```
#load packages
library(ggplot2)
#data layer + Geometric layer + Aesthetics layer
ggplot(data = penguins) + geom_point(mapping = aes(
```


In this output we can clearly differentiate 3 species of penguins

we generally use col aesthetic to use colors in our visuals in case of bar graph col aesthetic do not give color variation it just outlines the bar in bar chart so, for this problem we use fill attribute to replacement of col aesthetic.

Example for continuous data representation

```R
#install and load packages if you are using new R s
age <- c(19,34,56,23,45,18,34,32,17,15,16,9)
gender <- c("f","f","m","f","m","m","m","f","m","m",
height_in_cm <- c(183.98,178.56,167.984,156.78,178.
people <- data.frame(age, gender, height_in_cm)
ggplot(data = people) + geom_line(mapping = aes(x =
```

Output

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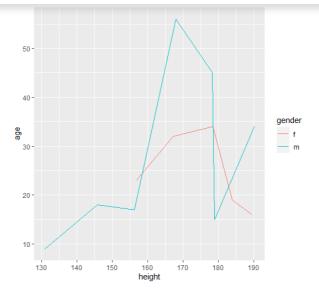Contact Us

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m = male, f = female representing continuous data differentiating with respective of their gender

Creating color palette

To create an intentional color palette for your visualization you should well equipped with good understanding of color theory and color psychology. So, to know about color schemes refer https://www.geeksforgeeks.org/differences-between-rgb-and-cmyk-color-schemes/

First we go through topics color theory and color psychology

Understand color theory

Color theory is a set of fundamental principles that governs how to create good color combinations. Understanding these principles is an important first step in creating effective color palettes.

color wheel representing primary, secondary and tertiary colors

Primary colors : The three primary colors are Red, Yellow, Blue

Secondary colors : Secondary colors are combination of primary colors

Purple : red + blue

Green : blue + yellow

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Tertiary colors : Combining secondary colors with primary colors creates tertiary colors they are red-purple, yellow-orange, blue-green, etc.

We can also modify pure color

Tint : It is mixture of pure color and white color.

Shade : It is mixture of pure color and black color

Tone : It is mixture of pure color and both white, black colors

Example

pure color, tint, shade, tone

Color psychology and understanding cultural context

Using color intentionally in visualization is critical. Color evokes meaning and emotion at subconscious level. Color is a powerful tool for communicating a important message and creating recognition for useful data. Different colors have different meanings on individual level certain colors also have deep - rooted cultural significance.

For example, In western countries, red is an color used to represent danger sign where as in some countries like India red represents luck and love.

So, Psychology of people changes according to their habitat and culture using appropriate color is important for visualization. For example, we are working on tsunami effected areas in country if we represent red for least effected place it doesn't make meaning red is used to represent danger symbol. This shows us context is critical in color section.

Using color palettes

Strong understanding of color theory and color psychology is important to create color palette. The first color you choose should be the primary color, primary color in the sense not primary colors in color wheel, it is the color which we choose first for visualization refers to the main color in a palette. There are five main types of color palettes **analogous, monochromatic, triad, complementary, split complementary.** These are main types of palettes which gives pleasant visuals.

Analogous

Analogous colors sit next to each other on the color wheel. This

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Example

yellow, orange-yellow, orange

Monochromatic

These color palette is based on a single color paired with various shades and tints. Monochromatic palettes can be very pleasing to look.

Example

brown color with different shade and tint

Triad

This color palettes consists of three colors that are evenly spaced apart on the color wheel, forming a triangle.

Example
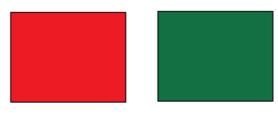
blue, yellow, red are the triad colors

Complementary

This color palettes contains colors on opposite ends of color wheel.

Example

red and green are opposite colors in color wheel

This color palettes are similar to complementary palettes but with a third color thrown in that which is next to one of the complementary colors.

Example

split complementary color palette

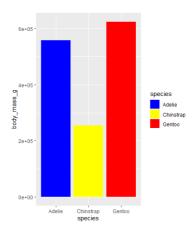Example for using color palettes using R

```R
#include palmerpenguins library anf ggplot2 library
library(palmerpenguins)
library(ggplot2)
triad_colors <- ggplot(penguins, aes(x = species, y
triad_colors + scale_fill_manual(values = c("blue",'
```

Output :

This is a example of using triad type palette and also represent that we have to use contrast colors to compare data

scale_fill_manual() function is used to create visuals as desired. Refer https://www.geeksforgeeks.org/how-to-manually-specify-colors-for-barplot-in-ggplot2-in-r for knowledge in bar plots.

There are also some inbuilt color palettes in R language this palettes are available in wesanderson package. Install wesanderson package in R script to get access of available color palettes in R language.

```R
R
```

❮
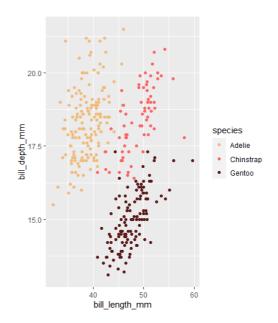
```
install.packages("wesanderson")
library(wesanderson)
monochromatic <- ggplot(penguins, aes(x = bill_lengt
# GrandBudapest1 is a available palette name
monochromatic + scale_color_manual(values = wes_pale
```
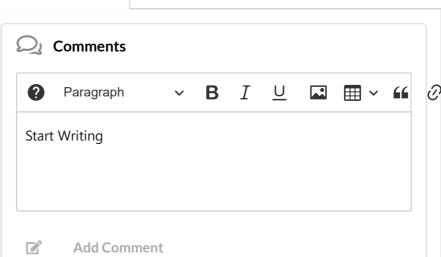
Output:

this example is for already available palettes and also

represents monochromatic type palettes

In the same way we can implement all types of palettes to create engaging visuals using R

use R 4.2.1 to run code

Words: 1035

Characters: 6853

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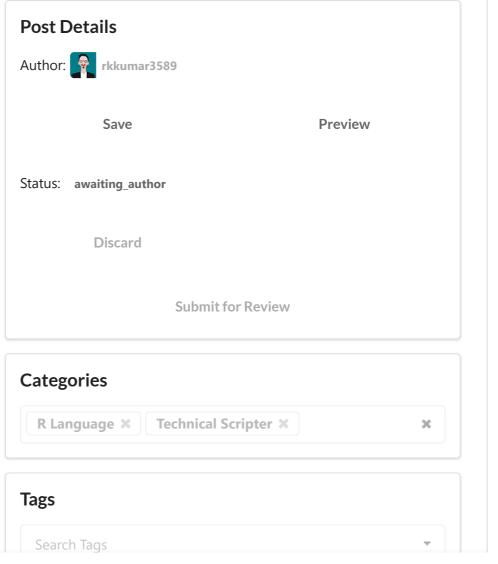
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Also cover the point of "Usage of Color palettes".

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1. Introduction about the topic 2. Concepts related to the topic 3. Steps needed 4. Good examples 5. Output screenshot ref - https://www.geeksforgeeks.org/r-bar-charts/

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