Star Properties

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Properties of star excercises

Loading the dataframe

```
library(tidyverse)
```

```
## -- Attaching packages ---------------------------------------- tidyverse 1.3.0 --

## v ggplot2 3.2.1     v purrr   0.3.3
## v tibble  2.1.3     v dplyr   0.8.4
## v tidyr   1.0.2     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.4.0

## -- Conflicts ------------------------------------------- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(dslabs)
data(stars)
options(digits = 3)
```

Getting summary of the dataframe

```
summary(stars)
```

```
##           star      magnitude          temp           type
##  Altair     : 2   Min.   :-8.00   Min.   : 2500   Length:96
##  *40EridaniA: 1   1st Qu.:-1.80   1st Qu.: 3168   Class :character
##  *40EridaniB: 1   Median : 2.40   Median : 5050   Mode  :character
##  *40EridaniC: 1   Mean   : 4.26   Mean   : 8752
##  *61CygniA  : 1   3rd Qu.:11.32   3rd Qu.: 9900
##  *61CygniB  : 1   Max.   :17.00   Max.   :33600
##  (Other)    :89
```

```r
str(stars)
```

```
## 'data.frame':    96 obs. of  4 variables:
##  $ star     : Factor w/ 95 levels "*40EridaniA",..: 87 85 48 38 33 92 49 79 77 47 ...
##  $ magnitude: num  4.8 1.4 -3.1 -0.4 4.3 0.5 -0.6 -7.2 2.6 -5.7 ...
##  $ temp     : int  5840 9620 7400 4590 5840 9900 5150 12140 6580 3200 ...
##  $ type     : chr  "G" "A" "F" "K" ...
```

Analysis 1

- Mean magnitude is: 4.26
- Standard deviation is: 7.35

```r
# Calculate the standard deviation
sd_magnitude <- stars %>% select(magnitude) %>%
    summarise(sd = sd(magnitude)) %>%
    .$sd
print(sd_magnitude)
```

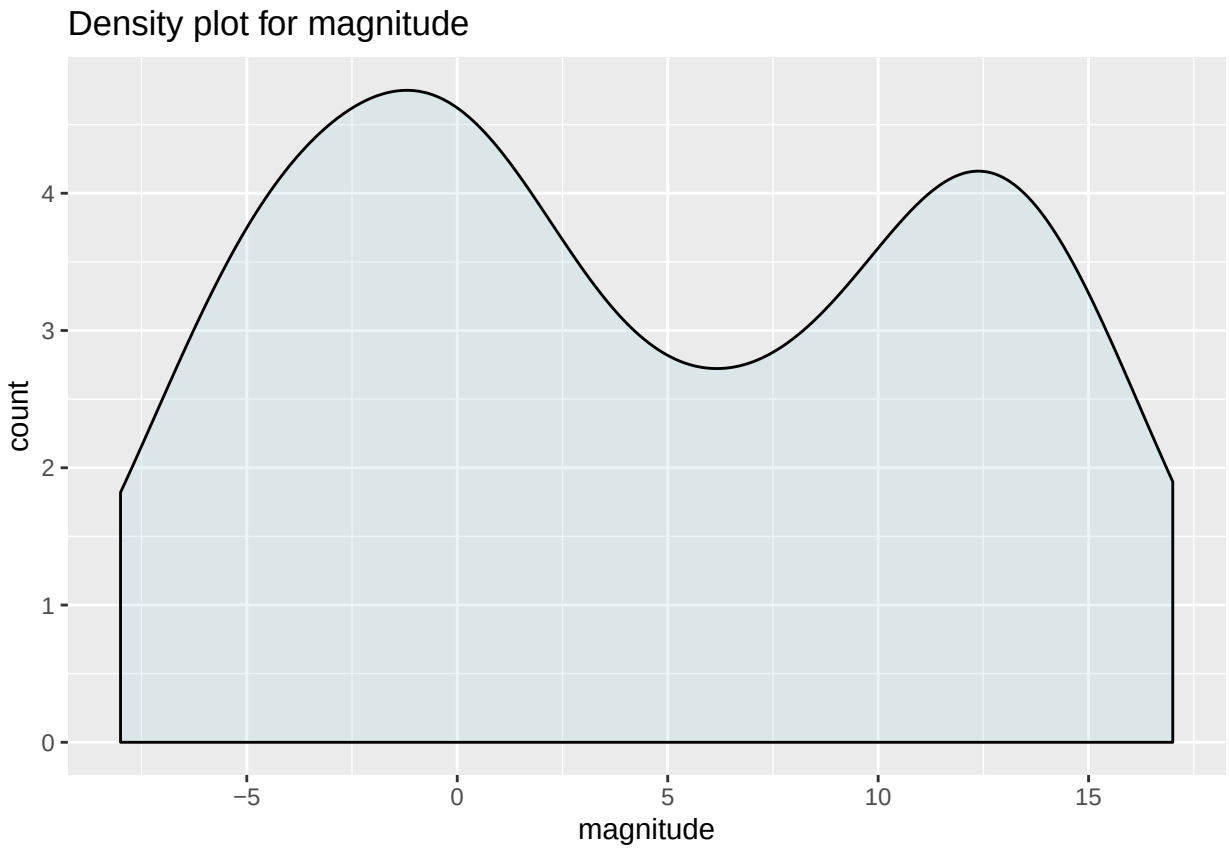
```
## [1] 7.35
```

Make a density plot of magnitude

Analysis

- There are 2 peaks, one at -1 and another at +12.5

```r
# Density plot for magnitude
stars %>% select(magnitude) %>% ggplot(aes(magnitude, y=..count..)) +
    geom_density(alpha = 0.25, fill='lightblue') +
    scale_x_continuous(breaks = c(-5,0,5,10,15)) +
    ggtitle("Density plot for magnitude")
```

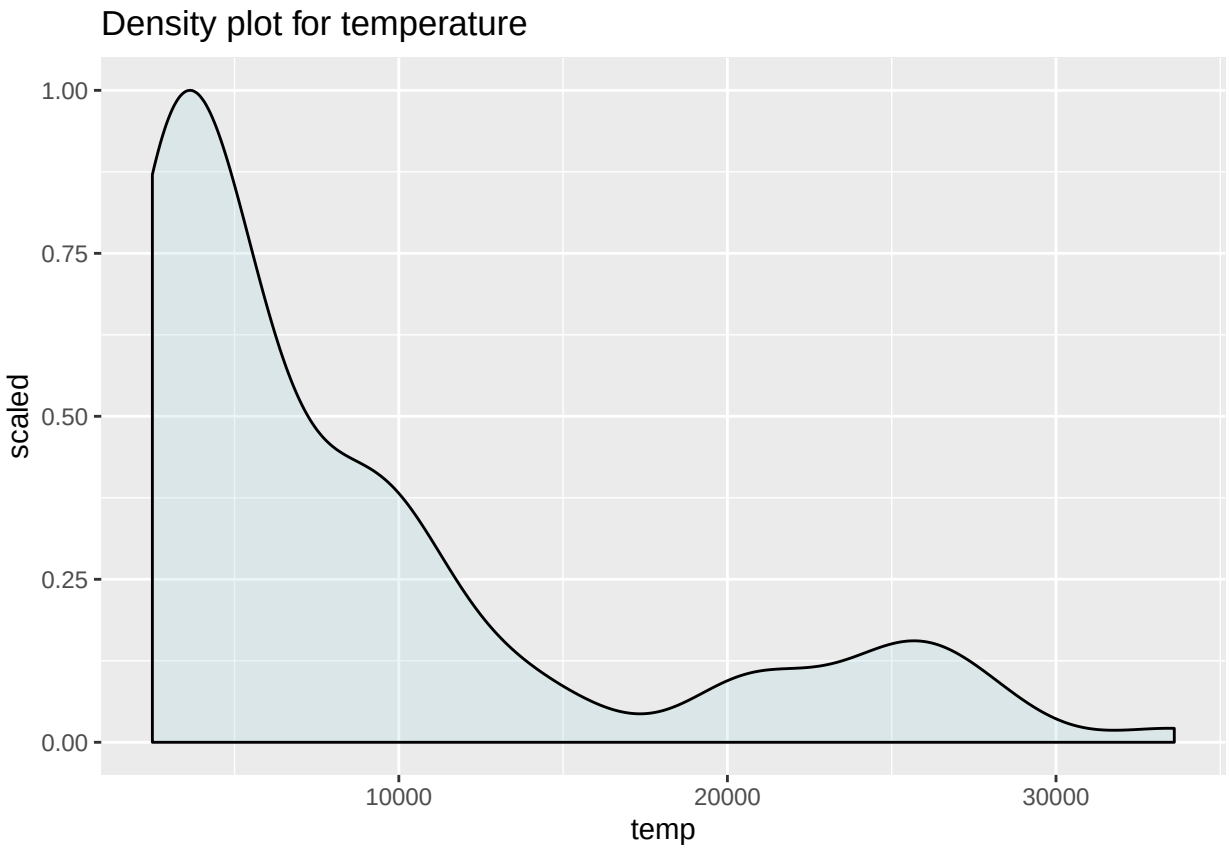


Distribution for star temperature

Analysis

- Most stars are low temperature

```
# Density plot for temperature
stars %>%
    select(temp) %>%
    ggplot(aes(temp, y =..scaled..)) +
    geom_density(alpha=0.25, fill='lightblue') +
    ggtitle("Density plot for temperature")
```



Scatter plot of magnitude vs temperature

Analysis

- Temperature increases as luminosity increases i.e. magnitude decreases.

```
# Scatter plot
p <- stars %>% ggplot(aes(temp, magnitude)) +
    geom_point(color='blue', size=2.5, alpha = 0.2 ) +
    ggtitle("Scatter plot for magnitude vs temperature")

# Inverting the axis to correlate luminosity and temp
p <- p + scale_y_reverse() +
    scale_x_log10() +
    scale_x_reverse()
```

```
## Scale for 'x' is already present. Adding another scale for 'x', which will
## replace the existing scale.
```

How many white-dwarf (low luminous & high temp stars) are there? 4

```
white_dwarfs <- stars %>% filter(temp>mean(temp) & magnitude>10)
print(count(white_dwarfs))
```

```
## # A tibble: 1 x 1
##       n
##   <int>
## 1     4
```

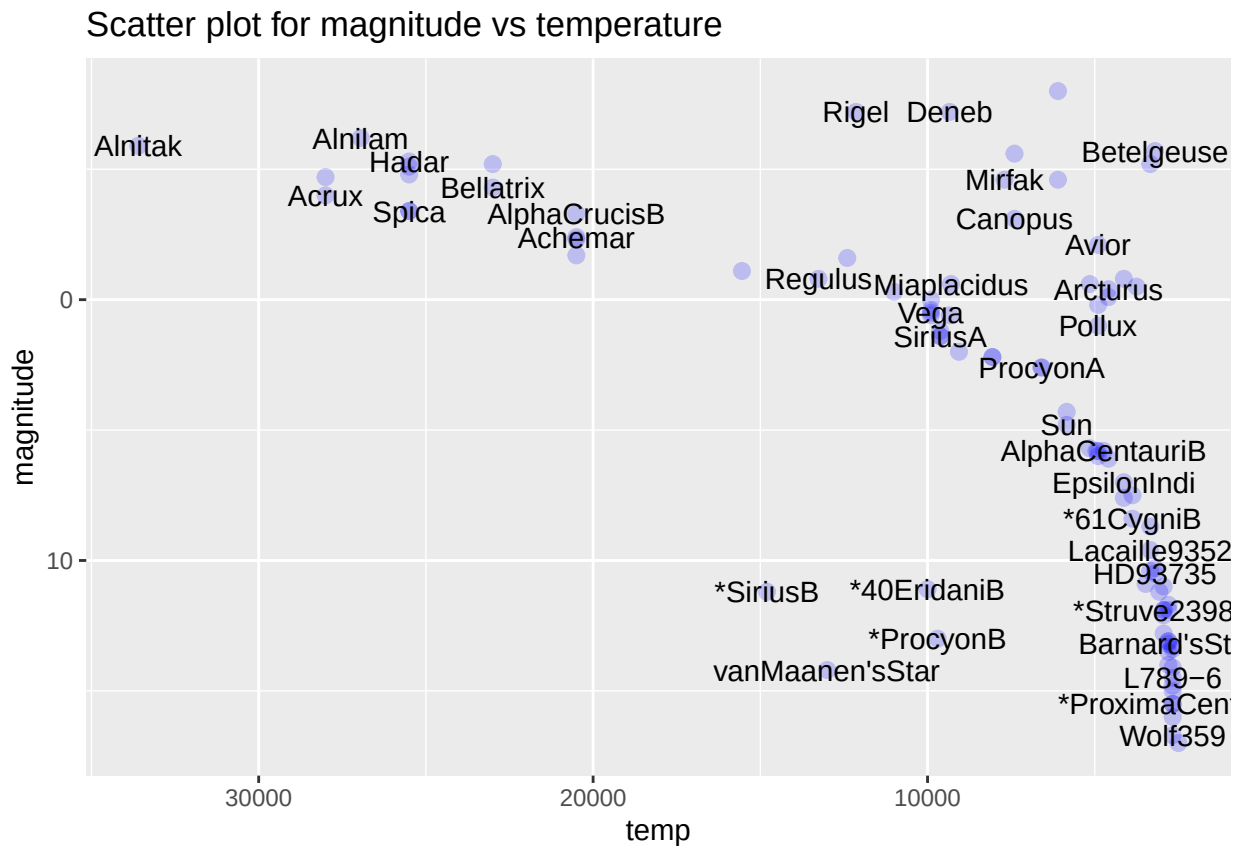
Mean temp of red giants (not white-dwarfs & not main sequence)? 5799

```
red_giants <- stars %>% filter(magnitude < 0 & temp < 10000)
print(mean(red_giants$temp))
```

```
## [1] 5799
```

Add text label to identify each star.

```
# Adding labels
p <- p + geom_text(aes(label = star), check_overlap = TRUE)
p
```

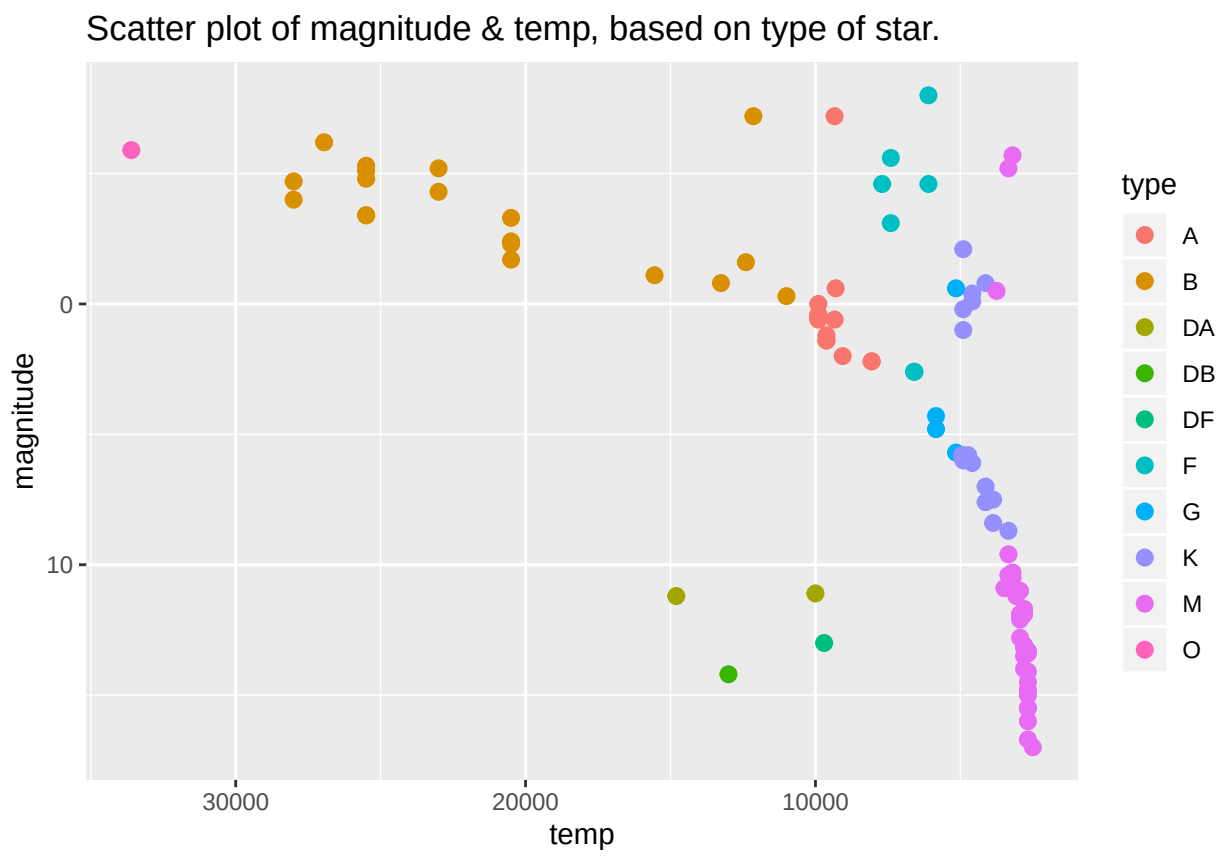


Scatter plot with color as type of star

```
p <- stars %>% ggplot(aes(temp, magnitude, color = type)) +
    geom_point( size = 2.5) +
    scale_y_reverse() +
    scale_x_log10() +
    scale_x_reverse() +
    ggtitle("Scatter plot of magnitude & temp, based on type of star.")
```

```
## Scale for 'x' is already present. Adding another scale for 'x', which will
## replace the existing scale.
```

```
p
```



Analysis

- `M` star type has the lowest temperature and luminosity.
- `O` star type has the highest temperature.