

changeover

Chris Parrish

December 10, 2016

changeover

references:

- Sheather, A Modern Approach to Regression with R, chapter 2, pp.30-33
- Data wrangling with `dplyr` and `tidyr`
- Stripchart with line segment, Raccoon

Load packages.

```
library(ggplot2)
library(dplyr)
```

Import the data.

```
data <- read.delim("changeover_times.txt", header=TRUE)
head(data, 3)
```

```
##      Method Changeover New
## 1 Existing          19    0
## 2 Existing          24    0
## 3 Existing          39    0
```

```
str(data)
```

```
## 'data.frame':  120 obs. of  3 variables:
## $ Method      : Factor w/ 2 levels "Existing","New": 1 1 1 1 1 1 1 1 1 1 ...
## $ Changeover: int  19 24 39 12 29 19 23 22 12 29 ...
## $ New         : int  0 0 0 0 0 0 0 0 0 0 ...
```

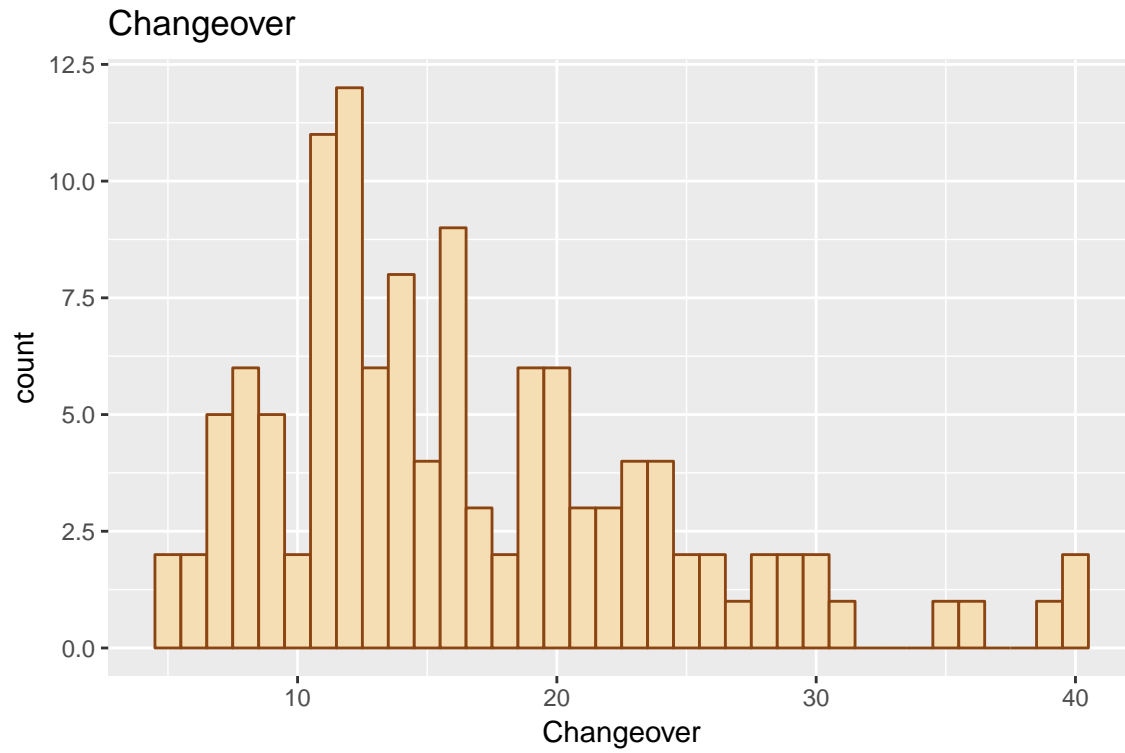
Numerical summaries of changeover times.

```
data %>%
  group_by(Method) %>%
  summarise(median = median(Changeover),
            IQR = IQR(Changeover),
            n = n())
```

```
## # A tibble: 2 × 4
##   Method median  IQR    n
##   <fctr> <dbl> <dbl> <int>
## 1 Existing    16 10.00    72
## 2      New     13 11.25    48
```

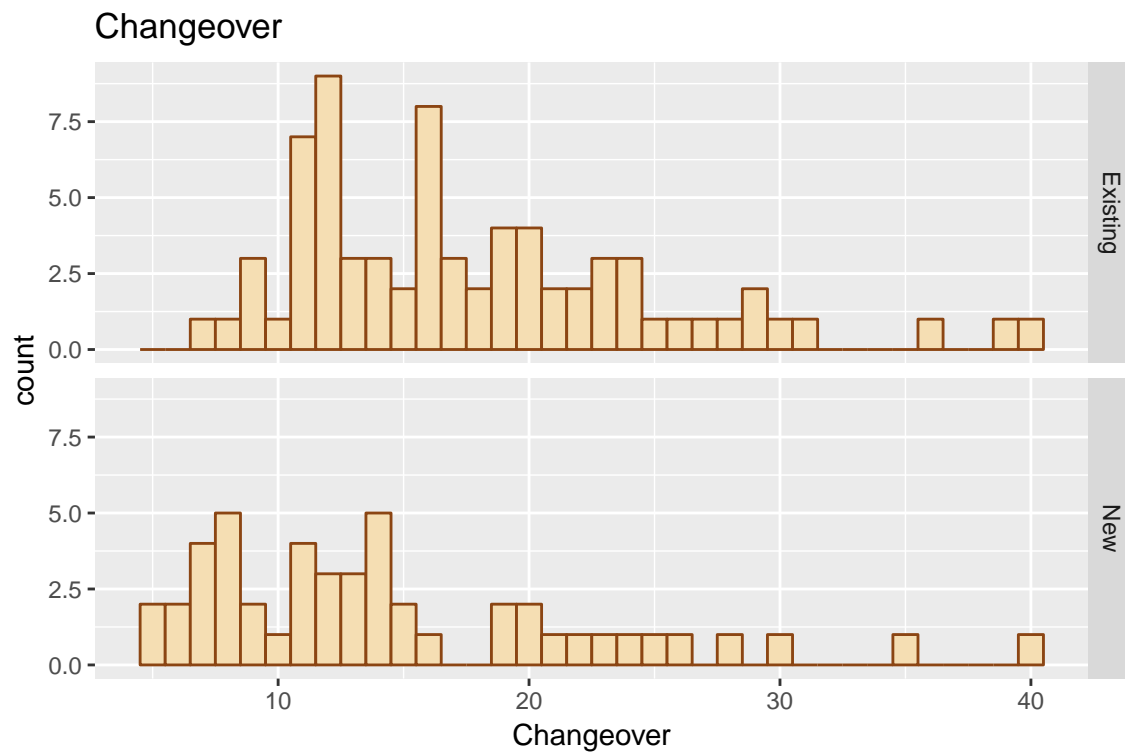
One histogram.

```
ggplot(data, aes(Changeover)) +
  geom_histogram(binwidth = 1, color = "saddlebrown", fill = "wheat") +
  ggtitle("Changeover")
```



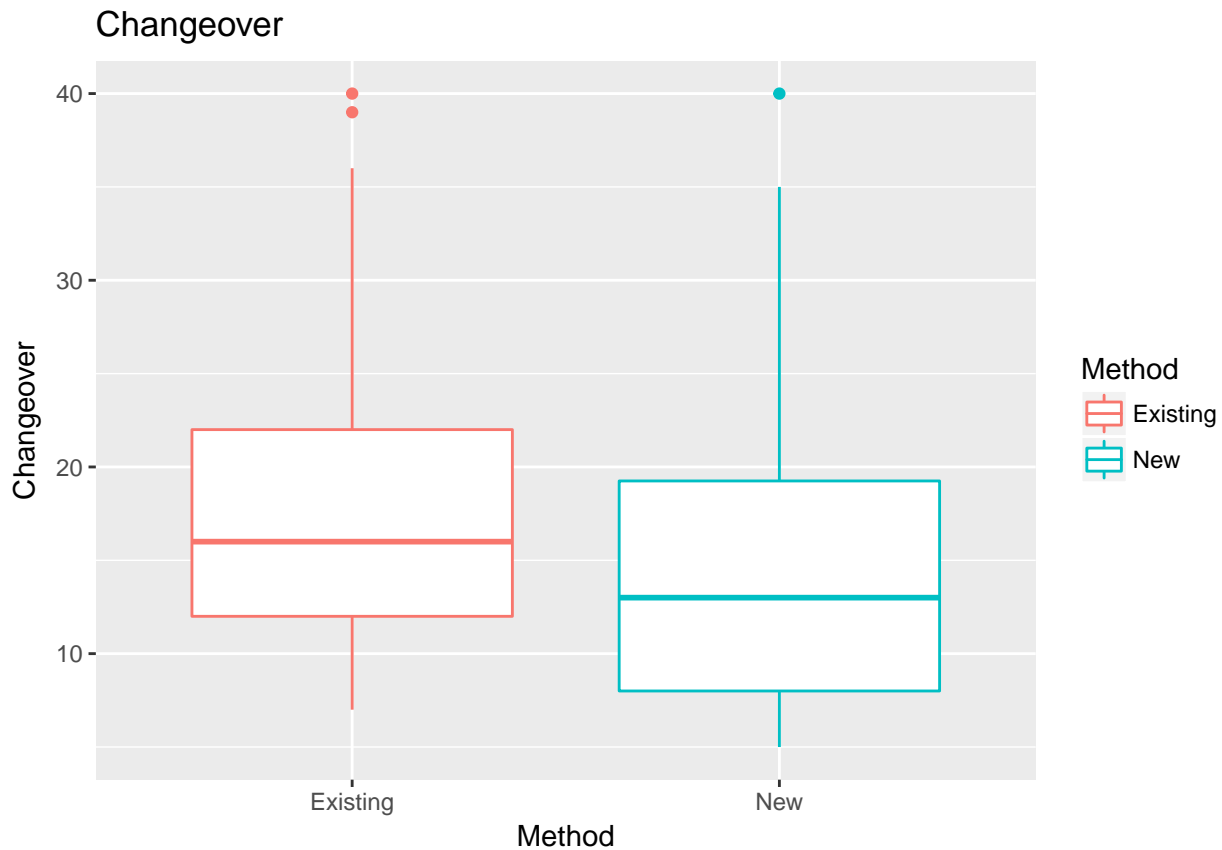
Two histograms.

```
ggplot(data, aes(Changeover)) +
  geom_histogram(binwidth = 1, color = "saddlebrown", fill = "wheat") +
  facet_grid(Method ~ .) +
  ggtitle("Changeover")
```



Boxplots.

```
ggplot(data, aes(Method, Changeover, color = Method)) +  
  geom_boxplot() +  
  ggtitle("Changeover")
```



Linear model.

```
changeover.lm <- lm(Changeover ~ Method, data=data)  
options(show.signif.stars = FALSE)  
summary(changeover.lm)
```

```
##  
## Call:  
## lm(formula = Changeover ~ Method, data = data)  
##  
## Residuals:  
##      Min       1Q   Median       3Q      Max   
## -10.861  -5.861  -1.861   4.312  25.312   
##  
## Coefficients:  
##              Estimate Std. Error t value Pr(>|t|)      
## (Intercept)  17.8611     0.8905  20.058  <2e-16     
## MethodNew   -3.1736     1.4080  -2.254  0.026     
##  
## Residual standard error: 7.556 on 118 degrees of freedom  
## Multiple R-squared:  0.04128,    Adjusted R-squared:  0.03315   
## F-statistic: 5.081 on 1 and 118 DF,  p-value: 0.02604
```

Group means.

```
change <- data %>% group_by(Method) %>% summarise(mean = mean(Changeover))  
change
```

```
## # A tibble: 2 × 2  
##   Method    mean  
##   <fctr>   <dbl>  
## 1 Existing 17.86111  
## 2      New 14.68750
```

```
ggplot(data, aes(Method, Changeover)) +  
  geom_jitter(width = 0.04, shape = 20, color = "darkred") +  
  geom_line(data = change, aes(x = Method, y = mean), color = "orange", group = 1) +  
  geom_point(data = change, aes(x = Method, y = mean), color = "orange") +  
  ggtitle("Changeover")
```

