

# Poisson\_fit.R

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```
# Poisson_fit.R
# Fitting the Poisson to frequency data

# Load necessary libraries
library(ggplot2)
library(MASS)

# Read in data set
poisdata <- read.table(header=T,colClasses=c("numeric","numeric"),text="
y obsfreq
0 6
1 15
2 17
3 29
4 20
5 6
6 5
7 1
8 1
9 0
10 0
")

# Generate offset y values for plot
poisdata <- transform(poisdata,yexp=y-0.1)
poisdata <- transform(poisdata,yobs=y+0.1)

# Print data
poisdata

##      y obsfreq yexp yobs
## 1  0         6 -0.1  0.1
## 2  1        15  0.9  1.1
## 3  2        17  1.9  2.1
## 4  3        29  2.9  3.1
## 5  4        20  3.9  4.1
## 6  5         6  4.9  5.1
## 7  6         5  5.9  6.1
## 8  7         1  6.9  7.1
## 9  8         1  7.9  8.1
## 10 9         0  8.9  9.1
## 11 10        0  9.9 10.1
```

```

# Convert tabulated data to raw form for R
ydata <- rep(poisdata[, "y"], poisdata$obsfreq)

# Calculate mean and variance
mean(ydata)

## [1] 2.91

var(ydata)

## [1] 2.628182

# Fit Poisson distribution
fitout <- fitdistr(ydata, "poisson")
fitout

##      lambda
## 2.9100000
## (0.1705872)

# Calculate expected frequencies
poisdata <- transform(poisdata, poisprob = dpois(poisdata$y, fitout$estimate))
poisdata <- transform(poisdata, expfreq = fitout$n * poisprob)

# Print revised data
poisdata

##      y obsfreq yexp yobs      poisprob      expfreq
## 1  0         6 -0.1  0.1 0.0544757299  5.44757299
## 2  1        15  0.9  1.1 0.1585243739 15.85243739
## 3  2        17  1.9  2.1 0.2306529641 23.06529641
## 4  3        29  2.9  3.1 0.2237333751 22.37333751
## 5  4        20  3.9  4.1 0.1627660304 16.27660304
## 6  5         6  4.9  5.1 0.0947298297  9.47298297
## 7  6         5  5.9  6.1 0.0459439674  4.59439674
## 8  7         1  6.9  7.1 0.0190995636  1.90995636
## 9  8         1  7.9  8.1 0.0069474663  0.69474663
## 10 9         0  8.9  9.1 0.0022463474  0.22463474
## 11 10        0  9.9 10.1 0.0006536871  0.06536871

# Generate plot showing frequencies
ggplot(poisdata, aes(yobs, obsfreq)) +
  geom_bar(stat = "identity", width = 0.05, fill = "blue") +
  geom_point(color = "blue", size = 3) +
  geom_bar(aes(yexp, expfreq), stat = "identity", width = 0.05, fill = "red") +
  geom_point(aes(yexp, expfreq), color = "red", size = 3) +
  ggtitle("Fitting the Poisson to frequency data")

```

