Creating Histograms in R

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Introduction

The histogram is a standard type of graphic used to summarise univariate data where the range of values in the data set is divided into regions and a bar (usually vertical) is plotted in each of these regions with height proportional to the frequency of observations in that region. In some cases the proportion of data points in each region is shown instead of counts.

The shape of the histogram is determined by the width and number of regions that divided up the data. A histogram provides an indication the following features of a set of data: the general shape, symmetry or skewness of data and modality (uni-, bi- or multi-modal).

To illustrate creating a histogram we consider data from the AFL sports league in Australia and the total number of points scored by the home team in each fixture. If we assume that the data is in a comma separated text file, named `afl_2003_2007.csv`, then we would import that data using the following command:

```
afl.df = read.csv("afl_2003_2007.csv")
```

The data is stored in a data frame called `afl.df` which we use to create a histogram with three possible graphics packages - **base**, **lattice** and **ggplot2**.

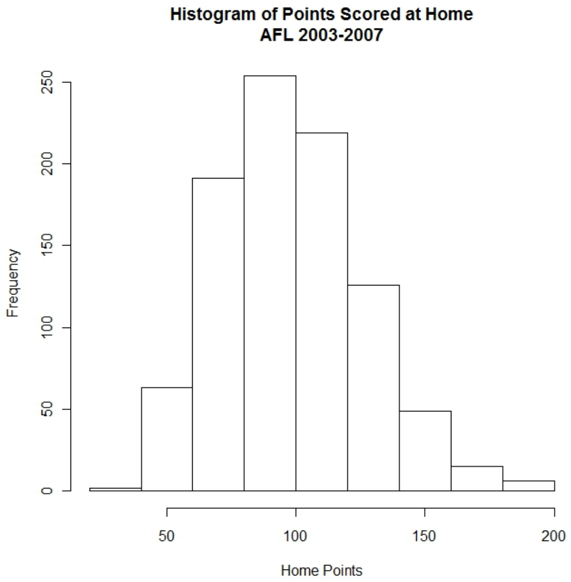
Base Graphics

In **base** graphics the function `hist` is used to create a histogram with the first argument being the name of the vector that contains the data to be plotted. The `x-axis` is given a label using the `xlab` argument and the `main` argument is used to add a title to the graph.

Code to create a histogram of home points is shown below:

```
hist(afl.df$Home.Total, xlab = "Home
Points", main = "Histogram of Points Scored
at Home\nAFL 2003-2007")
```

The default option is to display bars representing the frequency of data values in each of the ranges and the overall look of the graph is basic as shown here:



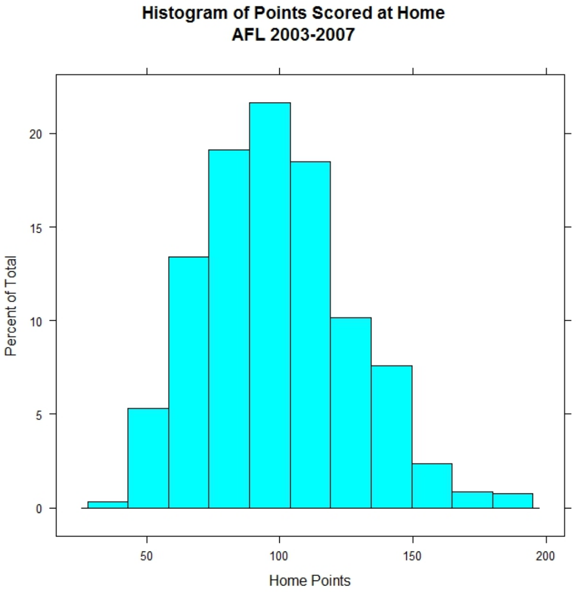
The default algorithm for selecting number of bins to use for the histogram usually makes a sensible selection but this can be specified if required.

Lattice Graphics

In the **lattice** graphics package there is a function `histogram` and we make use of the formula to specify a single variable for the number of points scored by the home team. The specification for the axis labels and graph title are the same as for the **base** graphics package. The equivalent graph is created using the following code:

```
histogram( ~ Home.Total, data = afl.df, xlab
= "Home Points", main = "Histogram of Points
Scored at Home\nAFL 2003-2007")
```

Here the default option is the work with proportions of the total number of data points rather than counts so the shape of the distribution is slightly different when compared to the **base** graphics plot. The **lattice** version is shown below:



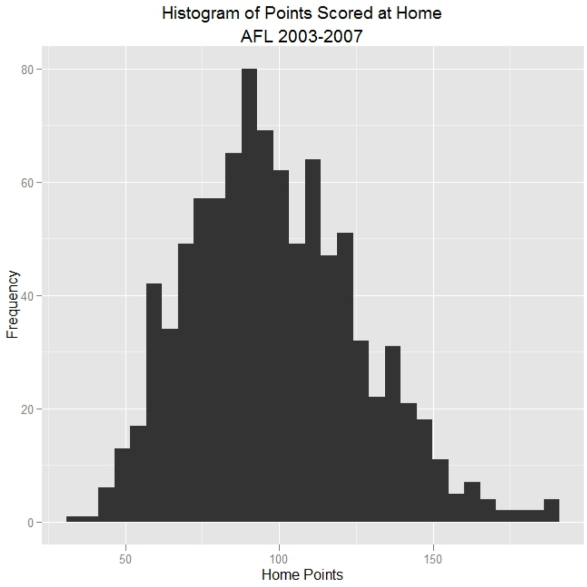
The main other difference is the choice of colour for the bars in the histogram and these can be adjusted by changing the global theme for **lattice**.

ggplot2 Graphics

The **ggplot2** library uses a general purpose graphics function called `ggplot` to create graphs of all types and the geom specifies the type of display to create, in this case a histogram. Components that make up the graph are added sequentially to build up the whole plot and in the example below we add axis labels and a main title.

```
ggplot(afl.df, aes(Home.Total)) +
geom_histogram() + xlab("Home Points") +
ylab("Frequency") + opts(title = "Histogram
of Points Scored at Home\nAFL 2003-2007")
```

The default theme for **ggplot2** is distinctive and the histogram is shown in the graph below:



The default number of bins is larger compared to **base** and **lattice** graphics which provides a rough distribution in this particular case.

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