

Plotting with `plotpdf()`

Georgi N. Boshnakov

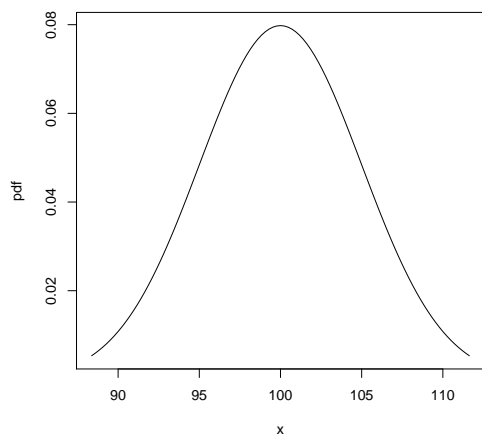
The function `plotpdf()` plots a function, usually probability density (pdf) or cumulative distribution function (cdf), over an interval containing the “interesting” part of the function. The interval is based on quantiles computed from a supplied cdf or quantile function.

`plotpdf()` is most useful when the quantiles are not readily available but here are some examples with a normal distribution to illustrate the idea:

```
> pdf1 <- function(x) dnorm(x, mean = 100, sd = 5) # pdf
> qdf1 <- function(x) qnorm(x, mean = 100, sd = 5) # qf
> cdf1 <- function(x) pnorm(x, mean = 100, sd = 5) # cdf
```

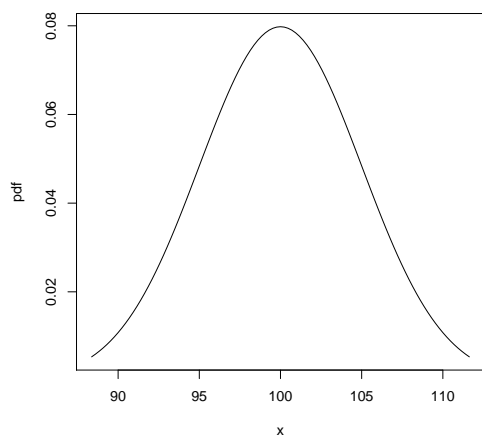
`plot(pdf1)` works but needs arguments 'from' and 'to' for a meaningful plot. We can simply pass the quantile function to `plotpdf()` to achieve this:

```
> plotpdf(pdf1, qdf1)
```



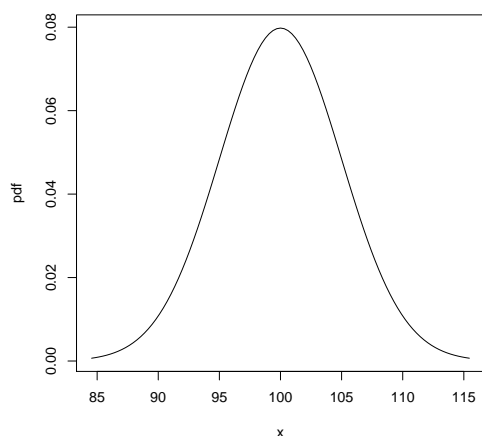
Similar result is obtained by supplying the cdf, which is handy when the quantiles are not easily available:

```
> plotpdf(pdf1, cdf = cdf1)
```

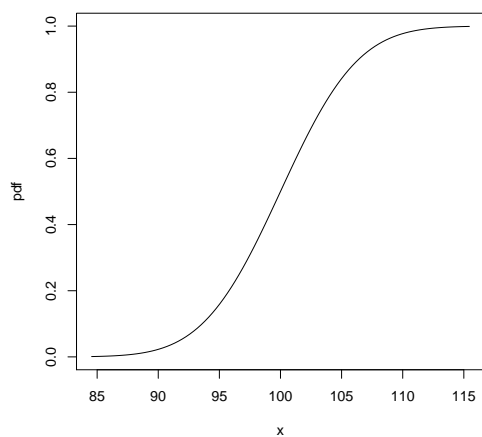


By default, the lower and upper 0.01 quantiles are used to set the limits on the x -axis. This can be changed with arguments `lq` and `uq`

```
> plotpdf(pdf1, cdf = cdf1, lq = 0.001, uq = 0.999)
```



```
> plotpdf(cdf1, cdf = cdf1, lq = 0.001, uq = 0.999) # plot a cdf
```



The pdf and cdf of a mixture distribution are usually straight-forward. Here is an example:

```

> pf1 <- function(x){
+   0.25 * pnorm(x, mean = 3, sd = 0.2) + 0.75 * pnorm(x, mean = -1, sd = 0.5)
+ }
> df1 <- function(x){
+   0.25 * dnorm(x, mean = 3, sd = 0.2) + 0.75 * dnorm(x, mean = -1, sd = 0.5)
+ }

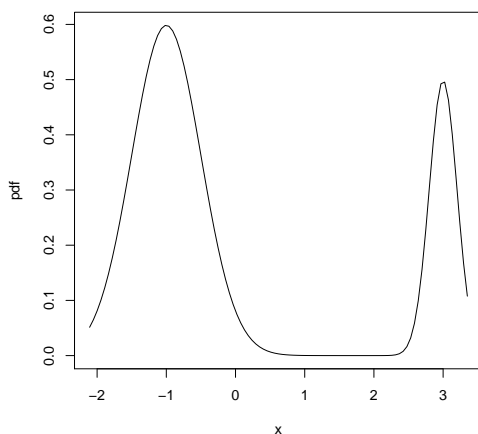
```

Here is a plot of the pdf:

```

> plotpdf(df1, cdf = pf1) # plot the pdf

```

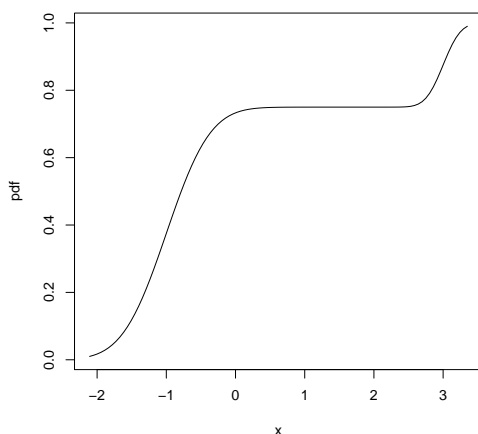


... and this produces the cdf:

```

> plotpdf(pf1, cdf = pf1) # plot the cdf

```

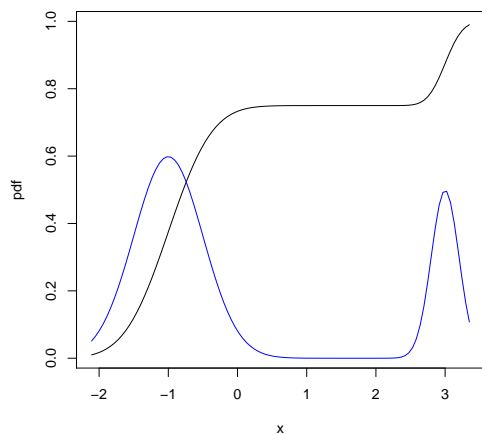


Additional arguments can be specified as for plot():

```

> plotpdf(pf1, cdf = pf1) # plot the cdf
> plotpdf(df1, cdf = pf1, add = TRUE, col = "blue") # overlay the cdf

```



`plotpdf()` uses `cdf2quantile()` to compute quantiles from a cdf. `cdf2quantile()` can be used directly, as well:

```
> c(q5pc = cdf2quantile(0.05, pf1), q95pc = cdf2quantile(0.95, pf1))
```

```
      q5pc      q95pc
-1.750551  3.168325
```