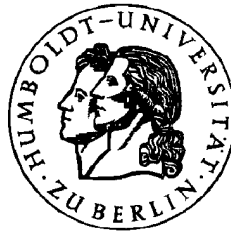


Web-based Interactive Teaching of Nonparametric Models

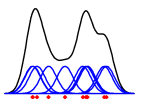
Marlene MÜLLER



June 16, 2000

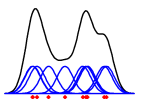
Institut für Statistik und Ökonometrie
Wirtschaftswissenschaftliche Fakultät
Humboldt-Universität zu Berlin, Germany

<http://ise.wiwi.hu-berlin.de/~marlene>



Outline

- Introduction
 - Introductory statistics
 - Advanced statistics courses
- WWW Interfaces to Stat/Math Software
- XploRe – XQC – XQS
- Teaching material on the Web
- Interactive Possibilities in XQC/XQS



Introduction

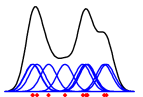
Profiles for computer–assisted teaching

- **Introductory courses**

Students learn the basic elements and methods

- **Advanced courses**

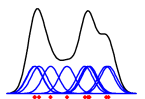
Students deal with particular statistical problems.



Introductory Statistics Courses

- only a few computer-based examples
 - computer-assisted teaching is meant to complement the course (300 students per year!)
- ⇒ computer programs are presented by the teacher/ are used by the students outside the classroom
- ⇒ main object is to study properties of statistical objects (e.g. variables, distributions) and methods (e.g. linear regression)
- ⇒ material should be easily accessible (WWW), mostly hardware independent, and easy to use

Statistics I, II → MM*stat (www.mm-stat.de)



Advanced Statistics Courses

- software is directly used by students
 - course scripts in electronic form are available
- ⇒ students apply “serious” statistical methods to real world examples
- ⇒ students get an introduction into programming the methods themselves

Applied Multivariate Statistical Analysis

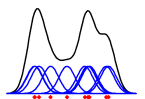
→ ise.wiwi.hu-berlin.de/statistik/multi.html

Non- and Semiparametric Modelling

→ ise.wiwi.hu-berlin.de/statistik/npm.html, ise.wiwi.hu-berlin.de/statistik/spm.html

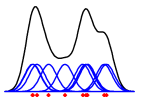
Statistics of Financial Markets

→ ise.wiwi.hu-berlin.de/statistik/fin_ma.html



General Software Requirements

- for introductory courses, routines should be mostly self-explaining,
- for advanced courses, several levels of complexity should be possible: from simple and easy-to-modify macros to full-featured applications,
- easy to access software,
- network capabilities, in particular WWW integration.

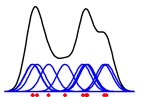


Specific Software Requirements

- state-of-the-art statistical methods,
- graphics: 2D and 3D,
- user interaction
- (high level) programming language.

...

- easy to learn/program,
- computational speed.



WWW Interfaces to Stat/Math Software

- **Rweb**

<http://www.math.montana.edu/Rweb>

- **StatServer (S-Plus)**

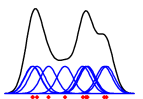
<http://www.mathsoft.com/statserver>

- **XploRe (Java version)**

<http://www.xplo-re-stat.de/java/java.html>

- **MathXplorer/JS (MathViews)**

<http://www.mathwizards.com/products/MathXplorerJ>



Statistics over the WWW

- **WebStat**

<http://www.stat.sc.edu/webstat/>

- **Xlisp-Stat**

<http://www.stat.ucla.edu/~jose/Xlisp-Stat.cgi>

- **XploRe**

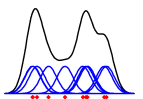
<http://www.xploRe-stat.de/java/java.html>

- **Statlets**

<http://www.sgcorp.com/statlets.htm>

- **GASP** Globally Accessible Statistical Procedures

<http://www.stat.sc.edu/rsrch/gasp/>



Web Enhanced Courses

- **Overview**

<http://www.execpc.com/~helberg/statistics.html>

- **GAUSS Programming for Econometricians**

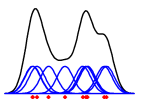
<http://eclab.econ.pdx.edu/gpe>

and ...

- **Non- and Semiparametric Modelling (XploRe)**

<http://ise.wiwi.hu-berlin.de/statistik/npm.html>

<http://ise.wiwi.hu-berlin.de/statistik/spm.html>

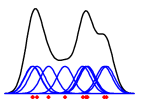


XploRe

<http://www.xplore-stat.de>

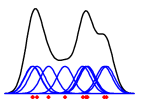
- interactive computational environment for statistics
- can be used either as standalone version as well as within a local network or the Internet

Schmelzer, Kötter, Klinke & Härdle (CompStat'96 Proceedings),
Härdle, Klinke, Müller: XploRe Learning Guide (Springer 1999)



XploRe Flavours

- ★ generic (standalone) versions
for Unix/X11 (Solaris/Sparc, Linux/PC, ...) and for
MS Windows (95/98/NT/2000 for PC)
- ★ Java client/server version – XQC/XQS
The server might run on a remote machine. The
XploRe Java client runs under Java 1.1.
- ★ Java applet version at the XploRe Web site – XQC
<http://www.xplore-stat.de/java/java.html>



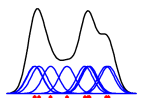
Teaching Material on the Web

- <http://ise.wiwi.hu-berlin.de>
→ Statistics → courses & material

The screenshot shows a Netscape browser window with the title "Netscape: Institut für Statistik und Ökonometrie". The address bar contains "http://ise.wiwi.hu-berlin.de/". The website header features a logo of a building and the text "Institute for Statistics and Econometrics". Below the header is a navigation menu with buttons for "professors", "assistants", "courses & material", and "research". The "courses & material" button is selected. The main content area is divided into "courses:" and "material:". Under "courses:", there are two columns: "Grundstudium" and "Hauptstudium". Under "material:", there are two columns of links. The footer contains contact information for Humboldt-Universität zu Berlin, including the address, phone, and fax numbers.

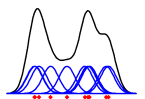
courses:	
Grundstudium	Hauptstudium
Statistische Methodenlehre I	Semiparametrische Methoden Nichtparametrische Methoden
Statistische Methodenlehre II	Multivariate Statistische Methoden
WM*Stat - Statistik multimedial	Computergestützte Statistik I Computergestützte Statistik II
Privatissimum	Applied Quantitative Methods
Einf. in die stat. Programmiersprache XploRe	Verallgemeinerte Lineare Modelle
Interaktive computergestützte stat. Analyse	Wirtschaftsstatistik
	Statistik der Finanzmärkte

Humboldt-Universität zu Berlin, Wirtschaftswissenschaftliche Fakultät, Lehrstuhl für Statistik
Spandauer Str. 1 10178 Berlin/Germany
Phone:+49-30-2093-5630 Fax:+49-30-2093-5649

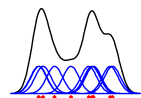
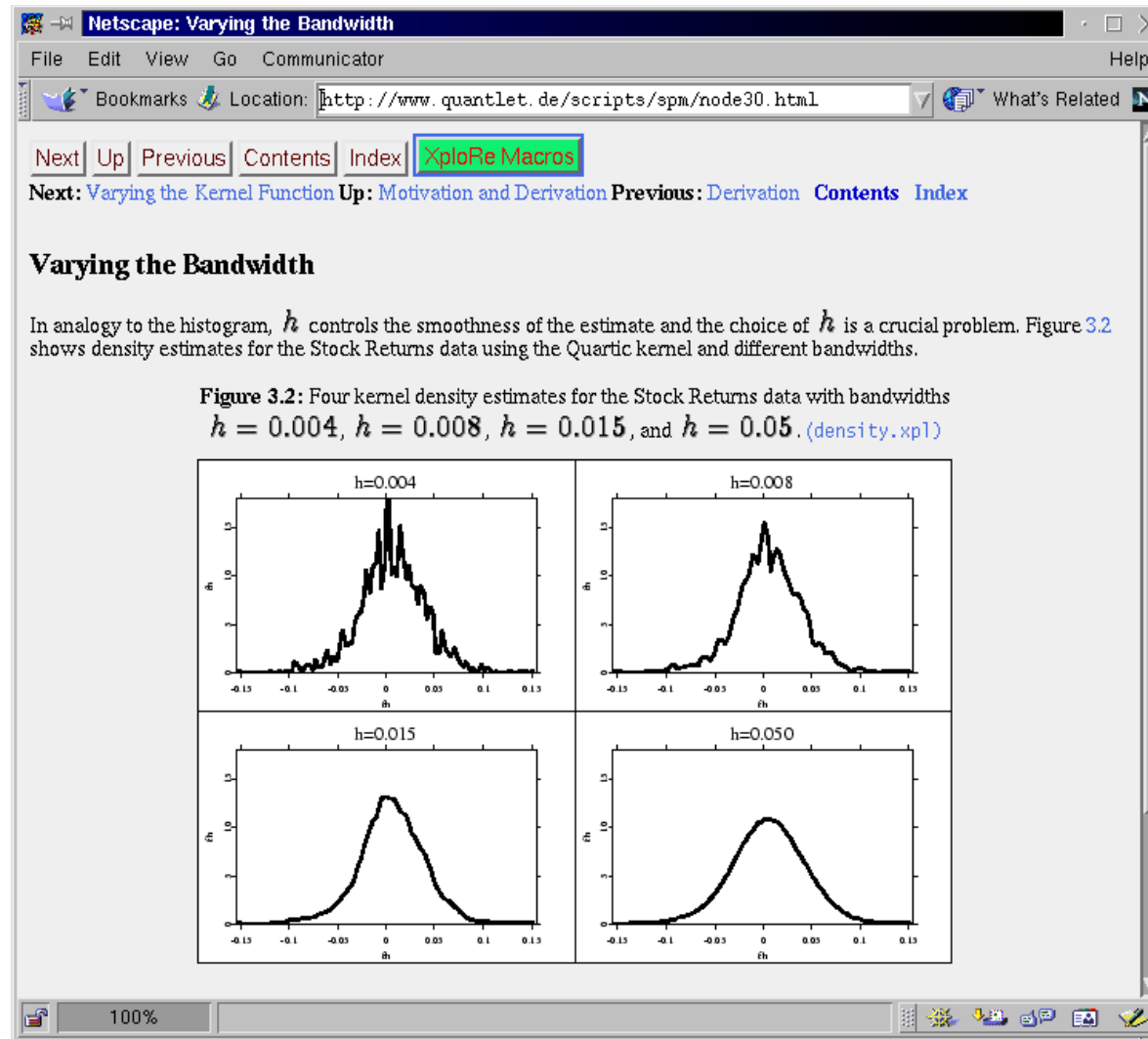


XploRe Based Teaching Material on the Web

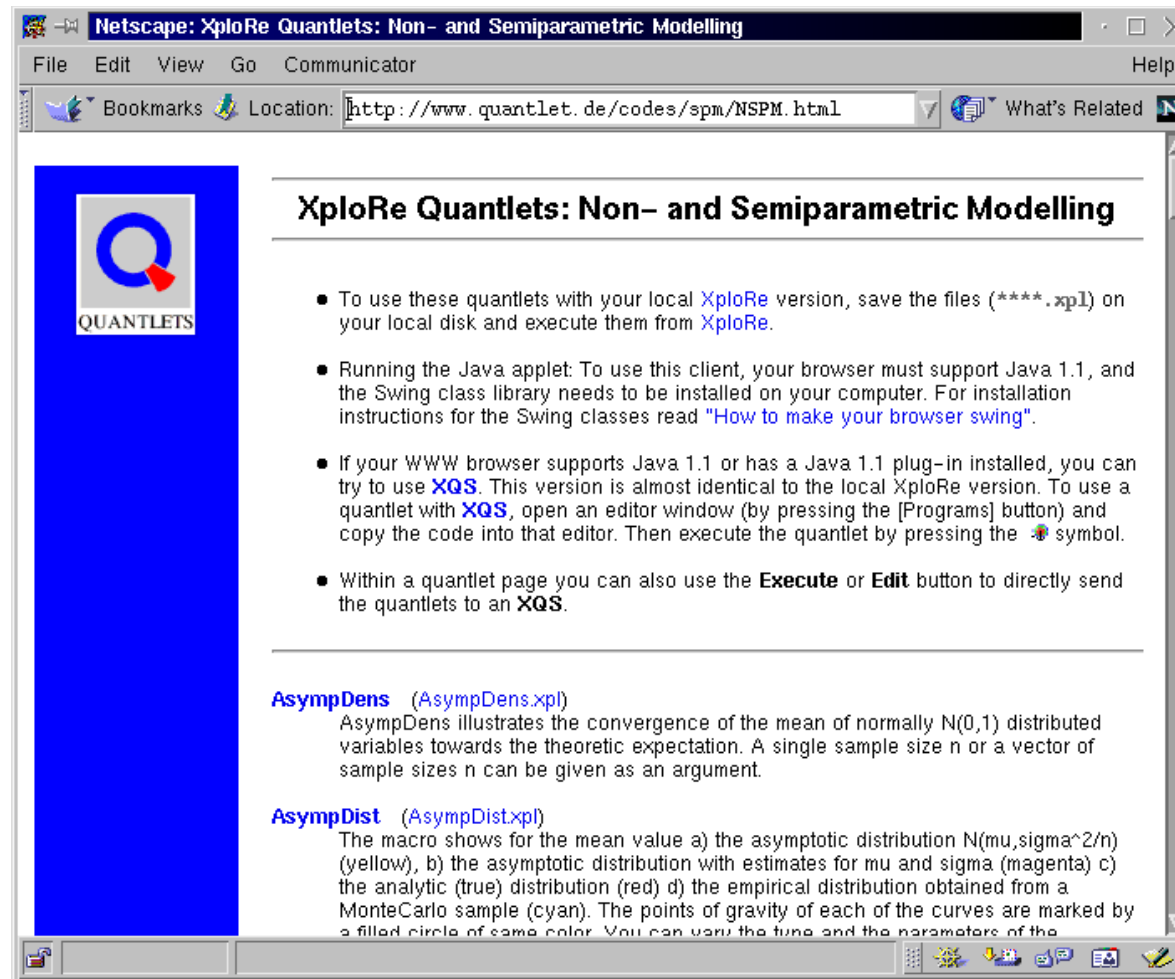
- <http://www.xplore-stat.de/ebooks/ebooks.html>




Electronic Scripts with Hyperlinks



XploRe Quantlets

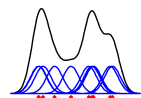


XploRe Quantlets: Non- and Semiparametric Modelling

- To use these quantlets with your local [XploRe](#) version, save the files (*.xpl) on your local disk and execute them from [XploRe](#).
- Running the Java applet: To use this client, your browser must support Java 1.1, and the Swing class library needs to be installed on your computer. For installation instructions for the Swing classes read "[How to make your browser swing](#)".
- If your WWW browser supports Java 1.1 or has a Java 1.1 plug-in installed, you can try to use [XQS](#). This version is almost identical to the local XploRe version. To use a quantlet with [XQS](#), open an editor window (by pressing the [Programs] button) and copy the code into that editor. Then execute the quantlet by pressing the  symbol.
- Within a quantlet page you can also use the **Execute** or **Edit** button to directly send the quantlets to an [XQS](#).

AsympDens ([AsympDens.xpl](#))
AsympDens illustrates the convergence of the mean of normally $N(0,1)$ distributed variables towards the theoretic expectation. A single sample size n or a vector of sample sizes n can be given as an argument.

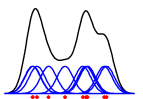
AsympDist ([AsympDist.xpl](#))
The macro shows for the mean value a) the asymptotic distribution $N(\mu, \sigma^2/n)$ (yellow), b) the asymptotic distribution with estimates for μ and σ (magenta) c) the analytic (true) distribution (red) d) the empirical distribution obtained from a MonteCarlo sample (cyan). The points of gravity of each of the curves are marked by a filled circle of same color. You can vary the tune and the parameters of the



```

; -----
; Library      NSPM
; -----
; See_also     denest createdisplay setmask setgopt
; -----
; Macro        density
; -----
; Description  estimates univariate kernel densities
;              with different bandwidths.
; -----
; Author       Stephanie Freese, Marlene Mueller 980604
; -----
library("plot")
library("smoother")
;
x=read("stock")
fh1=denest(x,0.004)
fh1=setmask(fh1,"line","solid")

```



Executable Quantlet

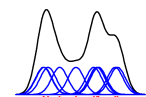


The screenshot shows a Netscape browser window titled "Netscape: density". The address bar contains the URL "http://www.quantlet.de/codes/spm/density.html". The page content includes a green banner at the top that says "XQS started, wait for applet!". Below this, the page is structured with several sections:

- Subject:** Non- and Semiparametric Modelling
- See XploRe:** [denest](#) [createdisplay](#) [setmask](#) [setgopt](#)
- Quantlet:** **density**
- Description:** estimates univariate kernel densities with different bandwidths.
- Download:** [density.xpl](#)
- Author:** Stephanie Freese, Marlene Mueller 980604
- Code:**

```
library(" graphic" )
library(" plot" )
library(" smoother" )
setsize(600, 450)
;
x=read(" stock" )
fh1=denest(x,0.004)
fh1=setmask(fh1, " line" , " solid" )
fh2=denest(x,0.008)
fh2=setmask(fh2, " line" , " solid" )
```

On the left side of the browser window, there is a blue sidebar with the "QUANTLETS" logo and four buttons: "Execute", "Edit", "Help", and "Quantlet List". The status bar at the bottom of the browser shows "100%" zoom and various system icons.



Editable Quantlet

Netscape: density
File Edit View Go Communicator Help
Location: <http://www.quantlet.de/codes/spm/density.html>

QUANTLETS

Execute
Edit
Help
Quantlet List

XQS started, wait for applet!

Subject: Non- and Semiparametric Modelling
See XploRe: [denest](#) [createdisplay](#) [setmask](#) [setgopt](#)

Quantlet: **density**
Description: estimates univariate kernel densities with different bandwidths.
Download: [density.xpl](#)

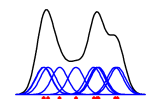
Author: Stephanie Freese, Marle

Code:

```
library("graphic")  
library("plot")  
library("smoother")  
setsize(600,450)  
;  
x=read("stock")  
fh1=denest(x,0.004)  
fh1=setmask(fh1,"line","solid")  
fh2=denest(x,0.008)  
fh2=setmask(fh2,"line","solid")  
fh3=denest(x,0.015)  
fh3=setmask(fh3,"line","solid")  
fh4=denest(x,0.05)
```

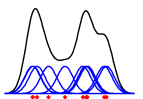
XploRe Editor density.xpl
File Edit XploRe

Unsigned Java Applet Window



Examples from Non- and Semiparametric Modelling

- ★ interactive examples
- ★ user-programmable examples



Interactive Examples

XploRe tools

- readvalue:
A input box to enter and modify parameters.
- selectitem:
A selection box to choose from a number of options.

User-Programmable Examples

XploRe tool

- XQC editor

