Wittier Webapps with RInside: Painlessly deploying R / C++ Apps on the Net

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And ever since, people have tried to fuse these two.

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- html, xml, css, ...
- cgi, ajax, javascript, websockets, ...
- xml, json, yaml, ...
- wdsl, soap, dom, ...
- java, perl, python, php, ruby, ...

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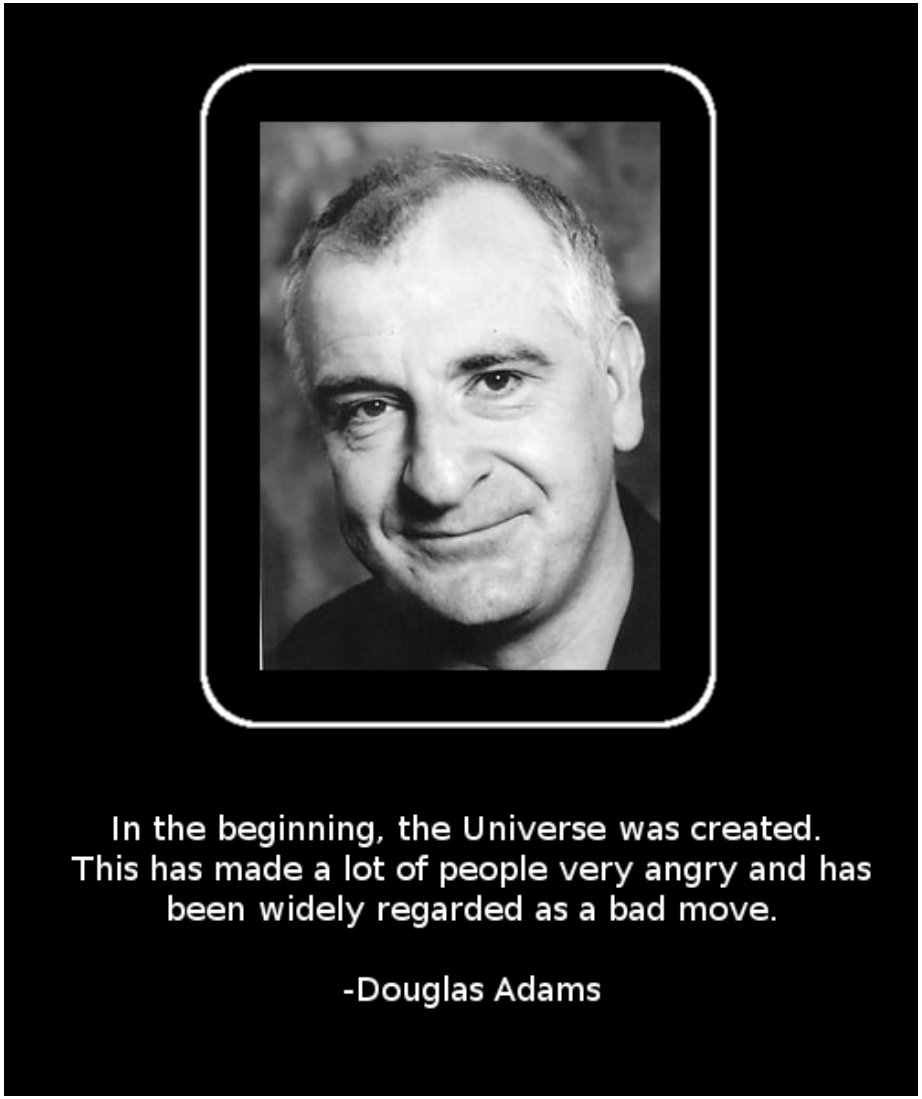


Image source: `http://i.imgur.com/IFIFb.jpg`

There has got to be a better way

My focus here in on combining C++ and R into applications.
But how do I connect these to the Web?

- When I was researching this issue I still looked at the wrong place: Wikipedia on JavaScript frameworks
- A better answer lurked here: Wikipedia on Web Application Frameworks
- Years ago a sharp colleague implemented remote control of co-located 'bots' (essentially lean and mean headless C++ applications) via an *embedded web interface*

This lead to Wt aka "witty".

Key features of Wt

A fuller discussion / list is on the Wt homepage, but in short:

- Automatic graceful degradation and progressive enhancement
- Supports server-initiated events (comet programming)
- A unified rendering API (SVG/HTML5 canvas/VML)
- Both client-side and server-side validation
- Various security features to avoid Cross-site scripting and CSRF vulnerabilities.
- Includes a compact, modern C++ ORM layer (Wt::Dbo)
- Uses WebSockets if available for communication between client and server, with fallbacks to Ajax or plain web pages

Source: `http://en.wikipedia.org/wiki/Wt_(web_toolkit)`

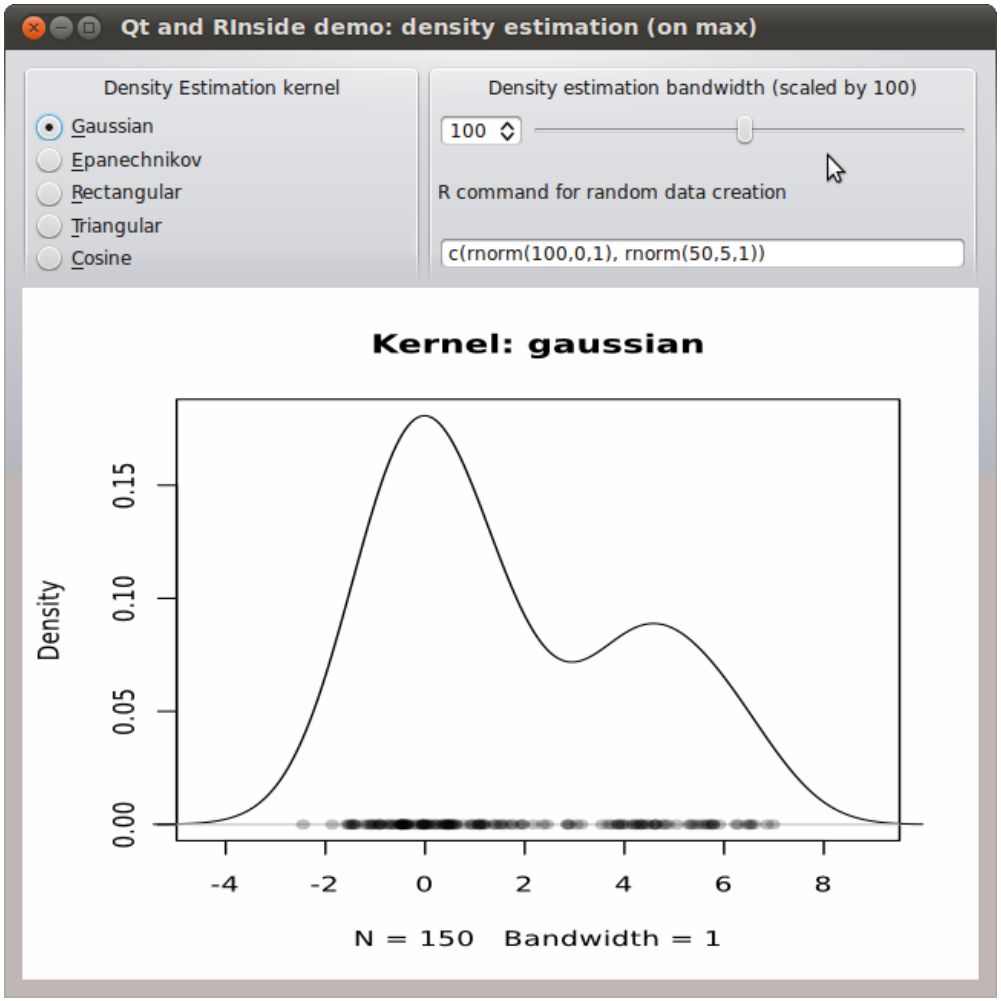
More key features of Wt

A more *personal* list:

- Zero effort installation on Debian / Ubuntu as Wt is packaged, and packaged well.
- A number of rather nice examples are included, and even the Wt website itself is written as a Wt / C++ app.
- Plenty of Doxygen-generated documentation on the API.
- Good mailing list support

It is really easy to get going.

So going from this Qt app ...



... to this Wt app is really painless

Witty WebApp With RInside - Mozilla Firefox

Witty WebApp With RInside

dirk.eddelbuettel.com:8088

Density Estimation

Density estimation scale factor (div. by 100)

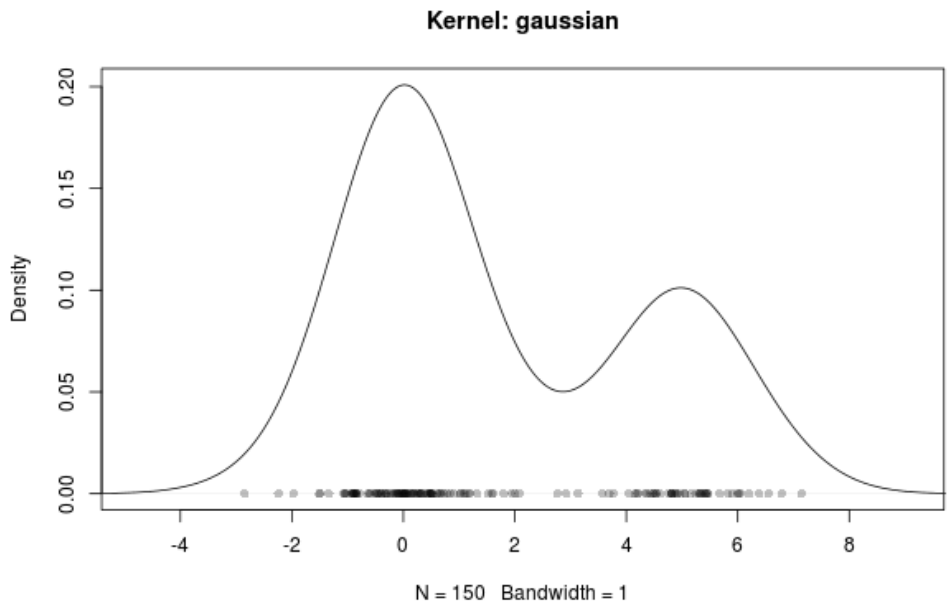
100

R Command for data generation

c(rnorm(100,0,1), rnorm(50,5,1))

- (•) Gaussian
- ( ) Epanechnikov
- ( ) Rectangular
- ( ) Triangular
- ( ) Cosine

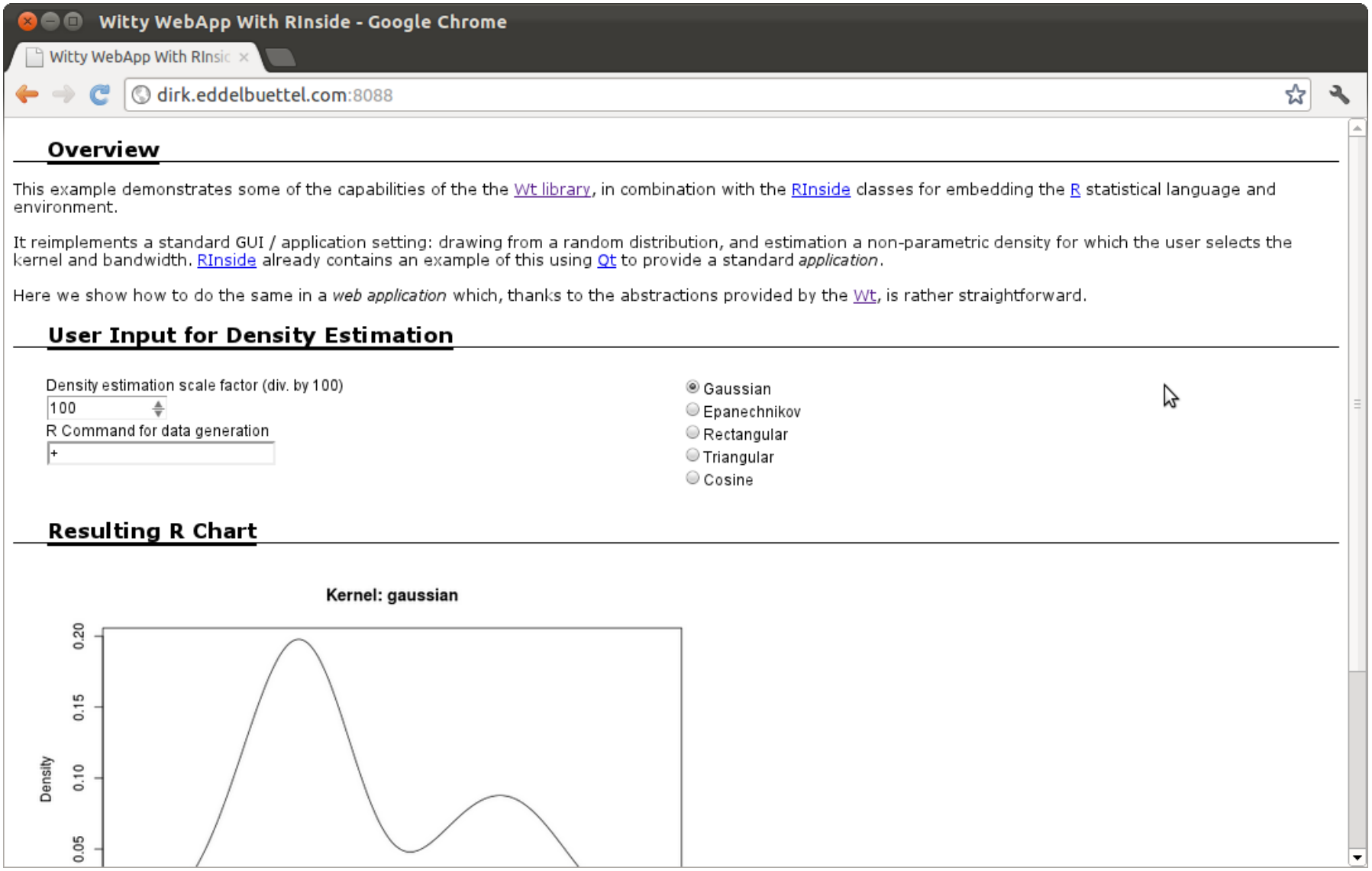
Resulting chart



Status

Finished request from 192.168.1.249 using Mozilla/5.0 (Ubuntu; X11; Linux i686; rv:8.0) Gecko/20100101 Firefox/8.0

... and even a dressier one with CSS and XML



Open issues for this example application

These points are mostly RInside issues:

- Single instance of R via RInside—so in the example, all 'session-specific data' goes back and forth to clients.
- Possibly cache it based on a per-client hash map cookie
- Or rather look into making RInside `fork()` on new connections (as e.g. Rserve does).
- Currently no error recovery, so each `eval()` should probably be wrapped in a `try/catch` block.

Resourses

- The Wt toolkit is available and documented at `http://www.webtoolkit.eu/wt`.
- RInside is available via CRAN and `http://dirk.eddelbuettel.com/code/rinside.html`; the sources contain the Qt and Wt examples shown here.
- We mention Rcpp too as RInside relies heavily on it: available via CRAN and at `http://dirk.eddelbuettel.com/code/rcpp.html`.