Subject: Re: time series analysis - request for ideas?
Posted by R.G.Stockwell on Tue, 21 Sep 2010 16:35:59 GMT
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"a" <oxfordenergyservices@googlemail.com> wrote in message
news:da83c4e7-1249-4a7e-8138-90bce4e37df0@l17g2000vbf.google groups.com...
> Hi
>
> I have a number of experimental time-series data (say 100) each of
> which consists of a number of readings at 10 second intervals for a
> year.
>
> I want to simulate many thousand of these time-series but they must
> agree statistically with the experimental data.
>
> Does anybody have any ideas of how this might be done or the types of
> fields that this problem has come up in?
>
> My initial thoughts were
>
> a) the distribution of values of the simulated must agree with
> experimental
> b) the distribution of (the change in each 10 seconds) must agree with
> experimental
> c) the autocorrelations of the simulation must agree with experimental
>
> The experimental data does not look like it can be used with fourier
> analysis - there are lots of spikes, lots of plateaus and lots of very
> low contiguous values etc.
>
> Any ideas appreciated
>
> Cheers!
>
> Russ

I would fit to find what kind of autoregressive process it appears to be.
Check out the power spectrum, and if it is a red spectrum (which is fairly
universal
in geophysics) just create an autoregressive process to mimic the spectral
slope.

(I.e create a time series from random white data, make an recursive filter
to tune
the spectra to look like the real thing).

for example: (you can put in your own alpha, or change how many lags you

want)

```
function  rednoise,len

; rewrite to calc all random numbers at once.

randomnumbers = randomn(seed, len)


alpha = 0.99d ; the one-lag autocorrelation of the red noise


factor = sqrt(1-alpha^2)
x = dblarr(len)
x(0) = factor*randomnumbers[0];
for i=1L,len-1 do begin
 x(i)=x(i-1)*alpha + factor*randomnumbers[i];
endfor

return,x

end
```

Subject: Re: time series analysis - request for ideas?
Posted by oxfordenergyservices on Fri, 24 Sep 2010 13:02:39 GMT
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On 21 Sep, 17:35, "R.G. Stockwell" <noem...@please.com> wrote:
> "a" <oxfordenergyservi...@googlemail.com> wrote in message
>
> news:da83c4e7-1249-4a7e-8138-90bce4e37df0@l17g2000vbf.google groups.com...
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> factor = sqrt(1-alpha^2)
> x = dblarr(len)
> x(0) = factor*randomnumbers[0];
> for i=1L,len-1 do begin
> x(i)=x(i-1)*alpha + factor*randomnumbers[i];
> endfor
>
> return,x

>
> end

Thanks RG

I'll take a look. One of the issues I have with the datasets is that they do not really resemble noise, white or red. There a periods of quietness, then periods of plateaus etc. Quite hard to model.

Thanks

Russ

Subject: Re: time series analysis - request for ideas?
Posted by Kenneth P. Bowman on Fri, 24 Sep 2010 14:58:10 GMT
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In article
<d6ff2568-ef07-4ccb-bbcf-13ea297e1177@n7g2000vbo.googlegroups.com>,
a <oxfordenergyservices@googlemail.com> wrote:

> I'll take a look. One of the issues I have with the datasets is that
> they do not really resemble noise, white or red. There a periods of
> quietness, then periods of plateaus etc. Quite hard to model.

You might need a hierarchical model. That is, a top-level random process that flips between different the modes of variability, and multiple low-level processes that simulate the statistics within each quasi-stationary period.

Ken Bowman

Subject: Re: time series analysis - request for ideas?
Posted by oxfordenergyservices on Fri, 01 Oct 2010 15:33:24 GMT
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On 24 Sep, 15:58, "Kenneth P. Bowman" <k-bow...@null.edu> wrote:
> In article
> < d6ff2568-ef07-4ccb-bbcf-13ea297e1...@n7g2000vbo.googlegroups .com >,
>
> a <oxfordenergyservi...@googlemail.com> wrote:
>> I'll take a look. One of the issues I have with the datasets is that
>> they do not really resemble noise, white or red. There a periods of
>> quietness, then periods of plateaus etc. Quite hard to model.
>

> You might need a hierarchical model. That is, a top-level random
> process that flips between different the modes of variability, and multiple
> low-level processes that simulate the statistics within each
> quasi-stationary period.
>
i think that's right. what i've tried so far makes simulations that
have the correct power spectrum but have effectively shuffled the time
signals so it doesn't look like the original.

i think i have to simulate activity or not and then introduce the
noise after.

thanks
