Subject: Re: pth order auto-regressive process with a specified mean and variance
Posted by Tom Van Niel on Tue, 14 Feb 2012 01:52:57 GMT
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Hi Yngvar,

That is just what I need. At the moment, I'm only using AR(1), so as long as I keep the parameter < 1, it should remain WSS. If I use AR(2) or greater, then I'll see if I can figure out the homework you have assigned :)

David, no need to look up your textbooks when Wikipedia is around, although it sounds like it brought back some good memories.

Thanks

Yngvar Larsen wrote:
> On Feb 13, 9:19 am, Tom Van Niel <mookiethe...@gmail.com> wrote:
>> Hi Guys,
>>
>> Does anybody have IDL code that simulates a pth order auto-regressive
>> process with a specified mean and variance? If so, please let me
>> know.
>>
>
> Well. Assuming that the parameters of your AR(p) process is
> chosen such that the process is wide-sense stationary, this should be
> easy:
>
> xmean = 0.9
> xvariance = 1.2
> ;; This example vector of AR(4) coefficients
> ;; results in a WSS process.
> ;; Homework: make sure this is the case yourself.
> ;; (Hint: Roots of characteristic polynomial
> ;; within unit circle)
> ;; My model:
> ;; X_t = \sum_{i=1}^p a_iX_{t-i} + n_t
> ;; with n_t iid normal.
> ;; Array A below contains (after reverse)
> ;; A = [a_{p-1}, ..., a_2, a_1]
> A = reverse([2.7607, -3.8106, 2.6535, -0.9238])
> p = n_elements(A)
> transient = 1000 ; Transient throwaway points
> npoints = 10000 + transient
>
> drive_proc = sqrt(xvariance)*randomn(seed, npoints)
> ar_proc = fltarr(npoints)

```
>  ar_proc[0] = drive_proc[0]
>  for ii=1, p-1 do $
>    ar_proc[ii] = drive_proc[ii] + $
>    total(A[p-ii:*]*ar_proc[0:ii-1])
>
>  for ii=p, npoints-1 do $
>     ar_proc[ii] = drive_proc[ii] + $
>     total(A*ar_proc[ii-p:ii-1])
>
>  ;; Remove transient points, where
>  ;; the process isn't WSS yet.
>  ;; Add mean value.
>  ar_proc = ar_proc[transient:*] + xmean
>
>  --
>  Yngvar
```
