Jason Byrne <jbyrne6@gmail.com>

Stats question

6 messages

Jason Byrne <jbyrne6@gmail.com> **24 June 2008 14:59**
To: eamonn.mullins@tcd.ie

Hi Eamonn,

I recently undertook the stats dip but was wondering if I can ask you a question on my work.
Essentially I have 'height-time' measurements of a feature tracking algorithm in images. I use the heights to derive velocity and acceleration. However I'm confused about what error analysis to perform. Would you know of anywhere I could find how to propagate errors into velocity and acceleration profiles with a derivative, especially for data sampled at uneven time intervals?

Cheers,
Jason.

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Eamonn Mullins <emullins@tcd.ie> **24 June 2008 15:08**
To: Jason Byrne <jbyrne6@gmail.com>
Cc: swilson@tcd.ie

Hi Jason

As I am completely ignorant of the area I have asked one of my colleagues who works with images (and who has also worked with physics data) if he could advise you. His name is Simon Wilson. He will be in touch.

Good luck!

Regards

Eamonn

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> <http://www.physics.tcd.ie/Astrophysics>www.physics.tcd.ie/Astrophysics

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Simon Wilson <swilson@tcd.ie> **7 July 2008 11:40**
To: Jason Byrne <jbyrne6@gmail.com>

Dear Jason,

Eamonn has passed this query on to me. I am sorry for the delay in replying. There are a couple of possibilities for what you want to do. Perhaps the best thing is to meet. However I am away for most of July - back around August 8th. Is that too late?

Simon

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Jason Byrne <jbyrne6@gmail.com> **7 July 2008 11:52**
To: Simon Wilson <swilson@tcd.ie>

Hi Simon,
Thanks for the reply. I think I have managed to figure out the errors analysis now; went through Bevington's book
(Bevington, "Data Analysis and Reduction for the Physical ; Sciences," McGraw-Hill (1969),)
and derived the maths behind using Lagrangian 3-point numerical differentiation on my heights to get vel & accel. and propagate the errors adequately. I think it is correct to take the exposure time of my instrument (ccd) as the error interval of the time-component for each data point. Unless you might suggest otherwise I'm happy enough now with the analysis. It's for a paper I submitted and am currently revising to resubmit before I head away myself in 2 weeks.
Cheers,
Jason.

2008/7/7 Simon Wilson <swilson@tcd.ie>:

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Simon Wilson <swilson@tcd.ie> **7 July 2008 12:44**
To: Jason Byrne <jbyrne6@gmail.com>

Hi Jason,

OK. The other possibility (and something that Bevington could not do in 1969) is a simulation study via bootstrapping that lets you estimate the likely errors in first and second derivatives. However I would say that unless you get some hassle from referees, go with what you have done.

Simon

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Jason Byrne <jbyrne6@gmail.com> **7 July 2008 13:37**

To: Simon Wilson <swilson@tcd.ie>

Ah ok, that sounds very interesting. The errors on the edges are significantly higher than my mid-points and though the maths explains why I was always of the opinion that the error is over-estimated based upon *not* knowing what an additional data point would do - but *I do* know the trend of increasing height is always maintained...

I might be interested in coming back to you in August if you are willing to talk about this. Certainly to have some ideas or a direction to take (reading papers etc) that might help would be great. My current knowledge of stats is limited: I did Theoretical Physics and never had a stats course, thus I undertook the diploma this year and certainly it stressed my need for sound error analysis in my PhD work.

Thanks Simon.

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