
Subject: Re: fitting many linear eqs simultaneously with outliers

Posted by [Jeremy Bailin](#) on Tue, 18 Oct 2011 06:56:16 GMT

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On 10/13/11 1:01 AM, Jeremy Bailin wrote:

> So I have a large number of very simple linear equations, which all look
> like:
>
> $a_i + b_i x_{ij} = a_k + b_k x_{kj}$
>
> for $i, k=1..N$ (all unique combinations of i and k), $j=1..M$. The data
> values x_{ij} and x_{kj} are measurements of the brightness of object j in
> images i and k respectively, where the images have an unknown zero point
> and scalings that I am trying to determine.
>
> (aside to astronomers: this may sound suspiciously like re-implementing
> mscimatch)
>
> Not all objects appear in all images, so there are different numbers of
> equations relating each pair of images. In principle, any number of
> linear solvers should work... BUT: it needs to be extremely robust to
> outliers. I know for a fact that there are many many many outliers, and
> there are some pairs of images where it looks like pure scatter. So I
> need some sort of solver that will do sigma clipping. Essentially, I
> want a sigma-clipping linear least squares solver that can solve more
> than one line at once.
>
> Does anyone know of such a beast already existing? Or something that's
> vaguely similar enough that I can use it as a basis?
>
> -Jeremy.

In case anyone cares, my solution was to get the user's brain (in this case, my undergrad) to do the hard work. I plotted up all the points for each possible pair of image combinations, got them to draw the best fit line on there, finessed it a little with a linear fit to only those points very close to the drawn line, and then solved for the best global solution for all images using singular value decomposition. Certainly not the most automated solution, but the results are beautiful. And my first ever IDL widget program...

-Jeremy.
