There are a huge number of solvers for non-linear least squares problems.

① Using Hessian

By doing a Taylor Series expansion of the ChiSquared test and finding the second term — the Hessian; that term could be used to evaluate the gradient of the gradient — that is the curvature of the Jacobian.

The Hessian would detect when the gradient of the function is zero — since the gradient of the gradient would near zero in those same locations. Could use Newton-Raphson to do this.

⇒ This approach would be faster than taking steps with the Jacobian (via steepest descent). Where the size of the step is proportional to the Hessian's gradient.

* The problem with this method is that the Hessian as a proportionality constant for step size is too variadic/unstable when not in the vicinity of an extrema.

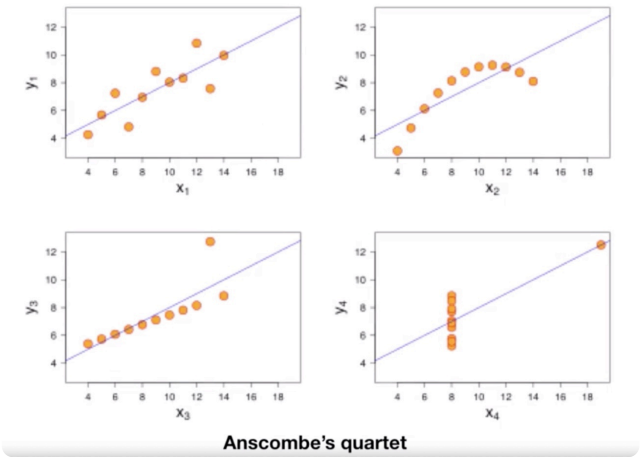
② Levenberg-Marquardt

- Uses steepest descent when far from the extrema
- then use Hessian closer to the extrema.
  if ChiSquared is getting better

⑤ Gauss-Newton, BFGS

- use Hessian's directly
- or - build up info about the Hessian iterstively
- depending on the convergence different methods are better

Robust Fitting



Fitting methods which place less significance on outliers/ flyer data points are called "robust".

One method more robust than Least Squares is taking the Absolute of the squared deviations.

(*) Numerical Methods book.