As a general nonlinear least square problem, because of the high complexity of computing Hessian matrix, quasi-Newton algorithms have been developed that use approximations to the Hessian, and the most well-known quasi-Newton algorithm is the BFGS algorithm. In this paper, we firstly investigate the precise orthogonality condition equations to least square solution of ranging positioning equations, moreover, an important property of the relative errors, which can be used to check the precision of the iterative solution in the case of critical geometric configuration, was studied when the linearized equations of the original range equations become rank defect. Secondly, A new Newton-Type iterative formula, named Closed-Newton iterative formula with Hessian matrix information in this paper, whose forms is simple in this special case when the nonlinear function is distance metric function, is deduced, then we design a numerical example to verify the validation of the research results. At last, we draw two conclusions: 1): The Gauss-Newton iterative formula can be easily modified to the closed-Newton iterative formula; 2): The precise information of Hessian matrix can improve the iterative speed remarkably, especially in the case of the critical circumstances. Keywords: nonlinear, least square, Newton-Type method, Hessian