The linear L-curve has been used for a long time as a tool for finding a regularized solution of ill-posed or ill-conditioned problems.

We have generalized the L-curve to ill-conditioned nonlinear system of equations, \( f(x) = 0 \), by using the Tikhonov problem \( \min_x t(x) + \lambda y(x) \) where \( t(x) \) measures the size of the residual, \( y(x) \) measures the size of the solution and \( \lambda \) is the regularization parameter. We will show that the nonlinear L-curve is strictly decreasing and convex and that its dual, the a-curve, is strictly increasing and concave. Using these curves we have developed optimization algorithms implemented in Matlab for solving inverse, ill-posed, problems that we use in several different applications such as artificial neural networks, image analysis, and parameter estimation in differential equations.