We show that adaptive algorithms are much more powerful than nonadaptive ones for approximating piecewise smooth functions in the L^p norm for $p < \infty$. More specifically, let $\mathcal{F}_r$ be a class of functions $f : [0, T] \to \mathbb{R}$ whose derivatives of order up to r are continuous and uniformly bounded for any point except for one unknown singular point. We provide an adaptive algorithm $\mathcal{A}_n^*$ that uses at most n function values and whose worst case error is proportional to n^{-r}. On the other hand, the worst case error of any nonadaptive algorithm is bounded from below by $\Omega(n^{-1/p})$. The class $\mathcal{F}_r$ assumes no more than one singularity per each function. We show that this restrictions are necessary for the power of adaption in the worst case setting. Fortunately, we next show that adaption regains its power in the *asymptotic setting* even for a very general class F_r^∞ of piecewise smooth functions. Indeed this class consists of piecewise C^r-smooth functions, each having a finite number of singularity points; and for any function from this class, our adaptive algorithm approximates it with errors converging at least as fast as n^{-r}. We also prove that the rate of convergence for nonadaptive methods is bounded from below by $n^{-1/p}$, i.e., is much slower. The above mentioned results do not hold if the errors are measured in the L^∞ norm since no algorithm could produce small L^∞ errors for functions with unknown discontinuites. However, we strongly believe that the L^∞ norm is inappropriate when dealing with singular functions and, instead, *Skorohod's distance* should be used. We show that our adaptive algorithms regain all their positive properties when the approximation errors are measured in Skorohod's distance. Numerical results for different r and p on a variety of functions confirm the theoretical properties of our algorithms.