

ABSTRACT

Volatility is an important instrument in stock options. That is because volatility has a strong relationship with the price of stock options. By determining the value of the volatility in the future, then we can know the price of the option in the future. One way to determine the value of volatility using data from existing volatility is called implied volatility. Implied volatility can be determined by equating the theoretical price to the market price. Black-Scholes model is one of the theoretical model to determine the price of stock option.

To optimize the value of volatility, then used Newton Raphson method and the steepest descent. Newton Raphson method is one of the most popular methods for the settlement of the equation. Steepest descent method is a method that requires information derivatives in the form of gradient vector Jacobian. In this method also requires information of the second derivative in the form of a matrix Hess.

For the value parameter *black scholes*, $S_0 = 21$, $E = 20$, $r = 0.1$, $t = 0.25$, $c = 1.875$, with *Newton Raphson*, the obtained value volatility of 0.234512914 with 7 iterations. If using steepest descent method volatility values obtained for 0.234203651 with 1565 iterations. There are two differences in these 2 methods, steepest descent get a better value but computationally takes longer till at the 1565 iteration.

Keyword : *Implied Volatility, Black-Scholes, Newton Raphson, Steepest Descent*