Conventional inversion methods of hypocentral parameters suffer from the vulnerability of high dependence on given velocity models. Accurate inversion methods often require large computational resources. A simple and efficient algorithm based on an 1-D velocity structure is introduced for inversion of hypocentral parameters of local earthquakes. The algorithm utilizes a weighted average P-velocity in the medium between the source and receivers. The accuracy is tested with synthetic data. The algorithm is applied for inversions of hypocentral parameters of natural earthquakes. The algorithm is benchmarked to conventional algorithms with high accuracy. The algorithm is found to have high accuracy, and is 100 times cheaper than an iterative inversion method based on a genetic algorithm in terms of computational time. The algorithm can be implemented to any conventional hypocentral inversion methods.