The present study focuses on the improvement of the activity and thermostability of an extracellular esterase enzyme from a *Bacillus subtilis* strain isolated from soil. The *Bacillus subtilis* strain was isolated by dilution plate method and tested for its ethyl acetate hydrolyzing ability. Then, the strain was subjected to UV mutagenesis technique by utilizing a UV light source with 254nm wavelength and 20Watt power from a distance of 20cm. The mutants were screened using a high throughput screening method by overlaying the screening media which comprised of 5mM HEPES buffer (pH 8), 0.45mM phenol red (indicator), 0.4% agarose, and 0.5mM ethyl acetate as the substrate on the bacterial growth on LB agar. The H/C ratio i.e. the ratio of the diameter of hydrolysis zone to the diameter of colony was measured to ensure screening the best mutants with highest ethyl acetate hydrolyzing efficiency. The mutant BSM-1 showed a 266% higher (40 ± 0.8 U/ml) activity compared to the wild-type esterase (15 ± 0.2 U/ml) while the mutant BSM-2 also showed a 166% higher enzyme activity (25 ± 0.6 U/ml) than the wild-type (15 ± 0.2 U/ml). The pH stability study of wild-type and mutants indicated mild alkali tolerance and the mutants showed an increase in thermostability by retaining their 55% (BSM-1) and 40% (BSM-2) activity at 60°C compared to the wild-type. The effect of metal ions and detergents was also determined and the results showed that BSM-1 retains 100% of its activity in the presence of SDS with an increased activity in the presence of Mg^{+2} and Ca^{+2} ions. The study explores the potential of UV mutagenesis technique in the creation of mutants with applications in the industrial sector.