

```
clear;
```

Parameter Settings

Baseline Parameters

```
p(1).population_size = 18;  
p(1).number_of_genes = 100;  
p(1).crossover_probability = 0.9;  
p(1).mutation_probability = 1/p(1).number_of_genes;  
p(1).maximum_generations = 150;  
name{1} = 'baseline';
```

Triple Population

```
p(2) = p(1);  
p(2).population_size = p(2).population_size * 3;  
p(2).maximum_generations = p(2).maximum_generations / 3;  
name{2} = 'Triple Population';
```

Triple Mutation

```
p(3) = p(1);  
p(3).mutation_probability = p(3).mutation_probability * 3;  
name{3} = 'Triple Mutation';
```

One Third Mutation

```
p(4) = p(1);  
p(4).mutation_probability = p(4).mutation_probability / 3;  
name{4} = 'One Third Mutation';
```

Triple Generations

```
p(5) = p(1);  
p(5).maximum_generations = p(5).maximum_generations * 3;  
p(5).population_size = p(5).population_size / 3; % To account for more generations  
name{5} = 'Triple Generations';
```

Experiments

```
tic; %Start a timer  
for experiment=1:5  
    clear best_fitness median_fitness  
    parfor run=1:100  
        [best_fitness(run,:), median_fitness(run,:)] = one_max(p(experiment));  
    end  
end
```

```

end
p(experiment).median_best_fitness = median(best_fitness,1);
p(experiment).median_median_fitness = median(median_fitness,1);
end
toc; %End a timer

```

Showing Results

```

figure(1); clf; hold on;
for experiment=1:5
    fitness_evaluations = [p(experiment).population_size: p(experiment).population_size : p(ex
    line_handles(experiment) = plot(fitness_evaluations, p(experiment).median_best_fitness, '-
    plot(fitness_evaluations, p(experiment).median_median_fitness, '--', 'Color', get(line_handle
end

legend(line_handles, name, 'Location', 'NorthWest')
xlabel('Function Evaluations'); ylabel('Fitness'); grid on;
set(gca, 'XLim', [0 2500]); title('Parameter Effects')

```

Conclusion

In the end using one third mutation rate results in the best performance, but does not converge as fast as most others. Tripling the population resulted in much slower convergence and the resulting fitness is still below the baseline and the one third mutation. The triple mutation stops improving at slightly above 80 fitness while converging about as fast as the baseline. The triple generations does not improve much after reaching 90 fitness, but has the fastest convergence rate. A mixture of both more generations with respect to population size and a high, but decreasing mutation rate over time might be best.