```
('# generations: 500 ;Population size 1000 ;Tournament size: 10 ;Mutation '
 'rate: 0.05')
('Min is 0.7074829931972789 Max is 1.0 Avg is 0.9378646174519283 in 81 '
 'iterations')
('# generations: 500 ;Population size 1000 ;Tournament size: 10 ;Mutation '
 'rate: 0.02')
('Min is 0.7414965986394558 Max is 1.0 Avg is 0.9687150211435981 in 148 '
 'iterations')
('# generations: 5000 ;Population size 1000 ;Tournament size: 2 ;Mutation '
 'rate: 0.02')
('Min is 0.6870748299319728 Max is 1.0 Avg is 0.9690752487562255 in 536 '
 'iterations')
('# generations: 5000 ;Population size 1000 ;Tournament size: 5 ;Mutation '
 'rate: 0.02')
('Min is 0.7278911564625851 Max is 1.0 Avg is 0.9581420595824603 in 145 '
 'iterations')
('# generations: 5000 ;Population size 1000 ;Tournament size: 10 ;Mutation '
 'rate: 0.02')
('Min is 0.7414965986394558 Max is 1.0 Avg is 0.9210745464852703 in 24 '
 'iterations')
('# generations: 50 ;Population size 1000 ;Tournament size: 2 ;Mutation rate: '
 '0.05')
('Min is 0.673469387755102 Max is 0.9591836734693877 Avg is 0.867160000000012 '
 'in 50 iterations')
('# generations: 50 ;Population size 1000 ;Tournament size: 5 ;Mutation rate: '
 '0.05')
('Min is 0.6938775510204082 Max is 0.9863945578231292 Avg is '
 '0.9109798639455896 in 50 iterations')
('# generations: 50 ;Population size 1000 ;Tournament size: 10 ;Mutation rate: '
 '0.05')
('Min is 0.7278911564625851 Max is 0.9931972789115646 Avg is '
 '0.9244708843537519 in 50 iterations')
('# generations: 500 ;Population size 1000 ;Tournament size: 2 ;Mutation rate: '
 '0.05')
('Min is 0.6938775510204082 Max is 0.9659863945578231 Avg is '
 '0.8864416054421903 in 500 iterations')
('# generations: 500 ;Population size 1000 ;Tournament size: 5 ;Mutation rate: '
 '0.05')
('Min is 0.7142857142857143 Max is 1.0 Avg is 0.934915999733237 in 204 '
 'iterations')
```

```
  iterations )
('# generations: 500 ;Population size 1000 ;Tournament size: 10 ;Mutation '
 'rate: 0.01')
('Min is 0.7414965986394558 Max is 1.0 Avg is 0.9588815901360604 in 64 '
 'iterations')
('# generations: 5000 ;Population size 1000 ;Tournament size: 2 ;Mutation '
 'rate: 0.01')
('Min is 0.6802721088435374 Max is 1.0 Avg is 0.9345584608843619 in 64 '
 'iterations')
('# generations: 5000 ;Population size 1000 ;Tournament size: 5 ;Mutation '
 'rate: 0.01')
('Min is 0.7210884353741497 Max is 1.0 Avg is 0.9774758715986478 in 448 '
 'iterations')
('# generations: 5000 ;Population size 1000 ;Tournament size: 10 ;Mutation '
 'rate: 0.01')
('Min is 0.7551020408163265 Max is 1.0 Avg is 0.972577357548529 in 109 '
 'iterations')
('# generations: 50 ;Population size 1000 ;Tournament size: 2 ;Mutation rate: '
 '0.02')
('Min is 0.7006802721088435 Max is 0.9931972789115646 Avg is 0.926287210884364 '
 'in 50 iterations')
('# generations: 50 ;Population size 1000 ;Tournament size: 5 ;Mutation rate: '
 '0.02')
('Min is 0.7210884353741497 Max is 0.9931972789115646 Avg is '
 '0.9437231292517084 in 50 iterations')
('# generations: 50 ;Population size 1000 ;Tournament size: 10 ;Mutation rate: '
 '0.02')
('Min is 0.7551020408163265 Max is 0.9931972789115646 Avg is '
 '0.9527731972789184 in 50 iterations')
('# generations: 500 ;Population size 1000 ;Tournament size: 2 ;Mutation rate: '
 '0.02')
('Min is 0.6870748299319728 Max is 1.0 Avg is 0.9559368833626236 in 151 '
 'iterations')
('# generations: 500 ;Population size 1000 ;Tournament size: 5 ;Mutation rate: '
 '0.02')
('Min is 0.7346938775510204 Max is 1.0 Avg is 0.9205041862899102 in 26 '
 'iterations')
```

```
('# generations: 500 ;Population size 100 ;Tournament size: 10 ;Mutation rate: '
 '0.1')
('Min is 0.7278911564625851 Max is 0.9523809523809523 Avg is '
 '0.8748809523809525 in 500 iterations')
('# generations: 5000 ;Population size 100 ;Tournament size: 2 ;Mutation rate: '
 '0.1')
('Min is 0.673469387755102 Max is 0.9319727891156463 Avg is 0.8260457551020398 '
 'in 5000 iterations')
('# generations: 5000 ;Population size 100 ;Tournament size: 5 ;Mutation rate: '
 '0.1')
('Min is 0.6938775510204082 Max is 0.9523809523809523 Avg is '
 '0.8578977551020444 in 5000 iterations')
('# generations: 5000 ;Population size 100 ;Tournament size: 10 ;Mutation '
 'rate: 0.1')
('Min is 0.7210884353741497 Max is 0.9591836734693877 Avg is '
 '0.8753344217687078 in 5000 iterations')
('# generations: 50 ;Population size 1000 ;Tournament size: 2 ;Mutation rate: '
 '0.01')
('Min is 0.7142857142857143 Max is 0.9863945578231292 Avg is '
 '0.9306397278911657 in 50 iterations')
('# generations: 50 ;Population size 1000 ;Tournament size: 5 ;Mutation rate: '
 '0.01')
('Min is 0.7210884353741497 Max is 0.9931972789115646 Avg is '
 '0.9578993197278972 in 50 iterations')
('# generations: 50 ;Population size 1000 ;Tournament size: 10 ;Mutation rate: '
 '0.01')
('Min is 0.7346938775510204 Max is 0.9863945578231292 Avg is '
 '0.9546775510204154 in 50 iterations')
('# generations: 500 ;Population size 1000 ;Tournament size: 2 ;Mutation rate: '
 '0.01')
('Min is 0.7074829931972789 Max is 1.0 Avg is 0.9263064935065018 in 55 '
 'iterations')
('# generations: 500 ;Population size 1000 ;Tournament size: 5 ;Mutation rate: '
 '0.01')
('Min is 0.7346938775510204 Max is 1.0 Avg is 0.9553503401360607 in 48 '
 'iterations')

('# generations: 5000 ;Population size 100 ;Tournament size: 2 ;Mutation rate: '
 '0.05')
('Min is 0.7074829931972789 Max is 0.9659863945578231 Avg is '
 '0.8845577278911547 in 5000 iterations')
('# generations: 5000 ;Population size 100 ;Tournament size: 5 ;Mutation rate: '
 '0.05')
('Min is 0.7278911564625851 Max is 1.0 Avg is 0.9316790157825985 in 1906 '
 'iterations')
('# generations: 5000 ;Population size 100 ;Tournament size: 10 ;Mutation '
 'rate: 0.05')
('Min is 0.7551020408163265 Max is 1.0 Avg is 0.9280656262504999 in 85 '
 'iterations')
'# generations: 50 ;Population size 100 ;Tournament size: 2 ;Mutation rate: 0.1'
('Min is 0.6870748299319728 Max is 0.9115646258503401 Avg is '
 '0.8245795918367349 in 50 iterations')
'# generations: 50 ;Population size 100 ;Tournament size: 5 ;Mutation rate: 0.1'
('Min is 0.7006802721088435 Max is 0.9319727891156463 Avg is '
 '0.8533278911564628 in 50 iterations')
('# generations: 50 ;Population size 100 ;Tournament size: 10 ;Mutation rate: '
 '0.1')
('Min is 0.7346938775510204 Max is 0.9387755102040817 Avg is 0.867273469387755 '
 'in 50 iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 2 ;Mutation rate: '
 '0.1')
('Min is 0.6870748299319728 Max is 0.9183673469387755 Avg is '
 '0.8252990476190479 in 500 iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 5 ;Mutation rate: '
 '0.1')
('Min is 0.7278911564625851 Max is 0.9455782312925171 Avg is '
 '0.8588205442176882 in 500 iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 10 ;Mutation rate: '
 '0.1')
('Min is 0.7278911564625851 Max is 0.9523809523809523 Avg is '
 '0.8748809523809525 in 500 iterations')
```

```
('# generations: 5000 ;Population size 100 ;Tournament size: 2 ;Mutation rate: '
 '0.02')
('Min is 0.7210884353741497 Max is 1.0 Avg is 0.9519007073027889 in 151 '
 'iterations')
('# generations: 5000 ;Population size 100 ;Tournament size: 5 ;Mutation rate: '
 '0.02')
('Min is 0.7414965986394558 Max is 1.0 Avg is 0.9727910023793844 in 649 '
 'iterations')
('# generations: 5000 ;Population size 100 ;Tournament size: 10 ;Mutation '
 'rate: 0.02')
('Min is 0.7482993197278912 Max is 1.0 Avg is 0.9666317809174956 in 273 '
 'iterations')
('# generations: 50 ;Population size 100 ;Tournament size: 2 ;Mutation rate: '
 '0.05')
('Min is 0.7142857142857143 Max is 0.9319727891156463 Avg is '
 '0.8592639455782316 in 50 iterations')
('# generations: 50 ;Population size 100 ;Tournament size: 5 ;Mutation rate: '
 '0.05')
('Min is 0.7074829931972789 Max is 0.9659863945578231 Avg is '
 '0.9062244897959189 in 50 iterations')
('# generations: 50 ;Population size 100 ;Tournament size: 10 ;Mutation rate: '
 '0.05')
('Min is 0.7482993197278912 Max is 0.9795918367346939 Avg is '
 '0.9197986394557823 in 50 iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 2 ;Mutation rate: '
 '0.05')
('Min is 0.7414965986394558 Max is 0.9523809523809523 Avg is '
 '0.8839564625850337 in 500 iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 5 ;Mutation rate: '
 '0.05')
('Min is 0.7278911564625851 Max is 0.9863945578231292 Avg is '
 '0.9313899319727886 in 500 iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 10 ;Mutation rate: '
 '0.05')
('Min is 0.7414965986394558 Max is 1.0 Avg is 0.9338685861941677 in 129 '
 'iterations')
```

```
('# generations: 5000 ;Population size 100 ;Tournament size: 2 ;Mutation rate: '
 '0.01')
('Min is 0.7074829931972789 Max is 1.0 Avg is 0.979869478290396 in 1082 '
 'iterations')
('# generations: 5000 ;Population size 100 ;Tournament size: 5 ;Mutation rate: '
 '0.01')
('Min is 0.7482993197278912 Max is 1.0 Avg is 0.9798674761043724 in 790 '
 'iterations')
('# generations: 5000 ;Population size 100 ;Tournament size: 10 ;Mutation '
 'rate: 0.01')
'Min is 0.7755102040816326 Max is 1.0 Avg is 0.97868859999516 in 281 iterations'
('# generations: 50 ;Population size 100 ;Tournament size: 2 ;Mutation rate: '
 '0.02')
('Min is 0.7142857142857143 Max is 0.9795918367346939 Avg is '
 '0.9181850340136053 in 50 iterations')
('# generations: 50 ;Population size 100 ;Tournament size: 5 ;Mutation rate: '
 '0.02')
('Min is 0.7551020408163265 Max is 0.9727891156462585 Avg is '
 '0.9331741496598634 in 50 iterations')
('# generations: 50 ;Population size 100 ;Tournament size: 10 ;Mutation rate: '
 '0.02')
('Min is 0.7551020408163265 Max is 0.9795918367346939 Avg is '
 '0.9370517006802715 in 50 iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 2 ;Mutation rate: '
 '0.02')
('Min is 0.7210884353741497 Max is 0.9931972789115646 Avg is '
 '0.9655757823129255 in 500 iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 5 ;Mutation rate: '
 '0.02')
('Min is 0.7482993197278912 Max is 1.0 Avg is 0.9703137581563246 in 245 '
 'iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 10 ;Mutation rate: '
 '0.02')
('Min is 0.7346938775510204 Max is 1.0 Avg is 0.9672580645161296 in 186 '
 'iterations')
```
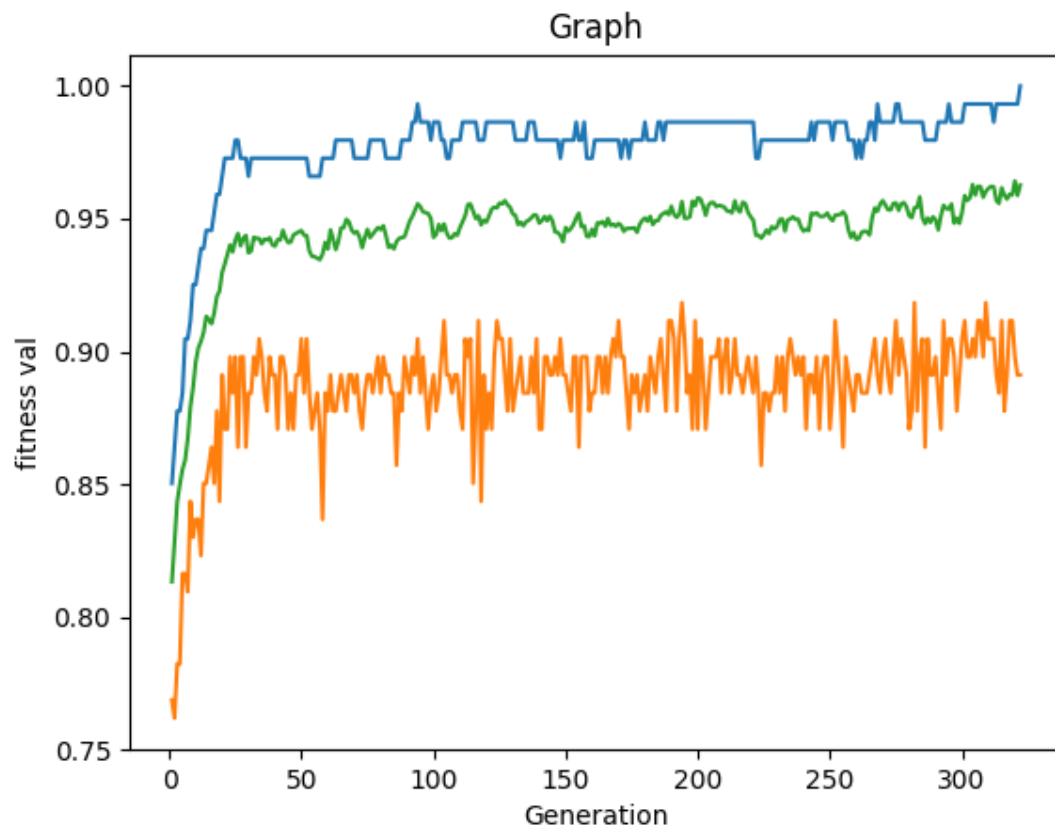
```
'# generations: 50 ;Population size 10 ;Tournament size: 2 ;Mutation rate: 0.1'
('Min is 0.7210884353741497 Max is 0.8979591836734694 Avg is '
 '0.8198503401360543 in 50 iterations')
'# generations: 500 ;Population size 10 ;Tournament size: 2 ;Mutation rate: 0.1'
('Min is 0.7074829931972789 Max is 0.9047619047619048 Avg is '
 '0.8216340136054422 in 500 iterations')
('# generations: 5000 ;Population size 10 ;Tournament size: 2 ;Mutation rate: '
 '0.1')
('Min is 0.6938775510204082 Max is 0.9115646258503401 Avg is 0.817202040816329 '
 'in 5000 iterations')
('# generations: 50 ;Population size 100 ;Tournament size: 2 ;Mutation rate: '
 '0.01')
('Min is 0.7074829931972789 Max is 0.9727891156462585 Avg is '
 '0.9122054421768704 in 50 iterations')
('# generations: 50 ;Population size 100 ;Tournament size: 5 ;Mutation rate: '
 '0.01')
('Min is 0.7687074829931972 Max is 0.9659863945578231 Avg is '
 '0.9299224489795911 in 50 iterations')
('# generations: 50 ;Population size 100 ;Tournament size: 10 ;Mutation rate: '
 '0.01')
('Min is 0.7619047619047619 Max is 0.9659863945578231 Avg is '
 '0.9260312925170067 in 50 iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 2 ;Mutation rate: '
 '0.01')
('Min is 0.7210884353741497 Max is 1.0 Avg is 0.9522782931354363 in 110 '
 'iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 5 ;Mutation rate: '
 '0.01')
('Min is 0.7619047619047619 Max is 0.9931972789115646 Avg is '
 '0.9761810884353767 in 500 iterations')
('# generations: 500 ;Population size 100 ;Tournament size: 10 ;Mutation rate: '
 '0.01')
('Min is 0.7755102040816326 Max is 1.0 Avg is 0.9717157974300838 in 90 '
 'iterations')
'# generations: 50 ;Population size 10 ;Tournament size: 2 ;Mutation rate: 0.01'
('Min is 0.7210884353741497 Max is 0.8843537414965986 Avg is '
 '0.8340136054421768 in 50 iterations')
('# generations: 500 ;Population size 10 ;Tournament size: 2 ;Mutation rate: '
 '0.01')
('Min is 0.7551020408163265 Max is 1.0 Avg is 0.9596924484079369 in 476 '
 'iterations')
('# generations: 5000 ;Population size 10 ;Tournament size: 2 ;Mutation rate: '
 '0.01')
('Min is 0.7346938775510204 Max is 1.0 Avg is 0.963465796875938 in 682 '
 'iterations')
'# generations: 50 ;Population size 10 ;Tournament size: 2 ;Mutation rate: 0.02'
('Min is 0.7482993197278912 Max is 0.9251700680272109 Avg is 0.87308843537415 '
 'in 50 iterations')
('# generations: 500 ;Population size 10 ;Tournament size: 2 ;Mutation rate: '
 '0.02')
('Min is 0.7551020408163265 Max is 0.9863945578231292 Avg is 0.93398911564626 '
 'in 500 iterations')
('# generations: 5000 ;Population size 10 ;Tournament size: 2 ;Mutation rate: '
 '0.02')
('Min is 0.7414965986394558 Max is 0.9795918367346939 Avg is 0.940590068027213 '
 'in 5000 iterations')
'# generations: 50 ;Population size 10 ;Tournament size: 2 ;Mutation rate: 0.05'
('Min is 0.7346938775510204 Max is 0.8775510204081632 Avg is '
 '0.8244353741496601 in 50 iterations')
('# generations: 500 ;Population size 10 ;Tournament size: 2 ;Mutation rate: '
 '0.05')
('Min is 0.7687074829931972 Max is 0.9183673469387755 Avg is '
 '0.8540734693877552 in 500 iterations')
('# generations: 5000 ;Population size 10 ;Tournament size: 2 ;Mutation rate: '
 '0.05')
('Min is 0.7142857142857143 Max is 0.9455782312925171 Avg is '
 '0.8590206802721084 in 5000 iterations')
```

One solution:

Best: blue
Average: green
Worst:
Orange

Graph

Generation: 500
Size: 100
Tournament size: 10
Mutation rate: 0.05

It can be observed that the number of generations required to reach the solution decreases as the size of the population increases and the tournament size increases. It converges quicker for larger population sets than for smaller ones.