|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Danzig \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | | Danzig \_algorithm  Single-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Saltation  Linear-rank | Danzig \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Saltation  Linear-rank |
| max | 708 | 721 | 683 | 721 | 719 | 721 | 721 | 721 | 719 | 721 | 710 | 721 | 721 | 721 | 721 | 721 |
| i | 7 | 5 | 2 | 3 | 5 | 3 | 3 | 1 | 3 | 4 | 4 | 7 | 3 | 4 | 2 | 4 |
| i-avg | 11,9 | 7,7 | 7,5 | 7,7 | 2,8 | 6,9 | 8,9 | 5,1 | 10,3 | 5,5 | 4,9 | 10,4 | 3 | 6,9 | 10,6 | 5 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Danzig \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Point mutation  Linear-rank | Danzig \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Inversion  Linear-rank | Danzig \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Translocation  Linear-rank | Danzig \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Saltation  Linear-rank | Random \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Single-point crossover  Point mutation  Linear-rank | Random \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Single-point crossover  Inversion  Linear-rank | Random \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Single-point crossover  Translocation  Linear-rank | Random \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Single-point crossover  Saltation  Linear-rank |
| 704 | 721 | 721 | 721 | 721 | 721 | 717 | 721 | 717 | 721 | 697 | 721 | 662 | 721 | 675 | 721 |
| 2 | 1 | 4 | 5 | 3 | 6 | 4 | 6 | 4 | 6 | 27 | 5 | 1 | 4 | 40 | 5 |
| 7,1 | 5,9 | 7,7 | 9,3 | 3 | 7,1 | 6,7 | 6,5 | 10,8 | 9 | 9,4 | 11,1 | 1,9 | 7,3 | 10,4 | 7,8 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Random \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Two-point crossover  Point mutation  Linear-rank | Random \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Two-point crossover  Inversion  Linear-rank | Random \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Two-point crossover  Translocation  Linear-rank | Random \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Two-point crossover  Saltation  Linear-rank | Random \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Random \_algorithm  Uniform crossover  Point mutation  Linear-rank | Random \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Random \_algorithm  Uniform crossover  Inversion  Linear-rank | Random \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Random \_algorithm  Uniform crossover  Translocation  Linear-rank | Random \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Random \_algorithm  Uniform crossover  Saltation  Linear-rank |
| 721 | 721 | 721 | 721 | 681 | 721 | 717 | 721 | 704 | 721 | 721 | 721 | 721 | 721 | 717 | 721 |
| 3 | 4 | 4 | 5 | 2 | 4 | 5 | 5 | 2 | 3 | 3 | 3 | 3 | 5 | 3 | 5 |
| 4,8 | 6,8 | 6,3 | 7,4 | 2,6 | 8,3 | 11 | 5,5 | 5,6 | 5,5 | 6,8 | 7,5 | 2,4 | 7,2 | 3,5 | 6,2 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Danzig \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | | Danzig \_algorithm  Single-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Saltation  Linear-rank | Danzig \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Saltation  Linear-rank |
| max | 554 | 578 | 551 | 578 | 552 | 578 | 578 | 578 | 578 | 578 | 578 | 578 | 554 | 578 | 578 | 578 |
| i | 2 | 2 | 33 | 3 | 3 | 5 | 13 | 4 | 4 | 7 | 1 | 4 | 2 | 4 | 3 | 3 |
| i-avg | 19,8 | 8,6 | 14 | 6,7 | 2,4 | 7,8 | 11 | 9,6 | 8,4 | 8 | 4,6 | 7,4 | 2,2 | 6,6 | 12,4 | 7,6 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Danzig \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Point mutation  Linear-rank | Danzig \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Inversion  Linear-rank | Danzig \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Translocation  Linear-rank | Danzig \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Saltation  Linear-rank | Random \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Single-point crossover  Point mutation  Linear-rank | Random \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Single-point crossover  Inversion  Linear-rank | Random \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Single-point crossover  Translocation  Linear-rank | Random \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Single-point crossover  Saltation  Linear-rank |
| 554 | 578 | 578 | 578 | 563 | 578 | 578 | 578 | 578 | 578 | 552 | 578 | 561 | 578 | 578 | 578 |
| 3 | 5 | 4 | 4 | 4 | 4 | 29 | 5 | 4 | 5 | 3 | 5 | 4 | 8 | 2 | 7 |
| 5,4 | 6,7 | 5,2 | 7,5 | 6 | 6,7 | 18,5 | 6,4 | 10,1 | 7,3 | 6,7 | 6,8 | 2,6 | 7,2 | 12,4 | 6,7 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Random \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Two-point crossover  Point mutation  Linear-rank | Random \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Two-point crossover  Inversion  Linear-rank | Random \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Two-point crossover  Translocation  Linear-rank | Random \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Two-point crossover  Saltation  Linear-rank | Random \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Random \_algorithm  Uniform crossover  Point mutation  Linear-rank | Random \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Random \_algorithm  Uniform crossover  Inversion  Linear-rank | Random \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Random \_algorithm  Uniform crossover  Translocation  Linear-rank | Random \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Random \_algorithm  Uniform crossover  Saltation  Linear-rank |
| 578 | 578 | 563 | 578 | 550 | 578 | 578 | 578 | 578 | 578 | 563 | 578 | 561 | 578 | 578 | 578 |
| 6 | 5 | 2 | 4 | 3 | 4 | 21 | 5 | 4 | 4 | 6 | 4 | 3 | 3 | 2 | 4 |
| 8 | 8,4 | 16 | 8,5 | 2,9 | 7,9 | 13,7 | 9,2 | 11,4 | 7,3 | 3,5 | 6,1 | 2,8 | 5,5 | 4,9 | 6,1 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Danzig \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | | Danzig \_algorithm  Single-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Saltation  Linear-rank | Danzig \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Saltation  Linear-rank |
| max | 641 | 647 | 647 | 647 | 641 | 647 | 640 | 647 | 634 | 647 | 640 | 647 | 614 | 647 | 647 | 647 |
| i | 3 | 5 | 13 | 5 | 2 | 4 | 31 | 5 | 11 | 5 | 4 | 5 | 2 | 3 | 5 | 1 |
| i-avg | 17,4 | 6,5 | 13,4 | 7 | 2,8 | 7,6 | 16,7 | 7,3 | 14 | 7,6 | 7,9 | 5,9 | 2,5 | 6,9 | 17,4 | 6,5 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Danzig \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Point mutation  Linear-rank | Danzig \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Inversion  Linear-rank | Danzig \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Translocation  Linear-rank | Danzig \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Saltation  Linear-rank | Random \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Single-point crossover  Point mutation  Linear-rank | Random \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Single-point crossover  Inversion  Linear-rank | Random \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Single-point crossover  Translocation  Linear-rank | Random \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Single-point crossover  Saltation  Linear-rank |
| 647 | 647 | 641 | 647 | 638 | 647 | 647 | 647 | 641 | 647 | 641 | 641 | 647 | 647 | 638 | 647 |
| 2 | 4 | 5 | 5 | 3 | 6 | 3 | 4 | 2 | 5 | 7 | 3 | 3 | 4 | 5 | 4 |
| 14,6 | 5,9 | 6,3 | 10,3 | 2,3 | 7 | 5,1 | 6,4 | 15,1 | 9,1 | 7,8 | 5,1 | 3 | 7,2 | 5,1 | 10 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Random \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Two-point crossover  Point mutation  Linear-rank | Random \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Two-point crossover  Inversion  Linear-rank | Random \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Two-point crossover  Translocation  Linear-rank | Random \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Two-point crossover  Saltation  Linear-rank | Random \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Random \_algorithm  Uniform crossover  Point mutation  Linear-rank | Random \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Random \_algorithm  Uniform crossover  Inversion  Linear-rank | Random \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Random \_algorithm  Uniform crossover  Translocation  Linear-rank | Random \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Random \_algorithm  Uniform crossover  Saltation  Linear-rank |
| 647 | 647 | 641 | 647 | 634 | 647 | 641 | 647 | 647 | 647 | 638 | 647 | 641 | 647 | 641 | 647 |
| 31 | 4 | 4 | 6 | 3 | 5 | 38 | 6 | 5 | 4 | 6 | 5 | 4 | 6 | 17 | 4 |
| 15,9 | 10,5 | 7,2 | 9,9 | 2,1 | 8,1 | 13,1 | 7,4 | 7,7 | 6,5 | 5,3 | 8,2 | 3,1 | 8,2 | 6,8 | 6,7 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Danzig \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | | Danzig \_algorithm  Single-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Saltation  Linear-rank | Danzig \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Saltation  Linear-rank |
| max | 837 | 861 | 861 | 861 | 861 | 861 | 837 | 861 | 861 | 861 | 809 | 861 | 837 | 861 | 828 | 861 |
| i | 3 | 6 | 2 | 3 | 3 | 6 | 2 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 5 | 4 |
| i-avg | 9 | 7,5 | 5,2 | 7,9 | 2,3 | 7,2 | 7,1 | 7,1 | 4,7 | 6,9 | 8,8 | 7 | 4 | 7,1 | 10,7 | 7,8 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Danzig \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Point mutation  Linear-rank | Danzig \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Inversion  Linear-rank | Danzig \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Translocation  Linear-rank | Danzig \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Saltation  Linear-rank | Random \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Single-point crossover  Point mutation  Linear-rank | Random \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Single-point crossover  Inversion  Linear-rank | Random \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Single-point crossover  Translocation  Linear-rank | Random \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Single-point crossover  Saltation  Linear-rank |
| 800 | 861 | 800 | 861 | 861 | 861 | 830 | 861 | 837 | 861 | 837 | 861 | 861 | 861 | 830 | 861 |
| 2 | 2 | 2 | 4 | 3 | 4 | 4 | 5 | 9 | 6 | 3 | 5 | 3 | 4 | 36 | 5 |
| 6,9 | 6,2 | 4,2 | 6,1 | 2,9 | 6,2 | 5 | 7,5 | 7,6 | 6,7 | 7,7 | 7,3 | 2,7 | 6,4 | 16,1 | 6 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Random \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Two-point crossover  Point mutation  Linear-rank | Random \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Two-point crossover  Inversion  Linear-rank | Random \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Two-point crossover  Translocation  Linear-rank | Random \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Two-point crossover  Saltation  Linear-rank | Random \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Random \_algorithm  Uniform crossover  Point mutation  Linear-rank | Random \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Random \_algorithm  Uniform crossover  Inversion  Linear-rank | Random \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Random \_algorithm  Uniform crossover  Translocation  Linear-rank | Random \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Random \_algorithm  Uniform crossover  Saltation  Linear-rank |
| 781 | 861 | 823 | 861 | 837 | 861 | 805 | 861 | 828 | 861 | 837 | 861 | 837 | 861 | 861 | 861 |
| 3 | 6 | 3 | 4 | 3 | 5 | 2 | 4 | 4 | 2 | 2 | 3 | 2 | 4 | 3 | 5 |
| 7 | 7,8 | 9,2 | 6,8 | 3,1 | 7,4 | 3,9 | 7,9 | 8,7 | 7,1 | 6,5 | 7 | 2,3 | 6 | 6,4 | 8,5 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Danzig \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | | Danzig \_algorithm  Single-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Saltation  Linear-rank | Danzig \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Saltation  Linear-rank |
| max | 834 | 843 | 843 | 843 | 824 | 843 | 843 | 843 | 815 | 843 | 843 | 843 | 843 | 843 | 834 | 843 |
| i | 26 | 1 | 3 | 3 | 2 | 6 | 2 | 5 | 23 | 3 | 3 | 5 | 4 | 3 | 3 | 5 |
| i-avg | 11,5 | 7,3 | 10,2 | 6,1 | 3,1 | 8,1 | 10,2 | 5,8 | 5,1 | 5,5 | 6,1 | 7,7 | 3,2 | 6,7 | 11 | 7,3 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Danzig \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Point mutation  Linear-rank | Danzig \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Inversion  Linear-rank | Danzig \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Translocation  Linear-rank | Danzig \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Saltation  Linear-rank | Random \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Single-point crossover  Point mutation  Linear-rank | Random \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Single-point crossover  Inversion  Linear-rank | Random \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Single-point crossover  Translocation  Linear-rank | Random \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Single-point crossover  Saltation  Linear-rank |
| 843 | 843 | 817 | 843 | 834 | 843 | 829 | 843 | 788 | 843 | 832 | 843 | 817 | 843 | 832 | 843 |
| 2 | 5 | 3 | 3 | 3 | 4 | 3 | 4 | 20 | 7 | 3 | 8 | 4 | 5 | 3 | 6 |
| 8,3 | 7,1 | 6,5 | 6 | 2,6 | 7 | 8 | 7 | 13,7 | 6,7 | 15,4 | 7 | 2,8 | 8,2 | 7,4 | 6,6 |

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| Random \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Two-point crossover  Point mutation  Linear-rank | Random \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Two-point crossover  Inversion  Linear-rank | Random \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Two-point crossover  Translocation  Linear-rank | Random \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Two-point crossover  Saltation  Linear-rank | Random \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Random \_algorithm  Uniform crossover  Point mutation  Linear-rank | Random \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Random \_algorithm  Uniform crossover  Inversion  Linear-rank | Random \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Random \_algorithm  Uniform crossover  Translocation  Linear-rank | Random \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Random \_algorithm  Uniform crossover  Saltation  Linear-rank |
| 832 | 843 | 829 | 843 | 843 | 843 | 787 | 843 | 834 | 843 | 843 | 843 | 824 | 843 | 812 | 843 |
| 2 | 6 | 20 | 3 | 2 | 6 | 9 | 5 | 2 | 4 | 3 | 5 | 2 | 4 | 21 | 6 |
| 4,2 | 7,3 | 10,2 | 7,3 | 2,8 | 6,4 | 9,5 | 6,5 | 9,7 | 7,8 | 8 | 6,4 | 2,4 | 7,4 | 13,7 | 6,9 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Danzig \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | | Danzig \_algorithm  Single-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Single-point crossover  Saltation  Linear-rank | Danzig \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Point mutation  Linear-rank | Danzig \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Inversion  Linear-rank | Danzig \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Translocation  Linear-rank | Danzig \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Two-point crossover  Saltation  Linear-rank |
| max % | 99,07 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| i max % | 65 | 15 | 82,5 | 12,5 | 12,5 | 15 | 77,5 | 12,5 | 57,5 | 17,5 | 10 | 17,5 | 10 | 10 | 12,5 | 12,5 |
| i-avg max % | 49,5 | 21,5 | 35 | 19,75 | 7,75 | 20,25 | 41,75 | 24 | 35 | 20 | 22 | 26 | 10 | 17,75 | 43,5 | 19,5 |
| I min % | 5 | 2,5 | 5 | 7,5 | 5 | 7,5 | 5 | 2,5 | 7,5 | 7,5 | 2,5 | 7,5 | 5 | 7,5 | 5 | 2,5 |
| i-avg min % | 22,5 | 16,25 | 13 | 15,25 | 5,75 | 17,25 | 17,75 | 12,75 | 11,75 | 13,75 | 11,5 | 14,75 | 5,5 | 16,5 | 26,5 | 12,5 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Danzig \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Point mutation  Linear-rank | Danzig \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Inversion  Linear-rank | Danzig \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Translocation  Linear-rank | Danzig \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Danzig \_algorithm  Uniform crossover  Saltation  Linear-rank | Random \_algorithm  Single-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Single-point crossover  Point mutation  Linear-rank | Random \_algorithm  Single-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Single-point crossover  Inversion  Linear-rank | Random \_algorithm  Single-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Single-point crossover  Translocation  Linear-rank | Random \_algorithm  Single-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Single-point crossover  Saltation  Linear-rank |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99,07 | 100 | 100 | 100 | 100 | 100 |
| 7,5 | 12,5 | 12,5 | 12,5 | 10 | 15 | 72,5 | 15 | 50 | 17,5 | 67,5 | 20 | 10 | 20 | 100 | 17,5 |
| 36,5 | 17,75 | 19,25 | 25,75 | 15 | 17,75 | 46,25 | 18,75 | 37,75 | 22,75 | 38,5 | 27,75 | 7,5 | 20,5 | 40,25 | 25 |
| 5 | 2,5 | 5 | 7,5 | 7,5 | 10 | 7,5 | 10 | 5 | 12,5 | 7,5 | 7,5 | 2,5 | 10 | 5 | 10 |
| 13,5 | 14,75 | 10,5 | 15 | 5,75 | 15,5 | 12,5 | 16 | 19 | 16,75 | 16,75 | 12,75 | 4,75 | 16 | 12,75 | 15 |

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| Random \_algorithm  Two-point crossover  Point mutation  Betta-Tournament | Random \_algorithm  Two-point crossover  Point mutation  Linear-rank | Random \_algorithm  Two-point crossover  Inversion  Betta-Tournament | Random \_algorithm  Two-point crossover  Inversion  Linear-rank | Random \_algorithm  Two-point crossover  Translocation  Betta-Tournament | Random \_algorithm  Two-point crossover  Translocation  Linear-rank | Random \_algorithm  Two-point crossover  Saltation  Betta-Tournament | Random \_algorithm  Two-point crossover  Saltation  Linear-rank | Random \_algorithm  Uniform crossover  Point mutation  Betta-Tournament | Random \_algorithm  Uniform crossover  Point mutation  Linear-rank | Random \_algorithm  Uniform crossover  Inversion  Betta-Tournament | Random \_algorithm  Uniform crossover  Inversion  Linear-rank | Random \_algorithm  Uniform crossover  Translocation  Betta-Tournament | Random \_algorithm  Uniform crossover  Translocation  Linear-rank | Random \_algorithm  Uniform crossover  Saltation  Betta-Tournament | Random \_algorithm  Uniform crossover  Saltation  Linear-rank |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 77,5 | 15 | 50 | 15 | 7,5 | 15 | 95 | 15 | 12,5 | 10 | 15 | 12,5 | 10 | 15 | 52,5 | 15 |
| 39,75 | 26,25 | 40 | 24,75 | 7,75 | 20,75 | 34,25 | 23 | 28,5 | 19,5 | 20 | 20,5 | 7,75 | 20,5 | 34,25 | 21,25 |
| 5 | 10 | 5 | 7,5 | 5 | 10 | 5 | 10 | 5 | 5 | 5 | 7,5 | 5 | 7,5 | 5 | 10 |
| 10,5 | 17 | 15,75 | 17 | 5,25 | 16 | 9,75 | 13,75 | 14 | 13,75 | 8,75 | 15,25 | 5,75 | 13,75 | 8,75 | 15,25 |