|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | 724 | 730 | 715 | 730 | 714 | 730 | 730 | 724 | 730 | 730 | 721 | 730 | 724 | 730 | 723 | 730 |
| i | 2 | 12 | 1 | 1 | 3 | 2 | 4 | 8 | 30 | 9 | 2 | 7 | 2 | 3 | 1 | 3 |
| i-avg | 10,5 | 7,8 | 2,5 | 4,7 | 2 | 5,6 | 10,3 | 7,4 | 13,8 | 9,1 | 2,7 | 7 | 2,1 | 6,7 | 9 | 5,7 |

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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 |
| 727 | 724 | 723 | 730 | 727 | 730 | 730 | 730 | 720 | 724 | 730 | 730 | 721 | 730 | 730 | 724 |
| 3 | 5 | 1 | 5 | 1 | 5 | 12 | 2 | 16 | 5 | 2 | 10 | 1 | 2 | 27 | 10 |
| 8,6 | 5,5 | 2,3 | 10,3 | 2,8 | 9,3 | 3 | 5,1 | 8,6 | 11,6 | 2,7 | 6,8 | 2,5 | 5,2 | 7,2 | 6,3 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |
| 724 | 730 | 724 | 730 | 730 | 730 | 730 | 724 | 730 | 730 | 724 | 730 | 724 | 730 | 721 | 730 |
| 2 | 7 | 2 | 2 | 1 | 7 | 3 | 4 | 4 | 9 | 10 | 3 | 2 | 4 | 24 | 10 |
| 7,4 | 7,8 | 6,5 | 7,5 | 1,7 | 8,4 | 9,6 | 6,1 | 4,5 | 7 | 4,5 | 4,8 | 2,1 | 7,8 | 9,7 | 6,7 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | 759 | 772 | 756 | 768 | 764 | 772 | 768 | 772 | 769 | 772 | 768 | 772 | 761 | 772 | 759 | 772 |
| i | 10 | 8 | 37 | 6 | 3 | 5 | 1 | 1 | 2 | 1 | 2 | 12 | 1 | 9 | 4 | 3 |
| i-avg | 14,2 | 7,3 | 5,8 | 4,6 | 2,3 | 4 | 6,5 | 5 | 6,1 | 4,7 | 3,2 | 7,7 | 1,5 | 7,6 | 6,9 | 5,9 |

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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 |
| 759 | 768 | 756 | 769 | 760 | 768 | 765 | 772 | 765 | 765 | 755 | 772 | 760 | 768 | 762 | 769 |
| 2 | 6 | 39 | 2 | 2 | 5 | 3 | 6 | 33 | 2 | 1 | 36 | 9 | 2 | 2 | 13 |
| 2,4 | 6 | 6,8 | 6,2 | 3,3 | 7,2 | 6 | 6,3 | 13,8 | 5,5 | 9,7 | 6,6 | 2,6 | 4 | 6,8 | 6,3 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |
| 772 | 772 | 762 | 772 | 772 | 772 | 761 | 772 | 772 | 772 | 768 | 772 | 765 | 768 | 762 | 768 |
| 3 | 6 | 21 | 6 | 2 | 7 | 3 | 4 | 2 | 9 | 1 | 11 | 2 | 3 | 2 | 5 |
| 3,5 | 6,7 | 7,5 | 6,5 | 2 | 5,9 | 3,2 | 5 | 5,9 | 8,6 | 4 | 7 | 1,9 | 7,6 | 2,2 | 5,9 |

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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 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 801 | 800 | 801 | 800 | 801 | 800 | 801 | 801 | 801 |
| i | 29 | 4 | 4 | 2 | 2 | 1 | 2 | 6 | 26 | 3 | 3 | 6 | 2 | 4 | 4 | 4 |
| i-avg | 8,7 | 7,7 | 11 | 4,5 | 2,2 | 4,9 | 3,8 | 6 | 7,1 | 5,4 | 2,4 | 6,2 | 4,8 | 5,1 | 2,3 | 6,3 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |
| 799 | 801 | 800 | 800 | 801 | 800 | 800 | 801 | 799 | 800 | 801 | 801 | 800 | 800 | 797 | 800 |
| 3 | 4 | 3 | 3 | 2 | 2 | 2 | 4 | 2 | 1 | 1 | 4 | 1 | 2 | 2 | 1 |
| 5,4 | 6,4 | 5,3 | 6,8 | 2,2 | 6,2 | 9,8 | 4,6 | 5,2 | 4,6 | 9,6 | 5 | 1,9 | 4,6 | 4,6 | 6,8 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |
| 794 | 801 | 800 | 801 | 799 | 800 | 799 | 800 | 800 | 801 | 799 | 800 | 800 | 800 | 792 | 801 |
| 1 | 1 | 1 | 4 | 3 | 1 | 3 | 2 | 3 | 7 | 8 | 3 | 2 | 2 | 6 | 5 |
| 4,6 | 5,4 | 5,3 | 6 | 2,2 | 4,9 | 4,3 | 4,5 | 8,3 | 7,1 | 9,2 | 5,8 | 3,2 | 5,2 | 2,8 | 4,6 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | 727 | 728 | 717 | 728 | 708 | 728 | 717 | 728 | 727 | 728 | 710 | 727 | 720 | 718 | 720 | 727 |
| i | 24 | 3 | 17 | 3 | 2 | 4 | 1 | 4 | 4 | 3 | 24 | 4 | 2 | 15 | 30 | 5 |
| i-avg | 13,8 | 5,5 | 5,6 | 7 | 2 | 6,8 | 5,7 | 5,6 | 8,3 | 5,7 | 3,7 | 6,6 | 2,9 | 5,4 | 7,9 | 5,3 |

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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 |
| 728 | 728 | 727 | 727 | 717 | 722 | 717 | 727 | 715 | 728 | 717 | 722 | 708 | 728 | 715 | 728 |
| 38 | 1 | 2 | 4 | 4 | 4 | 1 | 6 | 2 | 10 | 1 | 10 | 1 | 3 | 6 | 5 |
| 11,4 | 4,8 | 3,8 | 6,3 | 2,7 | 6,6 | 3,3 | 4,8 | 4,5 | 8,9 | 5,8 | 5,5 | 4,3 | 4,5 | 6,4 | 6,4 |

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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 |
| 720 | 722 | 717 | 728 | 717 | 728 | 728 | 717 | 727 | 727 | 717 | 728 | 722 | 728 | 720 | 728 |
| 2 | 4 | 22 | 4 | 2 | 8 | 11 | 3 | 12 | 2 | 1 | 7 | 3 | 7 | 2 | 6 |
| 5,6 | 5,2 | 7,8 | 6,4 | 2,8 | 5,7 | 5 | 6,1 | 9,2 | 5,8 | 2,3 | 6,3 | 2,3 | 6 | 2,5 | 6,8 |

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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 | 680 | 694 | 694 | 694 | 682 | 689 | 685 | 694 | 685 | 694 | 682 | 689 | 689 | 689 | 685 | 694 |
| i | 3 | 6 | 9 | 12 | 2 | 4 | 27 | 6 | 21 | 6 | 2 | 5 | 2 | 6 | 3 | 8 |
| i-avg | 5,6 | 5,7 | 5,3 | 5,7 | 1,8 | 6,4 | 12,1 | 5,2 | 7,9 | 12 | 5,2 | 7,1 | 1,8 | 5,3 | 6,6 | 6,4 |

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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 |
| 681 | 694 | 694 | 689 | 680 | 694 | 689 | 694 | 689 | 694 | 689 | 687 | 675 | 689 | 689 | 689 |
| 2 | 4 | 8 | 4 | 2 | 4 | 2 | 11 | 33 | 14 | 2 | 8 | 5 | 5 | 31 | 5 |
| 11,5 | 7,3 | 5,8 | 9,6 | 2,1 | 6,5 | 9,9 | 5,9 | 10 | 16,8 | 9 | 6,2 | 2,2 | 6,5 | 9 | 5,6 |

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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 |
| 687 | 687 | 675 | 694 | 680 | 694 | 694 | 694 | 694 | 694 | 694 | 694 | 682 | 689 | 686 | 694 |
| 11 | 3 | 35 | 7 | 5 | 12 | 3 | 5 | 36 | 5 | 3 | 9 | 3 | 3 | 3 | 3 |
| 12,1 | 5,6 | 5,5 | 7,8 | 1,9 | 7,8 | 7,3 | 9,2 | 11,3 | 7,3 | 11,2 | 8,3 | 3,7 | 5,4 | 9,3 | 9,5 |

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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 % | 99,88 | 100 | 100 | 100 | 99,88 | 100 | 100 | 100 | 100 | 100 | 99,88 | 100 | 99,88 | 100 | 100 | 100 |
| i max % | 72,5 | 30 | 92,5 | 30 | 7,5 | 12,5 | 67,5 | 20 | 75 | 22,5 | 60 | 30 | 5 | 37,5 | 75 | 20 |
| i-avg max % | 35,5 | 19,5 | 27,5 | 17,5 | 5,75 | 17 | 30,25 | 18,5 | 34,5 | 30 | 13 | 19,25 | 12 | 19 | 22,5 | 16 |
| I min % | 5 | 7,5 | 2,5 | 2,5 | 5 | 2,5 | 2,5 | 2,5 | 5 | 2,5 | 5 | 10 | 2,5 | 7,5 | 2,5 | 7,5 |
| i-avg min % | 14 | 13,75 | 6,25 | 11,25 | 4,5 | 10 | 9,5 | 12,5 | 15,25 | 11,75 | 6 | 15,5 | 3,75 | 12,75 | 5,75 | 13,25 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | 99,75 | 100 | 100 | 100 | 99,88 | 100 | 100 | 100 |
| 95 | 15 | 97,5 | 12,5 | 10 | 12,5 | 30 | 27,5 | 82,5 | 35 | 5 | 90 | 22,5 | 12,5 | 77,5 | 32,5 |
| 28,75 | 18,25 | 17 | 25,75 | 8,25 | 23,25 | 24,75 | 15,75 | 34,5 | 42 | 24,25 | 17 | 10,75 | 16,25 | 22,5 | 17 |
| 5 | 2,5 | 2,5 | 5 | 2,5 | 5 | 2,5 | 5 | 5 | 2,5 | 2,5 | 10 | 2,5 | 5 | 5 | 2,5 |
| 6 | 12 | 5,75 | 15,5 | 5,25 | 15,5 | 7,5 | 11,5 | 11,25 | 11,5 | 6,75 | 12,5 | 4,75 | 10 | 11,5 | 14 |

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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 | 99,88 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99,88 | 100 | 98,9 | 100 |
| 27,5 | 17,5 | 87,5 | 17,5 | 12,5 | 30 | 27,5 | 12,5 | 90 | 22,5 | 25 | 27,5 | 7,5 | 17,5 | 60 | 25 |
| 30,25 | 19,5 | 19,5 | 19,5 | 7 | 21 | 24 | 23 | 28,25 | 21,5 | 28 | 20,75 | 9,25 | 19,5 | 24,25 | 23,75 |
| 2,5 | 2,5 | 2,5 | 5 | 2,5 | 2,5 | 7,5 | 5 | 5 | 5 | 2,5 | 7,5 | 5 | 5 | 5 | 7,5 |
| 8,75 | 13 | 13,25 | 15 | 4,25 | 12,25 | 8 | 11,25 | 11,25 | 14,5 | 5,75 | 12 | 4,75 | 13 | 5,5 | 11,5 |