Source code: [linghan1997/EE6227 (github.com)](https://github.com/linghan1997/EE6227)

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**A N-queen problem based on Island Model by Python**

*The whole project is flexible to change any hyperparameter or add any new islands.*

1. **Hyperparameters of the algorithm are as follow:**
2. Set separate islands by instantiating island classes. (Here set to three)
3. The probability of crossover and mutation can be set to be different.

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1. **Algorithm:**
2. The working procedure of a single island can be found in the “readMe” file.
3. Ending criteria is set to be that either island converges to zero cost (find a feasible solution).
4. The island model is realized sequentially. Islands

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1. Populations exchange among islands randomly every “exchange\_period”.

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1. **Outcomes**

Here are some 100-Queen examples of Cost-Iteration Curve figures *(Cost of the island which found a feasible solution)* with its computing time shown in the title:

图表, 折线图

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图表, 折线图

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*Some unique solutions derived from the program for 100-Queen Problem:*

Solution 1 for 100-Queen is: [(58, 1), (61, 2), (21, 3), (71, 4), (2, 5), (45, 6), (11, 7), (69, 8), (74, 9), (37, 10), (54, 11), (42, 12), (76, 13), (94, 14), (43, 15), (32, 16), (38, 17), (31, 18), (91, 19), (89, 20), (29, 21), (23, 22), (7, 23), (82, 24), (73, 25), (81, 26), (60, 27), (4, 28), (52, 29), (70, 30), (40, 31), (28, 32), (33, 33), (83, 34), (27, 35), (98, 36), (16, 37), (50, 38), (64, 39), (30, 40), (75, 41), (59, 42), (24, 43), (17, 44), (1, 45), (99, 46), (93, 47), (100, 48), (78, 49), (49, 50), (44, 51), (72, 52), (90, 53), (22, 54), (97, 55), (36, 56), (92, 57), (56, 58), (13, 59), (84, 60), (25, 61), (77, 62), (5, 63), (26, 64), (15, 65), (88, 66), (55, 67), (6, 68), (63, 69), (41, 70), (57, 71), (79, 72), (62, 73), (20, 74), (18, 75), (8, 76), (96, 77), (80, 78), (46, 79), (85, 80), (66, 81), (39, 82), (35, 83), (87, 84), (51, 85), (47, 86), (9, 87), (53, 88), (34, 89), (48, 90), (65, 91), (10, 92), (12, 93), (3, 94), (86, 95), (19, 96), (67, 97), (14, 98), (68, 99), (95, 100)]

Solution 2 for 100-Queen is: [(59, 1), (41, 2), (83, 3), (46, 4), (34, 5), (81, 6), (64, 7), (39, 8), (54, 9), (82, 10), (43, 11), (99, 12), (96, 13), (21, 14), (70, 15), (4, 16), (36, 17), (62, 18), (25, 19), (61, 20), (56, 21), (68, 22), (84, 23), (100, 24), (11, 25), (1, 26), (22, 27), (71, 28), (98, 29), (32, 30), (67, 31), (13, 32), (7, 33), (44, 34), (47, 35), (29, 36), (38, 37), (58, 38), (77, 39), (57, 40), (35, 41), (93, 42), (3, 43), (49, 44), (16, 45), (60, 46), (74, 47), (31, 48), (8, 49), (6, 50), (79, 51), (18, 52), (90, 53), (87, 54), (85, 55), (69, 56), (15, 57), (80, 58), (14, 59), (94, 60), (40, 61), (27, 62), (55, 63), (2, 64), (19, 65), (28, 66), (66, 67), (91, 68), (5, 69), (86, 70), (12, 71), (33, 72), (42, 73), (63, 74), (51, 75), (97, 76), (26, 77), (50, 78), (52, 79), (30, 80), (65, 81), (9, 82), (92, 83), (95, 84), (10, 85), (76, 86), (17, 87), (73, 88), (23, 89), (88, 90), (78, 91), (37, 92), (24, 93), (72, 94), (75, 95), (53, 96), (48, 97), (89, 98), (45, 99), (20, 100)]

*For N-Queen Outcome where N ≤ 16, the configuration string can be drawn on a chessboard:*

背景图案

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1. **Analysis**

The comparison of computing time between single GA and Island Model is meaningless in this program because the multiple islands are not realized parallelly. The guess is that in a parallel system the computing time may be 1/3 for three-island model. And the exchange part will lead to a larger diversity of species for each island which can contribute to convergence.