GAs to Solve the TSP

Jacob House // Nabil Miri Omar Mohammed // Hassan El-Khatib

Computer Science 3201 Fall 2018



Outline

 \rightarrow The Team

- \rightarrow Our Approach
 - Population Size

 \rightarrow References





The Team

Omar Mohamed Project management

Programmer

Nabil Miri Algorithm implementation

Debugging

Jacob House Technical management

Code quality control

Hassan El-Khatib Programmer





 \triangleright For a route with n cities, we have

$$R := n \cdot (n-1) \cdot \cdot \cdot 3 \cdot 2 \cdot 1 = n!$$

possible routes that cover all cities





Population Size

For a route with *n* cities, we have

$$R := n \cdot (n-1) \cdots 3 \cdot 2 \cdot 1 = n!$$

possible routes that cover all cities

As n grows, so does R





Population Size

For a route with *n* cities, we have

$$R := n \cdot (n-1) \cdot \cdot \cdot 3 \cdot 2 \cdot 1 = n!$$

possible routes that cover all cities

- ► As n grows, so does R
- \triangleright Population size P should also grow with n





Our Approach Population Size

For a route with *n* cities, we have

$$R := n \cdot (n-1) \cdots 3 \cdot 2 \cdot 1 = n!$$

possible routes that cover all cities

- ► As n grows, so does R
- Population size P should also grow with n
- ightharpoonup We define P := 2n

References



Zefeng Chen, Yuren Zhou, and Yi Xiang. "A many-objective evolutionary algorithm based on a projection-assisted intra-family election". In: Applied Soft Computing Journal 61 (2017), pp. 394–411. ISSN: 1568-4946.



References

- Hassan Ismkhan. "Effective three-phase evolutionary algorithm to handle the large-scale colorful traveling salesman problem". In: Expert Systems with Applications 67 (2017), pp. 148–162. ISSN: 0957-4174. DOI: https://doi.org/10.1016/j.eswa.2016.09.022. URL: http://www.sciencedirect.com/science/article/pii/S0957417416305000.
- P. Larrañaga et al. "Genetic Algorithms for the Travelling Salesman Problem: A Review of Representations and Operators". eng. In: Artificial Intelligence Review 13.2 (1999), pp. 129–170. ISSN: 0269-2821.
 - Chengjun Li et al. "A novel evolutionary algorithm for the traveling salesman problem". eng. In: IEEE Publishing, 2011, pp. 2515–2517. ISBN: 9781612847191.



References



G. Tao and Z. Michalewicz. "Inver-over operator for the TSP". In: Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics) 1498 (1998), pp. 803–812. ISSN: 03029743.

Qingling Zhu et al. "A novel adaptive hybrid crossover operator for multiobjective evolutionary algorithm". eng. // In: Information Sciences 345 (2016), pp. 177–198/ISSM: // 0020-0255.

