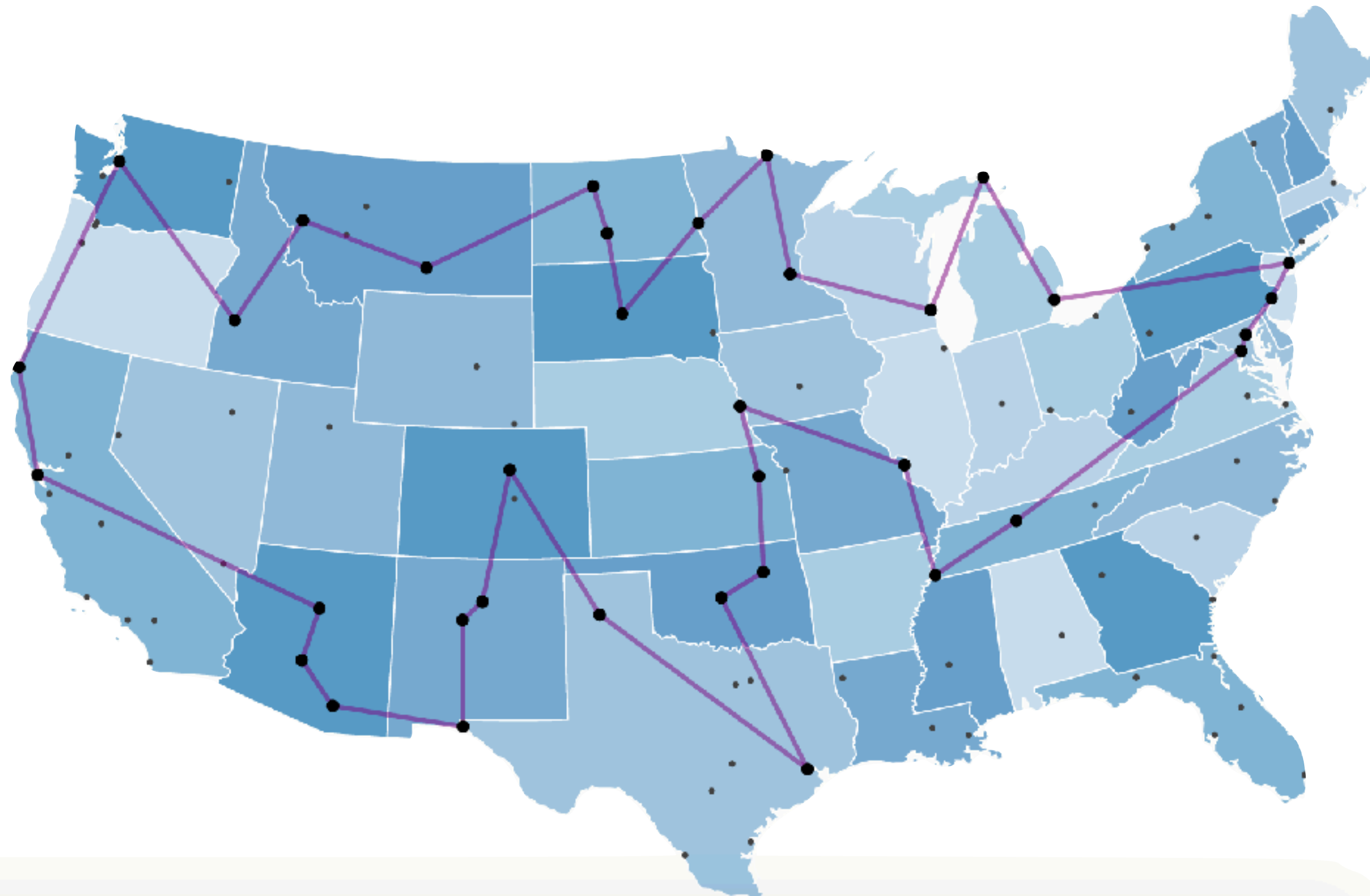


TRAVELLING SALESMAN PROBLEM

Team501: Ang Li , Xiaohan Zhao

PROBLEM DESCRIPTION

The **travelling salesman problem (TSP)** asks the following question: "Given a list of cities and the distances between each pair of cities, what is the shortest possible route that visits each city and returns to the origin city?" It is an NP-hard problem in combinatorial optimization, important in operations research and theoretical computer science.

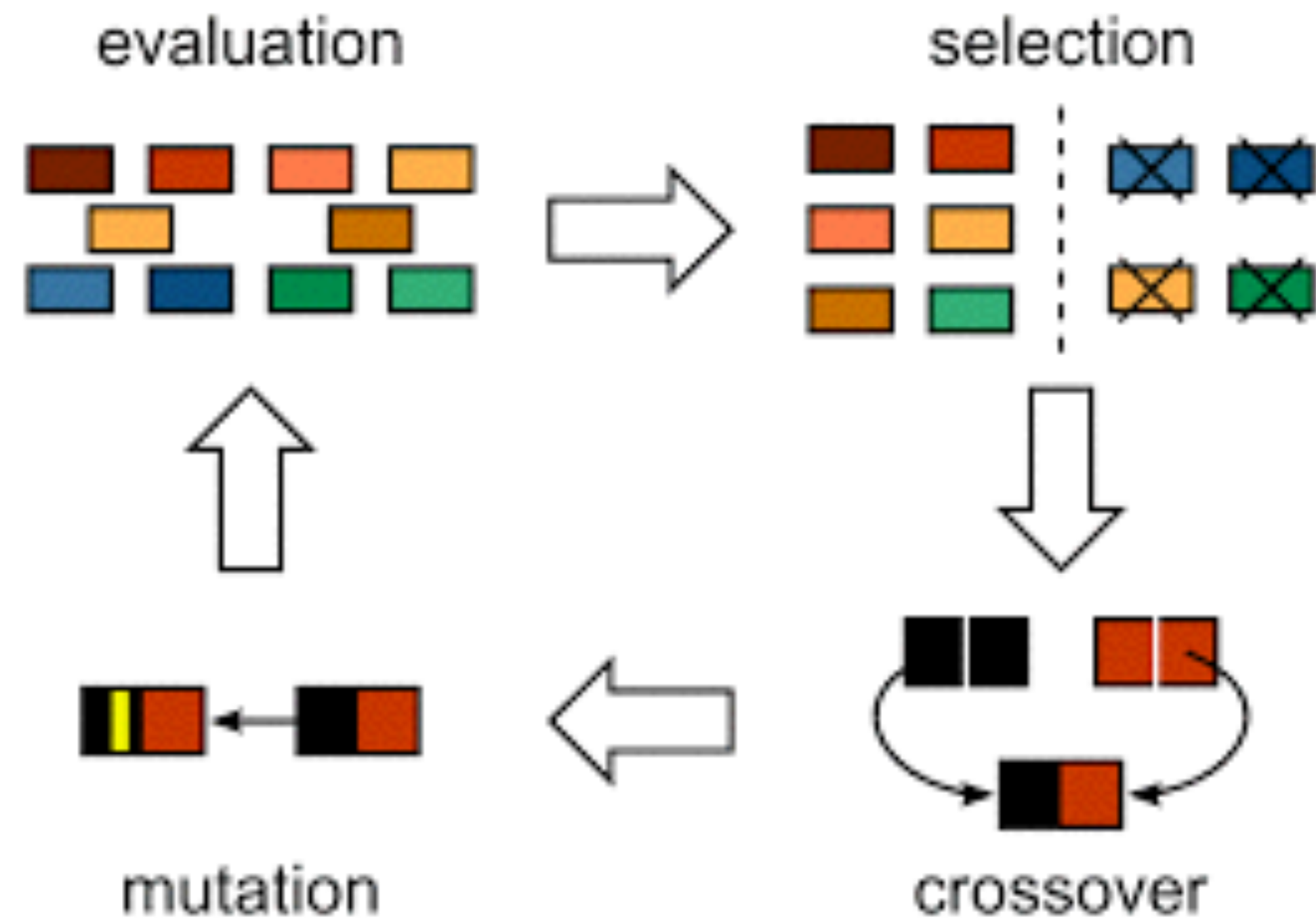


Source: [Wikipedia](#)

WHAT WE DID

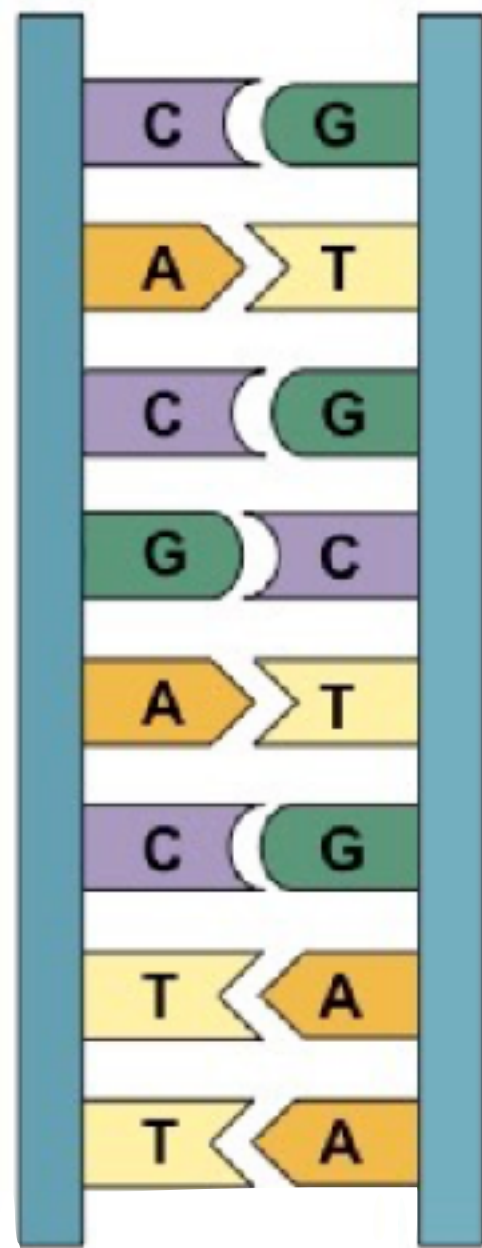
- Created a **genetic algorithm** to solve the travelling salesman problem with clearly comments
- Used **parallel computation mechanism** to divide population up into sub-populations and merge the next generations for each colony in parallel
- Created **unit tests** to test most of the methods to keep the project operating properly
- Created several input data files to be used in this algorithm
- Created a **user interface** using java Swing to show the progress of the evolution

GENETIC ALGORITHM



DESIGN OF TSPCHROMOSOME

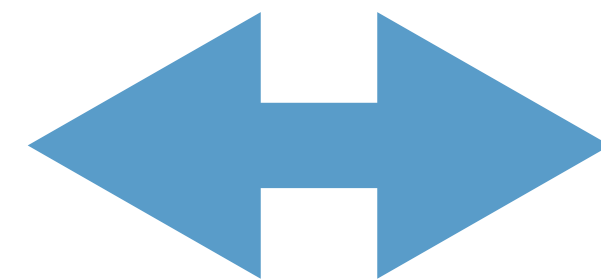
- GenotypeList is used to represent the genotype of the corresponding chromosome
- PhenotypeList is used to represent the real path



[AGAT, AGAA, AGAG, AGAC]



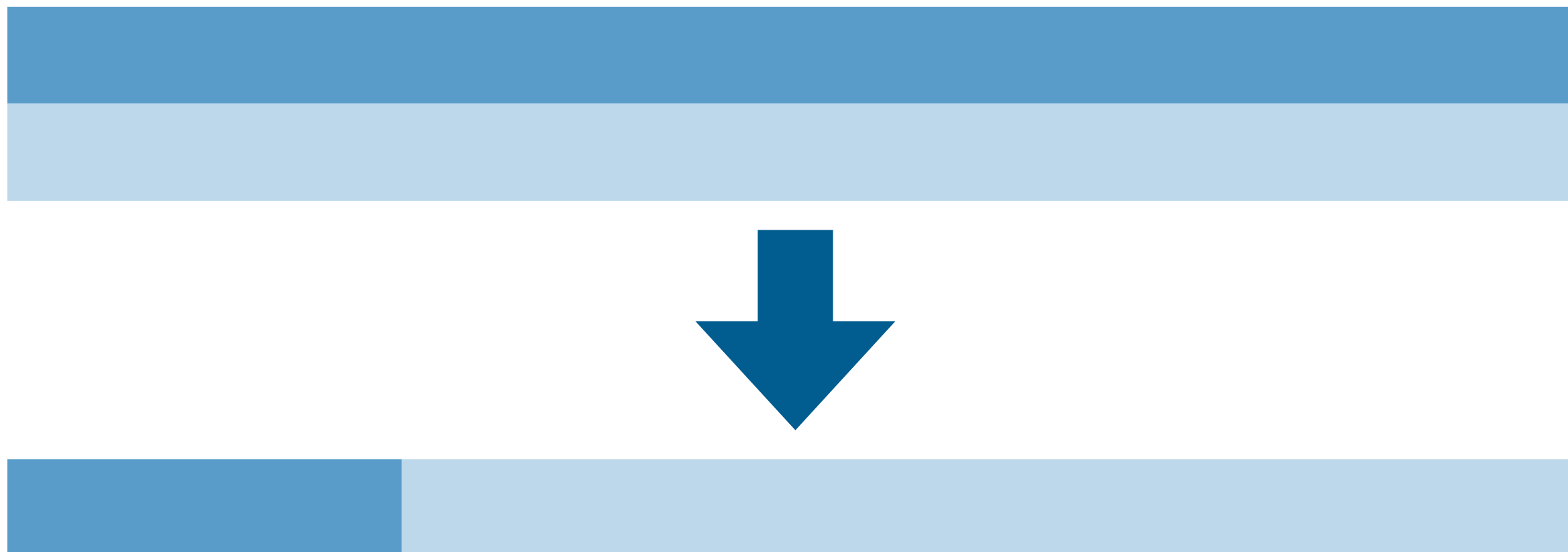
[19, 16, 17, 18]



DESIGN OF TSPCHROMOSOME

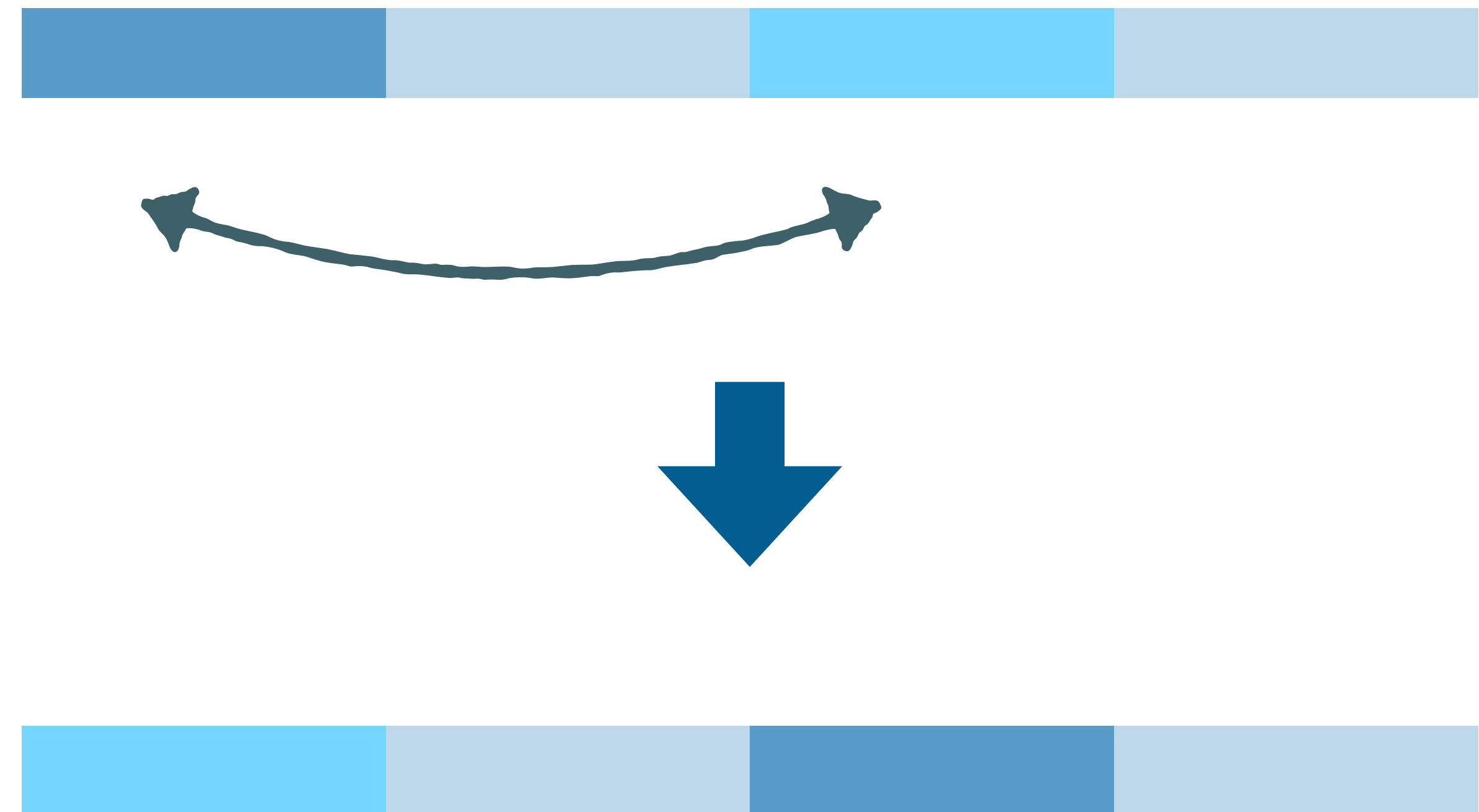
crossover:

- we generate a random number, and the new chromosome is generated by part of the father chromosome and part of the mother chromosome.
- To prevent visiting a city repeatedly, we need to ignore the used genes.



mutation

- generating two different cities randomly and swap them



DESIGN OF TSPGENETICALGORITHM

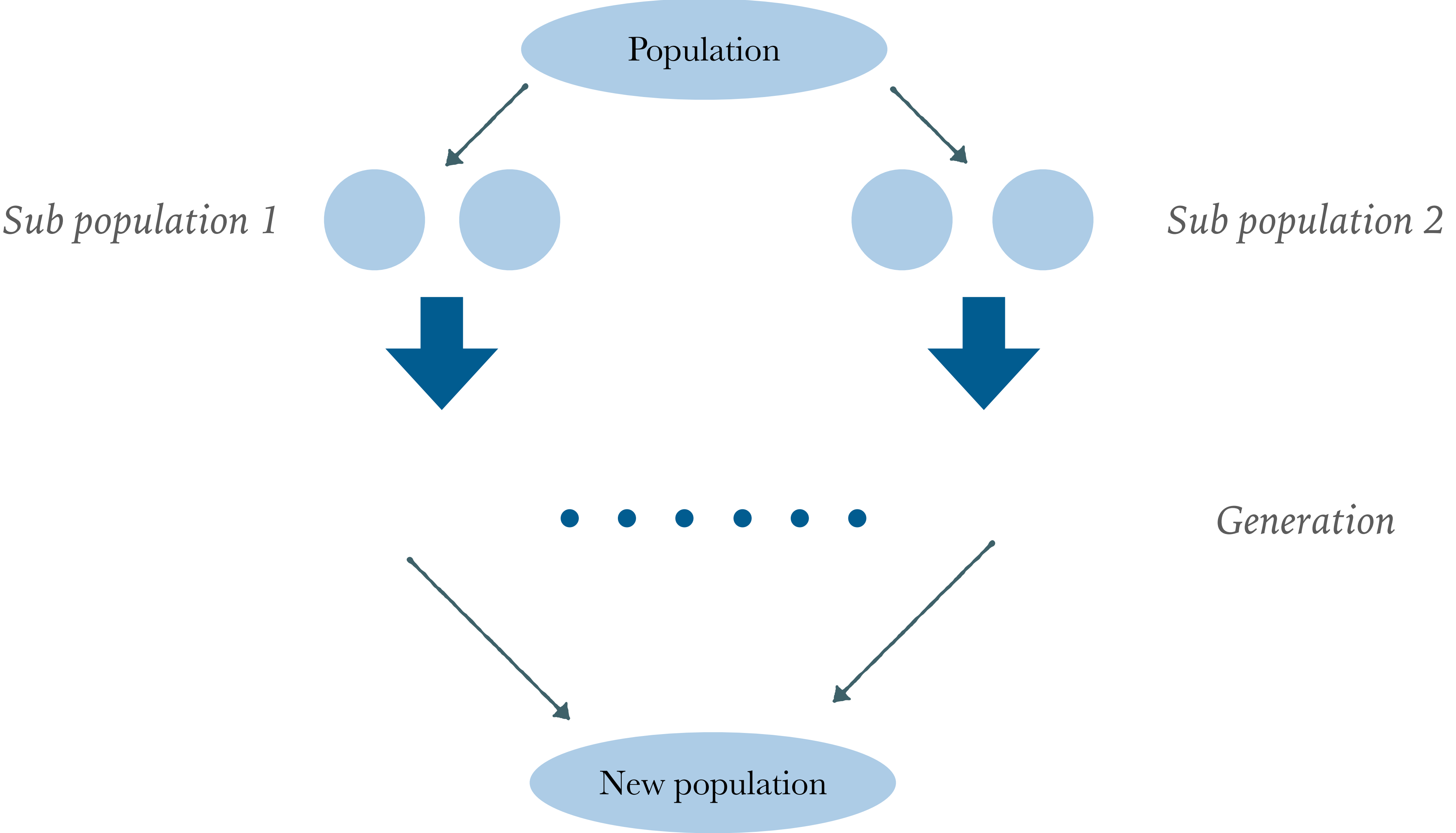
select()

- This method is used to choose good entities to generate a child generation and cull the bad entities
- The chromosomes are sorted by the weight to be chosen properly
- The best entity of each generation will keep alive without any change to keep the best genotype of old generation

evolution()

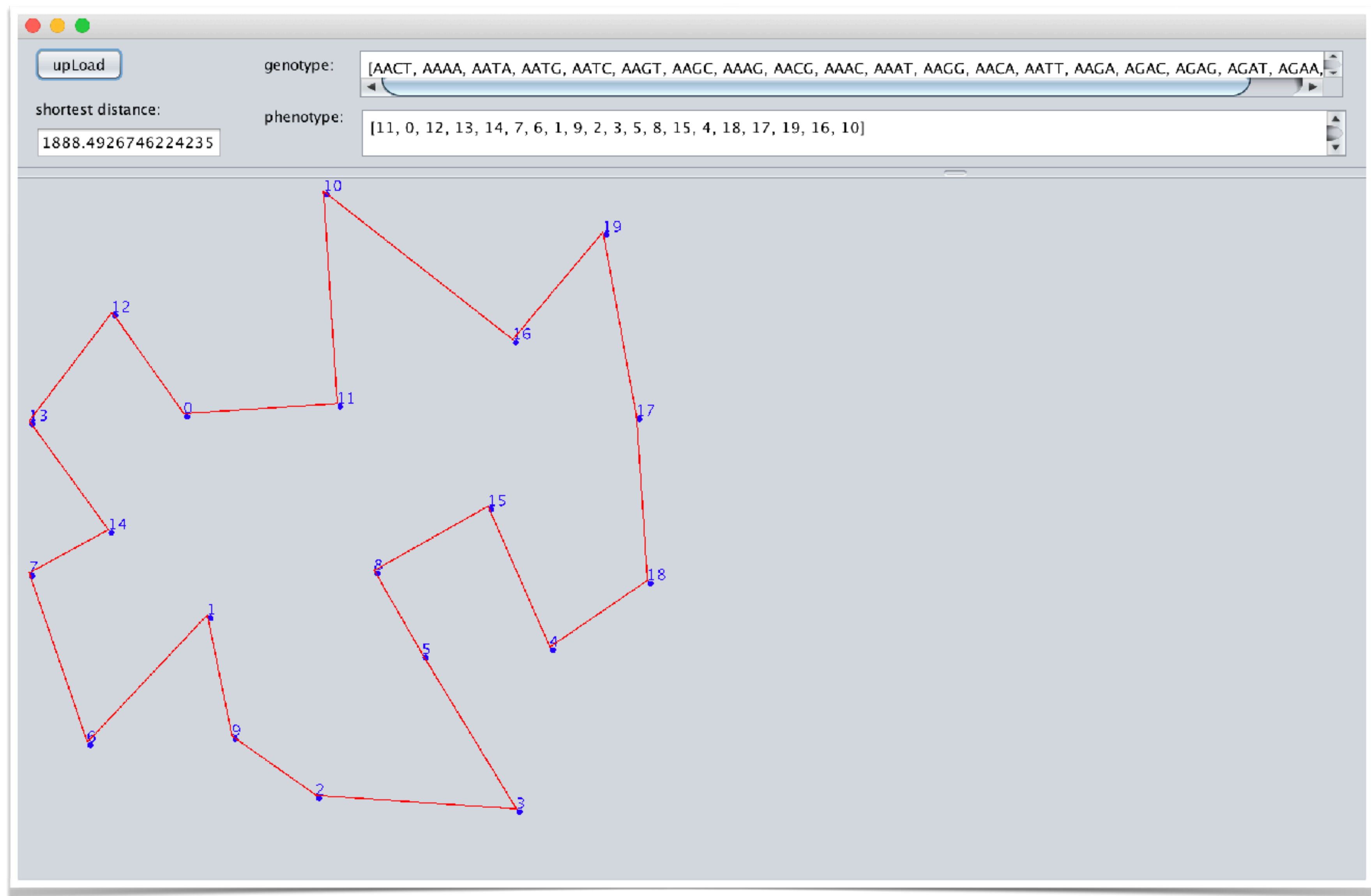
- This method is used to crossover and mutation of the new generation's genotype
- In our algorithm, the possibility of crossover is much higher than the possibility of mutation, this is a experiment conclusion

PARALLEL COMPUTATION MECHANISM



RESULT

Data.txt



RESULT

Test2.txt

