Genetic Algorithm
For maximum clique problem

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1 Task Description

Implement genetic algorithm to finding maximum clique in graph.

Requirements

Python 3.9.7
Matplotlib 3.4.3
Numpy 2.6.3

2 User's manual

To use implemented algorithm, user have to call function **facebook** from file
facebook.py with arguments: number of nodes in graph, type of graph ("random/groups/bipartite"), size of population, number of iterations, probability
of individual mutation (0-1), probability of gen mutation (0-1). Function will
return size of maximum clique and run time. Random graph is full graph with
deleted 60 percent of edges; groups is clustered graph and bipartite is bipartite
graph.

3 Best parameters

I did some experiments to find the best parameters for graph with 50 nodes.
According to figures below:
POpulation size: 35
Iterations: 80
Probability of individual mutation: 0.5
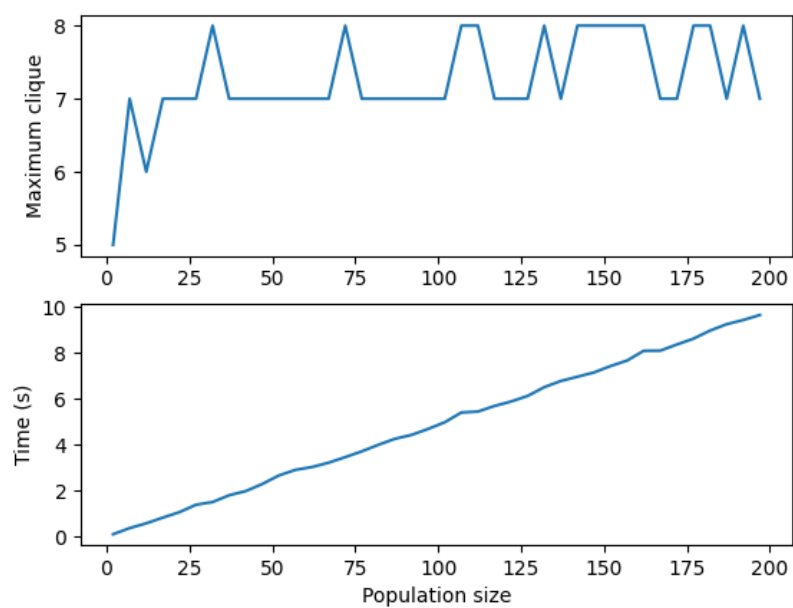Probability of gen mutation: 0.15
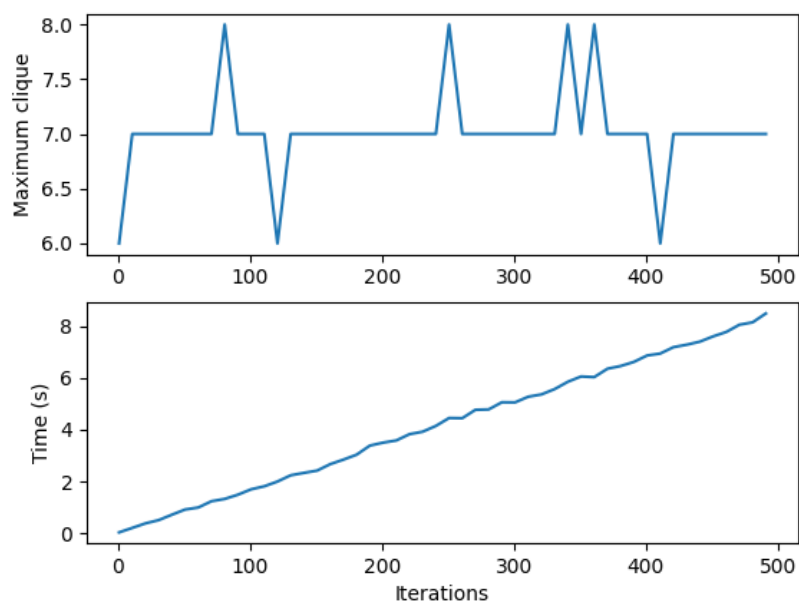
Figure 1: Test of the effect of population size

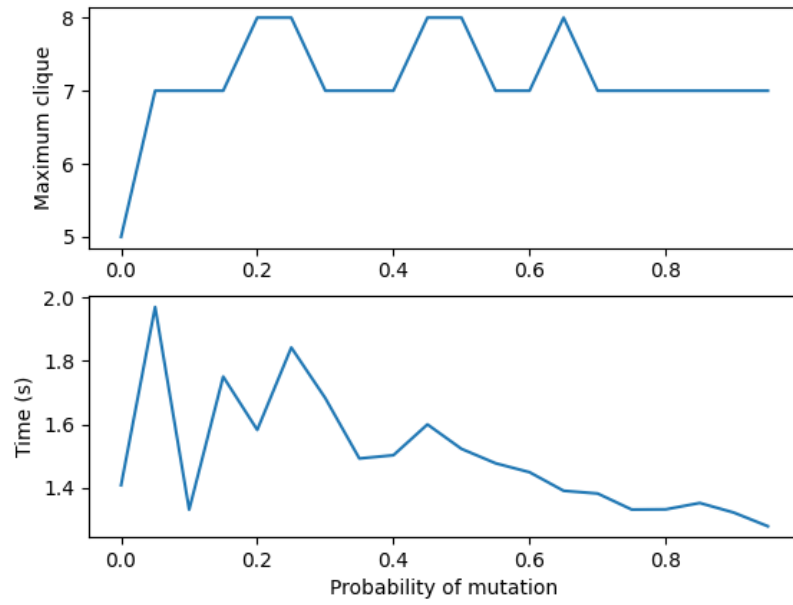Figure 2: Test of the effect of iterations number

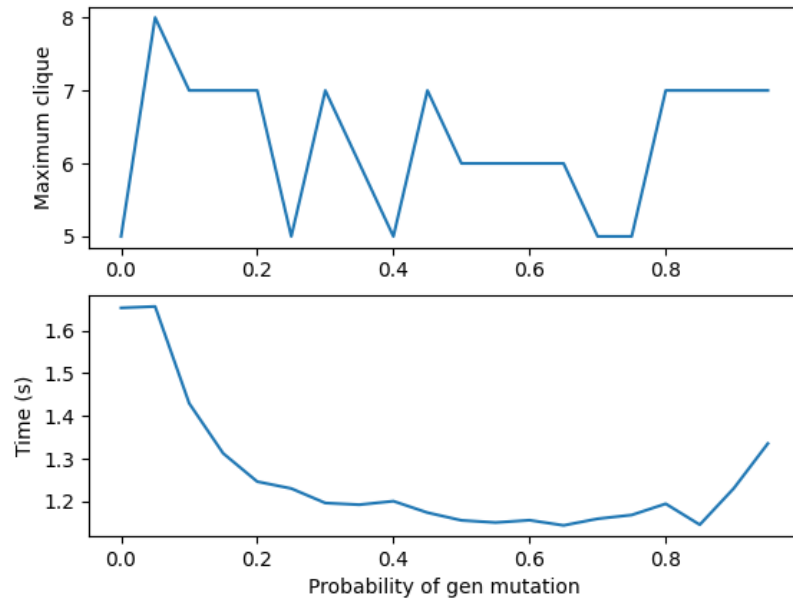Figure 3: Test of the effect of mutation probability

Figure 4: Test of the effect of gen mutation probability

4 Examples of algorithm usage on various graph types

Bellow I will show some examples of algorithm usage on all three graph types. I used there parameters of function from third section.
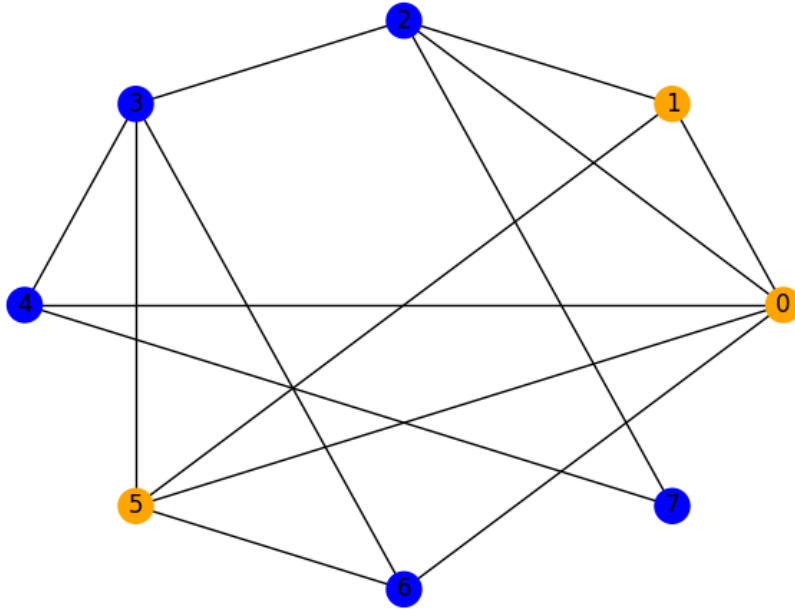

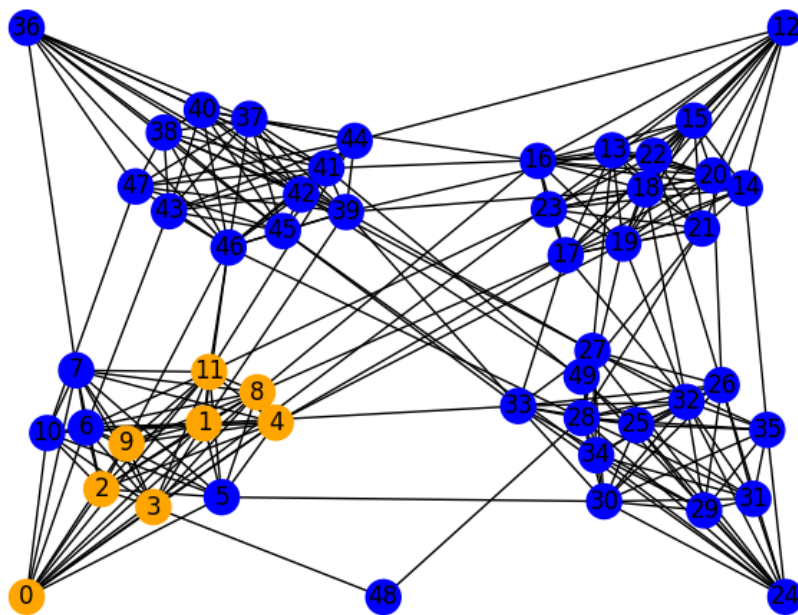Figure 5: Algorithm on random graph with 8 nodes

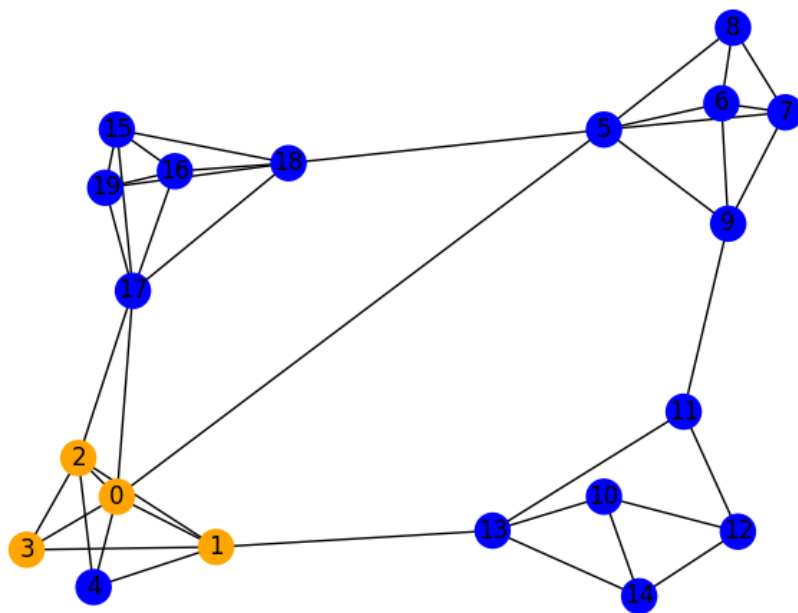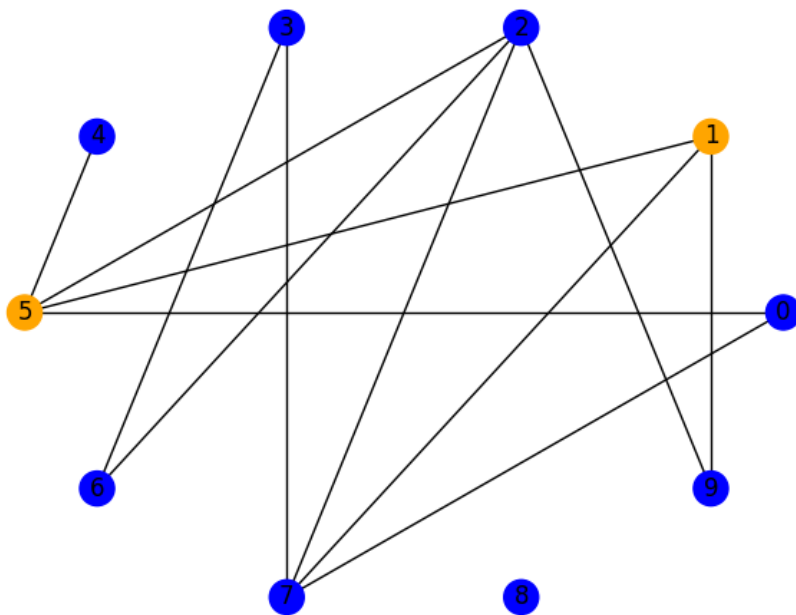Figure 6: Algorithm on clustered graph with 50 nodes

Figure 7: Algorithm on clustered graph with 20 nodes

Figure 8: Algorithm on bipartite graph