Generisanje random grafova

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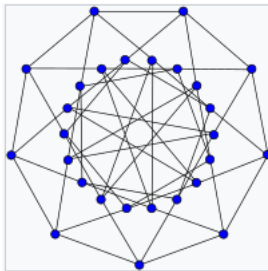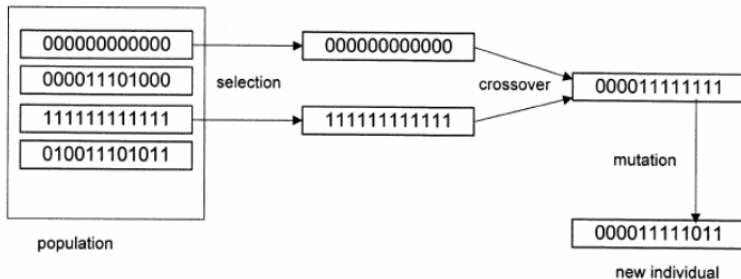
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Sadržaj

Uvod

- Značaj grafova — praktični i teorijski
- Grafovski algoritmi
- Mane algoritama

Opis problema

- Željena svojstva $\rightarrow$ graf
- Genetski algoritam

- Aviz projekat

Implementacija

1. Učitavanje test primera

```
{"num nodes": 6,
"average degree": 3.33,
"clustering coefficient": 0.7,
"num of connected components": 1,
"transitivity": 0.75}
```

2. Organizacija ulaznih vrednosti

3. Poziv algoritma

4. Rezultati

Implementacija

- Klasa *Individual*

```
1000  self.graph = nx.erdos_renyi_graph(self.num_nodes, 0.5)
```

```
1000  return
      -(abs(graph_avg_degree - self.avg_degree) / (max_deg - min_degree)
       +
1002  abs(graph_clustering_coefficient - self.avg_clustering_coeff) +
      abs(graph_transitivity - self.transitivity) +
1004  abs(self.graph_connected_components - self.num_components) / (max_comp
       - min_components))
```

Implementacija

- Funkcije *mutation* i *selection*

```
1000  nx.to_numpy_array(parent1.graph)
```

```
1000  nx.from_numpy_array(adj_mat_cld1)
```

Rezultati

Tabela 1: Vrednosti fitness funkcije

Broj čvorova	Veličina populacije	Fitness
6	50	-0.00562222222222093
6	100	-0.00562222222222093
10	50	-0.0
10	100	-0.0
10	50	-0.008490299823633132
10	100	-0.018649029982363168
25	50	-0.9116404928404928
25	100	-0.883244025540713
50	50	-0.22903390715500593
50	100	-0.25750585310408725
75	50	-0.1301827330208663
75	100	-0.09062161448330536
100	50	-2.463823741959615
100	100	-2.4304182119027153

Rezultati
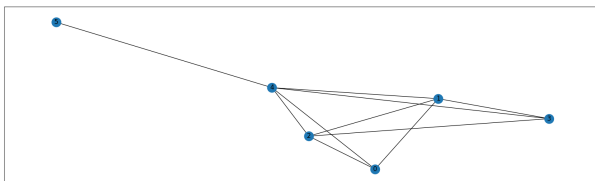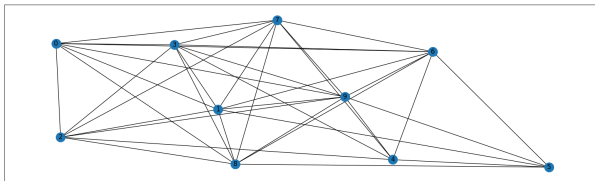
Rezultati

- Poboljšanja?
    - Postojanje linearnog modela?
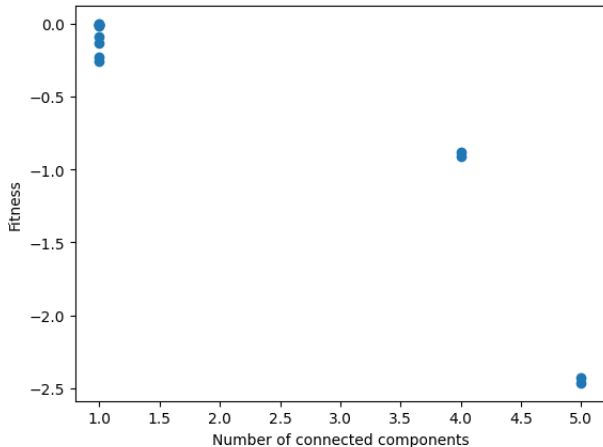
Rezultati

- Poboljšanja?
  - Matrica korelacije?

```
Correlation matrix is :
                   fitness  num_of_nodes  avg_degree  num_components  \
fitness           1.000000     -0.709088    0.269342       -0.933853
num_of_nodes     -0.709088      1.000000    0.442679        0.521044
avg_degree        0.269342      0.442679    1.000000       -0.354475
num_components   -0.933853      0.521044   -0.354475        1.000000
transitivity      0.571401     -0.329264    0.343455       -0.602434
clustering_coeff  0.563877     -0.311776    0.362305       -0.594298

                   transitivity  clustering_coeff
fitness                0.571401          0.563877
num_of_nodes          -0.329264         -0.311776
avg_degree             0.343455          0.362305
num_components        -0.602434         -0.594298
transitivity           1.000000          0.998739
clustering_coeff       0.998739          1.000000
```

Rezultati

- Poboljšanja?
  - Smanjenje verovatnoće za generisanje grana?

Tabela 2: Rezultati smanjenja verovatnoće za generisanje grana

Broj čvorova	Veličina populacije	Fitness
6	50	-0.00562222222222093
6	100	-0.00562222222222093
10	50	-0.0
10	100	-0.0
10	50	-0.015848555815769043
10	100	-0.005712522045855142
25	50	-0.4673944294699015
25	100	-0.37566199261992617
50	50	-0.2838353989472806
50	100	-0.21188723623250064
75	50	-0.14071529552130418
75	100	-0.110918584873799
100	50	-1.441273414793612
100	100	-1.451136134239242

Rezultati

- Poboljšanja?
    - Povećanje verovatnoće za mutaciju?

Tabela 3: Rezultati povećanja verovatnoće za mutaciju

Broj čvorova	Veličina populacije	Fitness
6	50	-0.0056222222222222093
6	100	-0.0611777777777778
10	50	-0.015999999999999997
10	100	-0.012000000000000002
10	50	-0.008549953314659233
10	100	-0.028018633540372477
25	50	-1.1550324678476098
25	100	-1.028002347714707
50	50	-0.3599163664500776
50	100	-0.34342872632582455
75	50	-0.18261250694257553
75	100	-0.17633613692486994
100	50	-2.5018729431754076
100	100	-2.5296294155103167

Rezultati

- Poboljšanja?
  - Ruletska selekcija?

Tabela 4: Rezultati korišćenja ruletske selekcije

Broj čvorova	Veličina populacije	Fitness
6	50	-0.12895555555555546
6	100	-0.35882222222222226
10	50	-0.5879999999999999
10	100	-0.7236363636363636
10	50	-0.24011695040710568
10	100	-0.3777777777777778
25	50	-1.3691475635475636
25	100	-1.374624532671323
50	50	-0.4782280972914995
50	100	-0.45437317966380203
75	50	-0.2960845929156614
75	100	-0.285166362017774
100	50	-2.6308003269331204
100	100	-2.6048549456728383

Zaključak

1. Relativno dobri rezultati
2. Problem sa međusobno zavisnim svojstvima
3. Prostor za poboljšanje

Literatura

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