

Algoritmi Genetici - Raport Tema 2'

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Abstract

Acest raport urmareste prezentarea unor idei de optimizare a algoritmului genetic discutat in cadrul Temei 2 si a unei analize comparative intre acestia.

1 Idei Optimizare

1.1 Conditia de Opre

Nu impunem un numar de genratii, ci lasam algoritmul genetic sa ruleze cat timp nu sunt mai mult de MAXGEN generatii consecutive care sa convearga spre acelasi optim

1.2 Parametrii Adaptivi

Fiecare bit al unei dimensiuni are asociat un factor de mutatie si o noua conditie ca mutatia sa aiba loc

```
const double mutationProbability = 0.01;
int mutationFactor[MAXBITLEN];

void mutatePopulation() {
    for (int i = 0; i < popSize; ++i)
        for (int j = 0; j < dim*bitLen; ++j)
            if (rand() / (RAND_MAX + 1.) < mutationProbability * mutationFactor[j mod bitLen])
                currPop->candidateSol[i][j] = !currPop->candidateSol[i][j];
}
```

Acest factor de mutatie trebuie initializat cu o valoare mare si scazut in timp, cu mentiunea ca factorul celor mai semnificativi biti ai unei dimensiuni vor scadea mai repede decat ceilalti

```
if (generationCount mod 100 == 0) changeMutationFactor();

void changeMutationFactor() {
    int stop = min(generationCount / 100, bitLen);
    for (int i = 0; i < stop; ++ i) mutationFactor[i] = max(mutationFactor[i] - 1, 0);
}
```

1.3 Imbunatairea Solutiei

Pasam funtiei bestImprovementHillClimbing() cel mai bun candidat al ultimei generatii

2 Analiza comparativa

dim	best	worst	mean	stDev	time(s)
5	0.0005	6.520824	2.592754	2.149368	2.819
10	0.014316	16.20774	6.258031	4.054297	6.747
30	268.9049	375.2729	328.9278	67.1577	7.766

Table 1: Rastrigin's function Analysis

dim	best	worst	mean	stDev	time(s)
5	0.000000	1.000000	0.033333	0.182574	64.880
10	0.994959	9.954628	5.325765	2.237188	123.247
30	33.508177	73.519860	54.874482	10.340336	395.399

Table 2: Rastrigin's function Analysis (improved version)

dim	best	worst	mean	stDev	time(s)
5	0.01494	0.236258	0.07999	0.056983	3.99
10	0.337246	1.221445	1.07868	0.250496	5.924
30	40.26489	185.052	106.4894	41.27796	17.592

Table 3: Griewangk's function Analysis

dim	best	worst	mean	stDev	time(s)
5	0.000000	0.094228	0.041447	0.021856	99.090
10	0.019944	0.583014	0.171323	0.149916	193.396
30	0.000000	0.575187	0.091077	0.150153	636.481

Table 4: Griewangk's function Analysis (improved version)

dim	best	worst	mean	stDev	time(s)
5	1.445085	14.71907	5.114197	2.908234	1.67
10	3.310754	41.71715	12.3806	7.190294	3.772
30	80.86974	891.389	258.8388	161.8607	18.471

Table 5: Rosenbrock's Valley function Analysis

dim	best	worst	mean	stDev	time(s)
5	1.245677	3.673279	1.757189	0.652394	57.299
10	3.825846	10.526679	7.363394	1.937280	107.951
30	27.207837	73.883068	34.348416	12.004546	330.495

Table 6: Rosenbrock's Valley function Analysis (improved version)