ONLINE NEWSPAPER ASSIGNMENT

MACHINE INTELLIGENCE FOR COMBINATORIAL OPTIMIZATION

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DATA ANALYSIS

The provided dataset consists of 200 authors with specific article's dimension expressed in bytes and their respective followers, which represent the expected readers of the newspaper. The maximum capacity of the newspaper is about 10Mbytes. After conducting an analysis of the provided data, the following information has been gathered:

- Minimum article dimension: 5 656
- Maximum article dimension: 493 016
- Average article dimension: 250 033.6
- Minimum author's followers: 3 499
- Maximum author's followers: 499 153
- Average author's followers: 237 347.48

Therefore, a nearly optimal solution would be to identify almost 4 authors, which article dimension is about 250033.6, to cover all the space available in the newspaper. This would result in a total of followers equals to 949 389.92, based on the average followers of the authors.

GREEDY ALGORITHM

Implementing a first algorithm with a greedy approach, where each author is chosen with a high number of followers until the total space available is almost covered, results in the following solution:

Total space occupied: 9 926 546
Total space unoccupied: 73 454
Total followers: 16 734 865
Total authors: 37

The total number of followers of the obtained authors is much more elevated than the expectations based on the data analysis conducted before, even if the number of authors chosen is elevated.

SIMULATED ANNEALING

Implementing the simulated annealing algorithm, using the solution obtained from the Greedy algorithm as the initial solution, yields the following results:

Total space occupied: 9 997 505
Total space unoccupied: 2 495
Total followers: 11 679 423

Total authors: 46

We observe an increase in the number of considered authors followed by a decrease of the unoccupied space and total followers.

Implementing the simulated annealing algorithm, using the solution obtained from the Greedy algorithm as the initial solution, yields the following results:

Total space occupied: 9 993 392
Total space unoccupied: 6 608
Total followers: 13 650 103
Total authors: 49

We observe an increase in the number of considered authors followed by a decrease of the unoccupied space and an increase of the total followers.

POPULATION ALGORITHM – (5,20) EVOLUTIONARY STRATEGY

Utilizing the (μ, λ)-evolutionary strategy with values $\mu = 5,\ \lambda = 20$ as the population algorithm and starting from the solution of the Greedy algorithm and implementing 20 generations:

Total space occupied: 9 855 735
Total space unoccupied: 144 265
Total followers: 13 951 937
Total authors: 49

Using a random population and the same parameters, the best solution obtained is:

Total space occupied: 9 817 303
Total space unoccupied: 182 697
Total followers: 17 000 889
Total authors: 51

Which represents the best solution found based on the total followers obtained from the authors chosen.