

Alvira Syahfitri Ispriadi, 2020, **Penerapan *Hybrid Crow Search Algorithm (CSA)* dan *Simulated Annealing Algorithm (SA)* untuk Menyelesaikan *Uncapacitated Facility Location Problem (UFLP)***. Skripsi ini dibawah bimbingan Asri Bekti Pratiwi, S.Si., M.Si dan Dr. Herry Suprajitno, M.Si. Departemen Matematika, Fakultas Sains dan Teknologi, Universitas Airlangga, Surabaya.

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### ABSTRAK

Penulisan skripsi ini bertujuan untuk menyelesaikan *Uncapacitated Facility Location Problem (UFLP)* dengan menggunakan *Hybrid Crow Search Algorithm (CSA)* dan *Simulated Annealing Algorithm (SA)*. UFLP merupakan permasalahan menentukan lokasi yang akan dibangun fasilitas yang akan melayani  $m$  pelanggan dimana terdapat  $n$  lokasi untuk membangun  $n$  fasilitas. Pada permasalahan ini diasumsikan bahwa fasilitas yang dibangun tidak memiliki batasan melayani pelanggan, setiap pelanggan hanya dilayani satu fasilitas, dan satu lokasi hanya terdapat satu fasilitas dengan fungsi tujuannya yaitu meminimumkan total biaya pembangunan fasilitas dan pelayanan pelanggan. CSA merupakan algoritma yang terinspirasi dari perilaku kawanan gagak dalam mengingat dan mempertahankan tempat persembunyian makanan. SA merupakan algoritma yang terinspirasi dari proses *annealing* dalam bidang pengerasan kristal. Program penerapan *Hybrid Crow Search Algorithm (CSA)* dan *Simulated Annealing Algorithm (SA)* untuk menyelesaikan *Uncapacitated Facility Location Problem (UFLP)* harus melalui beberapa prosedur yaitu prosedur inisialisasi, pembangkitan populasi gagak, evaluasi nilai fungsi tujuan, menentukan perpindahan ke posisi baru sesuai nilai AP kemudian menempuh prosedur SA sehingga dapat dihasilkan solusi untuk menyelesaikan permasalahan tersebut. Program *Hybrid CSA-SA* dibuat menggunakan Dev C++. Program tersebut diimplementasikan pada dua kasus yaitu data kecil terdiri dari 10 lokasi dengan 15 pelanggan dan data besar terdiri dari 50 lokasi dengan 50 pelanggan. Pada proses *running* program *Hybrid CSA-SA*, diperoleh solusi 546.863,125 untuk data berukuran kecil dan 813.169,75 untuk data berukuran besar. Berdasarkan hasil implementasi disimpulkan bahwa semakin besar jumlah kawanan gagak, iterasi, dan nilai AP, maka solusi dari UFLP semakin baik.

**Kata Kunci:** *Crow Search Algorithm (CSA)*, *Simulated Annealing Algorithm (SA)*, *Uncapacitated Facility Location Problem (UFLP)*.

Alvira Syahfitri Ispriadi, 2020, **Application of *Hybrid Crow Search Algorithm (CSA) and Simulated Annealing Algorithm (SA) to Solve Uncapacitated Facility Location Problem (UFLP)***. This undergraduate thesis was supervised by Asri Bekti Pratiwi, S.Si., M.Si and Dr. Herry Suprajitno, M.Si. Departement of Mathematics, Faculty of Science and Technology, Airlangga University, Surabaya.

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### ABSTRACT

The aim of the research is to solve Uncapacitated Facility Location Problem (UFLP) using Hybrid Crow Search Algorithm (CSA) and Simulated Annealing Algorithm (SA). UFLP is a problem to determine  $n$  facilities that will be built at an  $n$  location where its will serve  $m$  customer. In this problem, it is assumed that the facilities was built have no limitation, each customer only served by one facility, and one location only provides one facility. The purpose of UFLP is to minimize the total cost of building facilities and customer service costs. CSA is an algorithm inspired by the behavior of the crows that they can remember and preserve their food's hiding place. SA is an algorithm inspired by annealing process in the field of hardening. The Application *Hybrid Crow Search Algorithm (CSA) and Simulated Annealing Algorithm (SA) to solve Uncapacitated Facility Location Problem (UFLP)* has several procedure i.e initialication parameters and data, generate crow position, determine the movement of crows to a new position according to AP value and then follow the SA procedure so that solution can be generated to solve the problem. The Program of Hybrid CSA-SA was made using a Dev C++ which is implemented in two cases, there are small data and large data. There is small data with 10 locations and 15 customers, while the large data with 50 locations and 50 customers. In the data processing by running the Hybrid CSA-SA program is obtained a solution 546.863,125 for small data and 813.169,75 for large data. Based on the results of the implementation, it was concluded that that the greater number of crow flocks, iterations, and the AP value, then the solution of UFLP settlement is getting better.

**Keywords:** *Crow Search Algorithm (CSA), Simulated Annealing Algorithm (SA), Uncapacitated Facility Location Problem (UFLP).*