

A Review Paper on Cuckoo Search Algorithm (CSA)

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ABSTRACT- CS was first proposed by Xin-She Yang and Suash Deb in 2009, and it has received a lot of interest because of its potential efficiency in handling a variety of optimisation issues and contributes substantial. Because of the publication of a large number of studies in the previous several years about cuckoo search, the body here you will find a summary of the majority of the research on cuckoo search that has been published in peer-reviewed publications a thorough classification of these references into relevant categories might provide a basis for subsequent study. Many studies on cuckoo search have been published in recent years, and the field on the subject has grown substantially. EAs' main purpose is to find the internationally optimum or near-optimal solutions in the lowest amount of time. This section summarizes the majority of the particle swarm optimization investigations that have been published in consensus journals and at conventions so far. These resources may be organized into appropriate sections and used as a jumping off location for further research.

KEYWORDS- Cuckoo Algorithm, Engineering optimization, Hybrid, Search, Variant.

I. INTRODUCTION

Cuckoo search (CS) is now used in nearly every aspect of function optimization, engineering improvement, computer vision, programming, budgeting, and extraction of characteristics, prediction, and real applications. At the moment of posting this section, a cursory Google Scholar check revealed 440 articles, original work having mentioned 223 times. A Skiros query turned up 616 hits, included 126 academic articles from July 2013 to July 2014. While many papers are still in production, it is impossible to obtain all of them [1]. Cuckoo search outperformed PSO and GA. Since then, the algorithm's creators and a number of academics have adapted it to efficient production methods [2].

CSA has been given in this brief study. The links have been categorised in a methodical manner. Cuckoo searching is a

very dynamic and exciting research field, as shown by the rapidly growing bibliography. Additional cuckoo searching studies will very certainly be released in the coming years. It is worth noting, based on the preceding assessment, that there are a few key concerns that require further research [3-6]. One thing that needs be done is a theoretical study to get insight into various variations of the cuckoo search algorithm. Furthermore, performing variable adjustment in certain efficient variations and seeing how parameters affects algorithm performance may be extremely beneficial. In addition, programs should concentrate on large-scale real-world scenarios [7].

The CS technique was motivated by the community reasoning of Cuckoo animals. The Cuckoo bird lays its eggs are usually of various animals. The represent or detects Cuckoo's egg with a possibility of pa. The egg was discovered by the avian species possibly via the eggs or via the abandonment of nesting in attempt to build a fresh one. The number of host nests is considered to be fixed for mathematical modelling simplicity. The Cuckoo search (CS) algorithm's mathematical model [8] was stated as follows:

Assume there are N Cuckoos in the surroundings. Each Cuckoo symbolises a nest in this game. The nest is connected to the a solution to a problem of optimization Let's get this party started. find the ith Cuckoo in an n-dimensional search space.

A. Cuckoo Search: Variants and Hybrids

1) Variants

Mathematical unit optimisation tests were used to test the initial cuckoo search. This type of issue is typically used as a test bed for newly developed algorithms [9]. Cuckoo search is capable of dealing with multidimensional issues in a natural and efficient manner. However, experts have sought to enhance its effectiveness even further in order to achieve better results. Figure 1 shows the variant of cuckoo search algorithm [10].

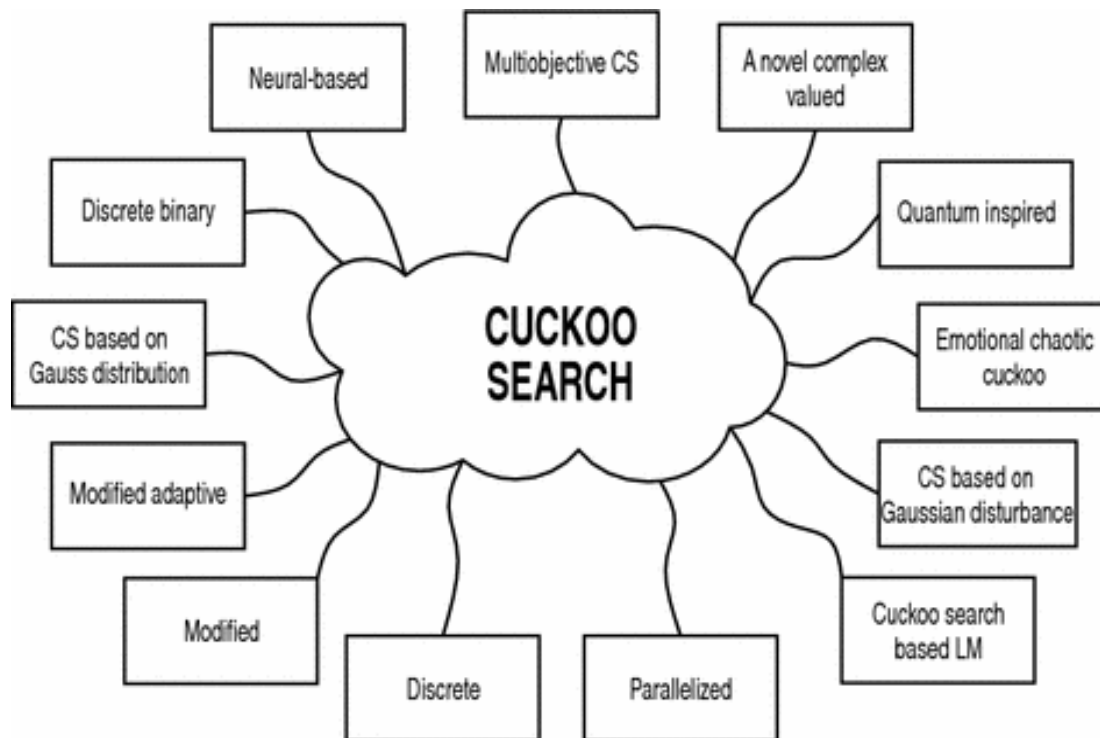


Figure 1: The above figure shows the variant of Cuckoo Search algorithm [springer]

Jamil and Zepernick's work is worthy highlighting since it offers better answers than those found in the literature [11].

2) Hybrid Algorithms

Cuckoo search can identify the required answers quickly for many ongoing optimisation. Nevertheless, when acceptable answers for other optimisation can be discovered, some difficulties may develop, is valid for all strategies influenced by biology. According to the "No-Free-Lunch" idea, this is correct. Could get beyond the theory, optimizing compilers have employed hybridized to tackle a specific set of issues [12]. Cuckoo searching is being utilized in conjunction with a variety of optimisation techniques, computational methodologies, algorithms, and other techniques to accomplish this. Hybridization may occur in nearly every aspect of the cuckoo hunt. Initialising method, monitoring and supervision, movement function, and other functions, for example, have all been attempted [13].

3) Multi-objective Optimization

Inter optimisation entails the pursuit of several goals, some of which may be at odds with one another. Many real-world optimisation issues necessitate design solutions that take into account a variety of factors. Solitary optimization seeks a single ideal solution, but multi-objective optimization, referred to as the Pareto front, necessitates a collection of numerous (possibly infinite) ideal answers [14]. Obviously, there are several difficulties and techniques to multi-objective optimization; nonetheless, two objectives enhancement are noteworthy [23-26]:

- To get as near to the actual Pareto front as feasible.

- To create as many different solutions on the non-dominated front as possible. The following is a list of some of the most common CS multi-objective optimization variations [15-17].
- CS with many objectives.
- Scheduling with multiple objectives.
- Estimation of Jiles-Atherton vector hysteresis parameters using a multi-objective cuckoo search method.
- Search for a Pareto archived cuckoo.

B. Engineering Optimization

Amongst the many different uses of cuckoo search, the engineering design applications may have received the most attention. Presently, solutions may be found in nearly every technical field shown in Figure 2.

C. Applications

Engineering optimisation is, of course, only one of the many applications. Cuckoo search and its variations have been used in nearly every field of research, technology, and business.

D. Theoretical analysis and implementation

As people have now analysed, CS has a wide range of applications. Theoretical investigations, on the other hand, are quite restricted. This brief description may point to the necessity for more theoretical study on cuckoo search [18-21].

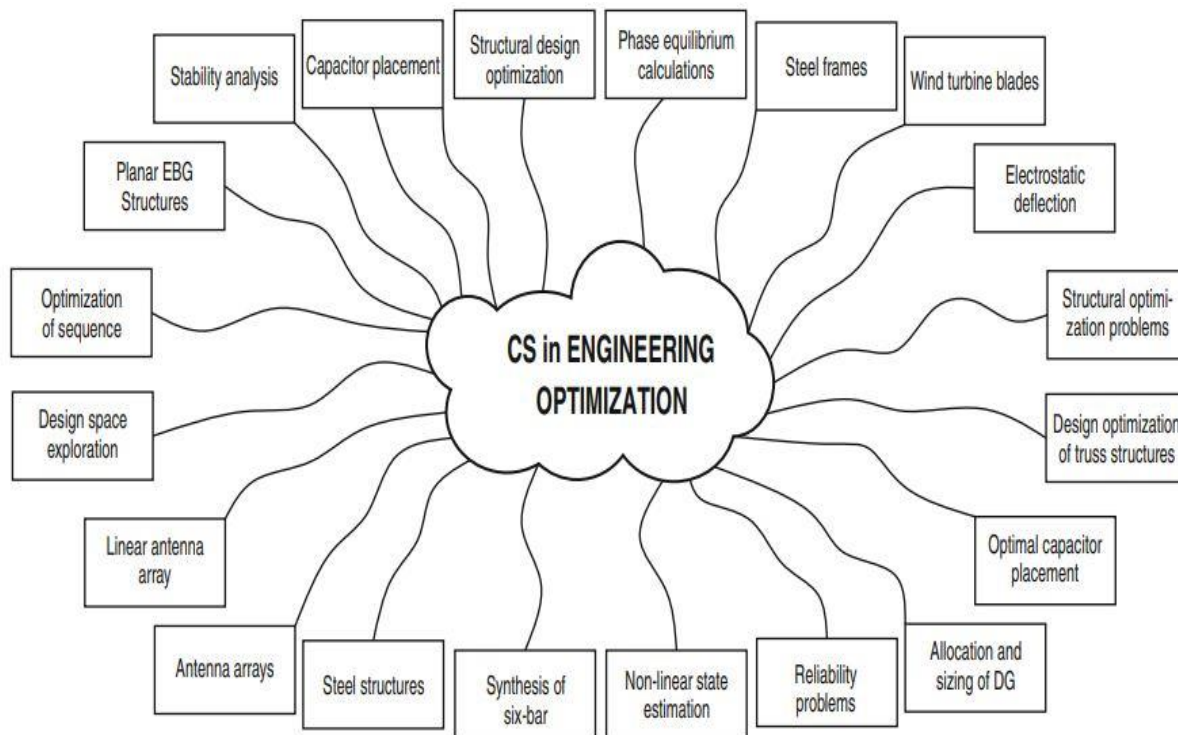


Figure 2: The above figure shows the Engineering Optimization [22]

E. Applications of Cuckoo Search

Figure 3 shows the application of Cuckoo Search.

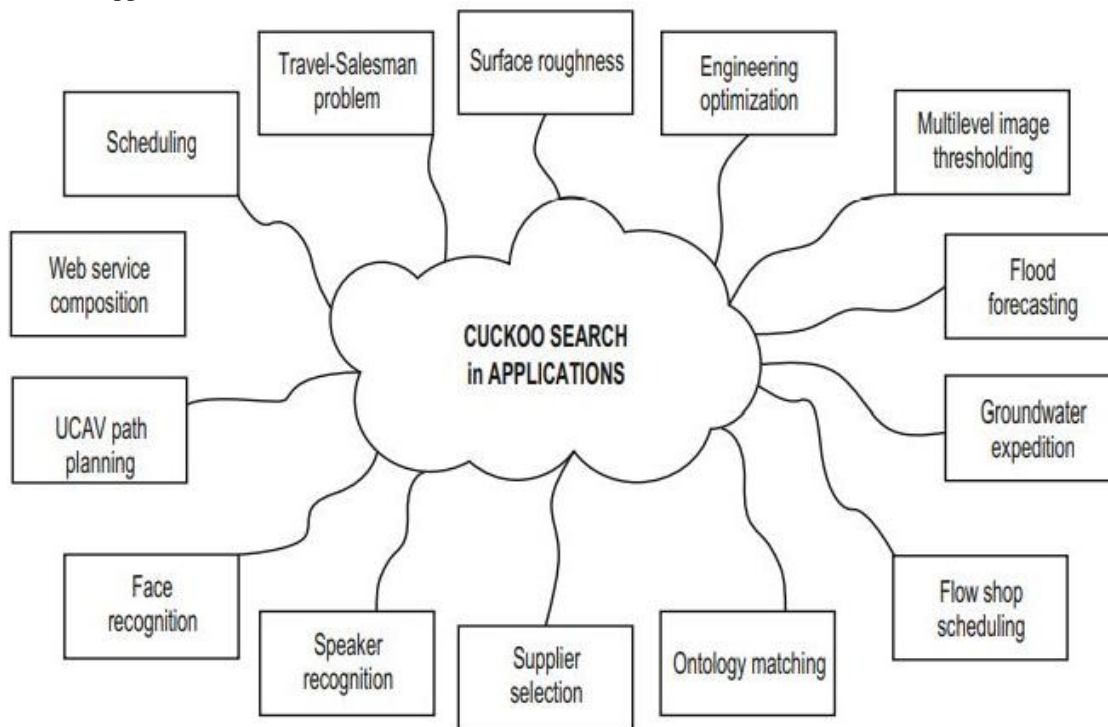


Figure 3: The above figure shows the applications of Cuckoo Search [22]

F. Theory and Algorithm Analysis

Nonetheless, the following are some theoretical research on cuckoo search in the present literature

- Using center of mass Voronoi tessellations, begin configuring the cuckoo search algorithm.

- A lesson on the bat algorithm and cuckoo search.
- Inverse problem metaheuristic algorithms.
- Cuckoo search Markov model and convergence analysis.

- Contributing to the advancement of the cuckoo search algorithm.

II. DISCUSSION

The author has discussed about the CSA, CS is now used in nearly every aspect of function optimization, engineering improvement, computer vision, programming, budgeting, and extraction of characteristics, prediction, and real applications. This is in accordance with the "No-Free-Lunch" theory. To get beyond this theory, optimization techniques have employed hybridized to tackle a specific set of issues. Cuckoo searching is being used in conjunction with a variety of optimisation techniques, computational methodologies, algorithms, and other techniques to accomplish this. It has received a lot of interest because of its potential effectiveness in handling a variety of optimisation issues and contributes substantial. Because of the publication of a large number of studies in the previous several years about cuckoo search, the body here you will find a summary of the majority of the research on cuckoo search that has been published in peer-reviewed publications a thorough classification of these references into relevant categories might provide a basis for subsequent study and Figure 4. Many studies on cuckoo search have been published in recent years, and the field on the subject has grown substantially.

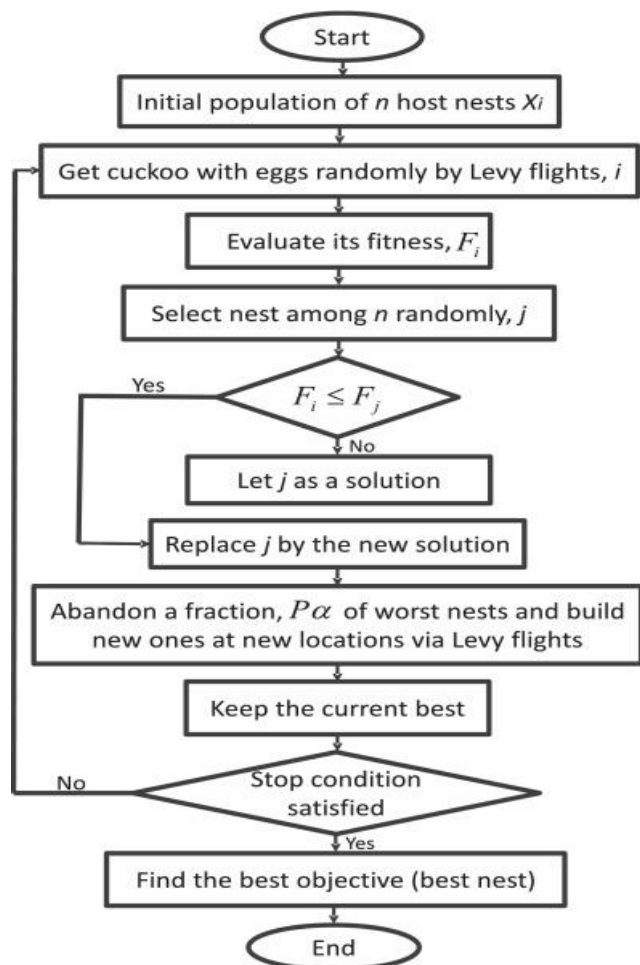


Figure 4: The above figure shows the flowchart of Cuckoo Search Algorithm [sciencedirect]

III. CONCLUSION

The author has concluded a very complete bibliography on the CSA has been given in this brief study. The connections have already been organized in a systematic way. Cuckoo search is a very dynamic and exciting research field, as shown by the rapidly growing bibliography. Further cuckoo search studies will very certainly be released in the coming years. It is worth noting, based on the preceding assessment, that there are a few key concerns that require further research. One thing that needs be done is a theoretical study to get insight into various variations of the cuckoo search algorithm. Furthermore, performing variable adjustment in certain efficient variations and seeing how parameters affects algorithm performance may be extremely beneficial. In addition, programs should concentrate on large-scale real-world scenarios.

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