

# N-Queens Problem Solving using Parameter Filtration Based Artificial Bee Colony Algorithm

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**Abstract :** Nature Inspired algorithm are very standard in the execution for handling the authentic issues. This paper proposes a changed interpretation of fake honey bee state algorithm called Parameters Filtration reliant on ABC Algorithm. This paper takes a gander at between standard honey bee settlement algorithm and the proposed parameters filtration based ABC algorithm through N-Queens issue. N Queens Problems is a champion among the most generally perceived issues in the part section, so the paper considers it a preliminary case for the algorithms' execution partition. The parameters are taken for applying the channels on the Scout Local search Filtration ,Site abandonment , Neighborhood Shrinking Basis. Trials were executed to pass judgment on the proposed algorithm improvements utilizing various benchmarks information. As per these investigations, The proposed algorithm exhibits all the more progressively, versatile, and productive execution than ABC algorithm.

**Index Terms – Nature Inspired Algorithm , ABC Algorithm, N-Queens Problem.**

## I. INTRODUCTION

Programming designing and science have shared an all-encompassing history along. for a long time, pc researchers have organized algorithms to procedure and analyze natural learning (for instance microarrays), and in like way, researcher have discovered various specialist decides that have excited new improvement ways (for instance neural frameworks). Starting late, these 2 headings are affiliation maintained the scrutinized that natural procedures locale unit inherently algorithms that nature has proposed to decide procedure issues. [1]

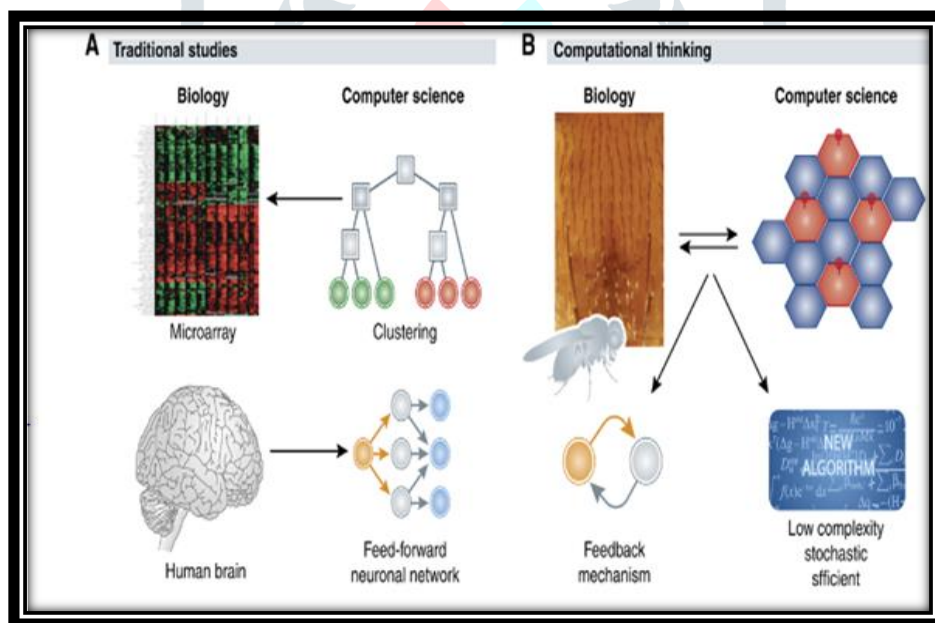


Fig 1 Nature Inspired Algorithms Concept

Natural computing, conjointly known as Natural estimation, could be a word familiar with handle 3 classes of systems:

- Those who take inspiration from nature for the event of novel basic reasoning techniques;
- Those who area unit maintained the use of PCs to mix natural wonders; and
- Those who use natural materials (e.g., particles) to figure.

The guideline fields of assessment that make these 3 branches domain unit fake neural frameworks, natural procedure algorithms, swarm understanding, counterfeit safe systems, geometry, counterfeit life, polymer computing, and quantum computing, among others. Computational perfect models considered by natural computing district unit disengaged from natural ponders as different as self-replication, the working of the cerebrum, Darwinian improvement, bunch direct, the structure, the embellishment properties of living things, cell layers, and ontogenesis. Other than old electronic hardware, these machine perfect models will be maintained on various physical media like bimolecular (DNA, RNA), or got molecule quantum computing devices.[1] Dually, one will examine procedures occurring in nature as information science. Such procedures typify self-party, natural procedure forms, cistron control frameworks, protein-protein association frameworks, natural vehicle (dynamic vehicle, inactive vehicle) frameworks, and citron assembling in living thing living things. Tries to acknowledge natural systems conjointly exemplify

structuring of semi-fabricated animals, and understanding the universe itself from the inspiration driving read of data process. Undoubtedly, the thought was even top tier that information is additional fundamental than issue or imperativeness. The Zuse-Fredkin hypothesis, abstract examination back to the Sixties, communicates that the whole universe may be an enormous cell machine that on and on invigorates its measures. Starting late it's been urged that the absolute universe may be a quantum pc that figures its own special conduct.[2]

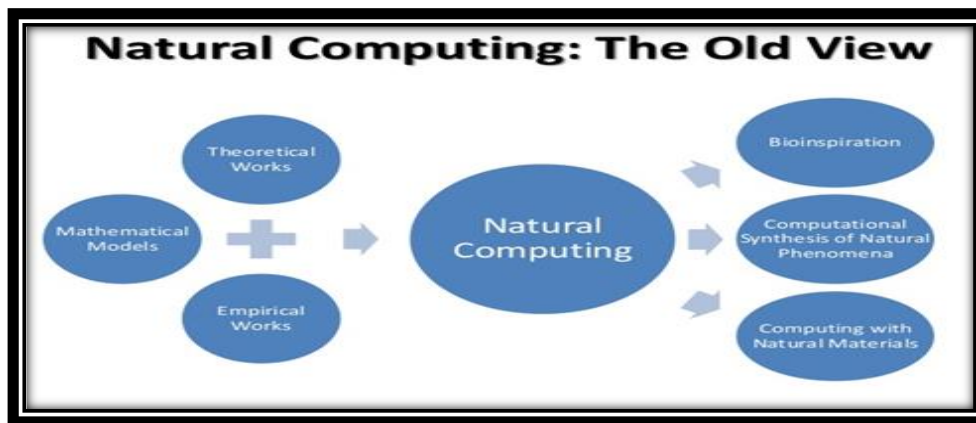


Fig 2 Natural Computing

Swarm intelligence, every so often insinuated as total intelligence, is portrayed as the basic reasoning behavior that ascents up out of the association of individual pros (e.g., minuscule life forms, ants, termites, bumble bees, 8-legged creature, point, flying animals) which talk with various administrators by following up on their neighborhood surroundings.[3]

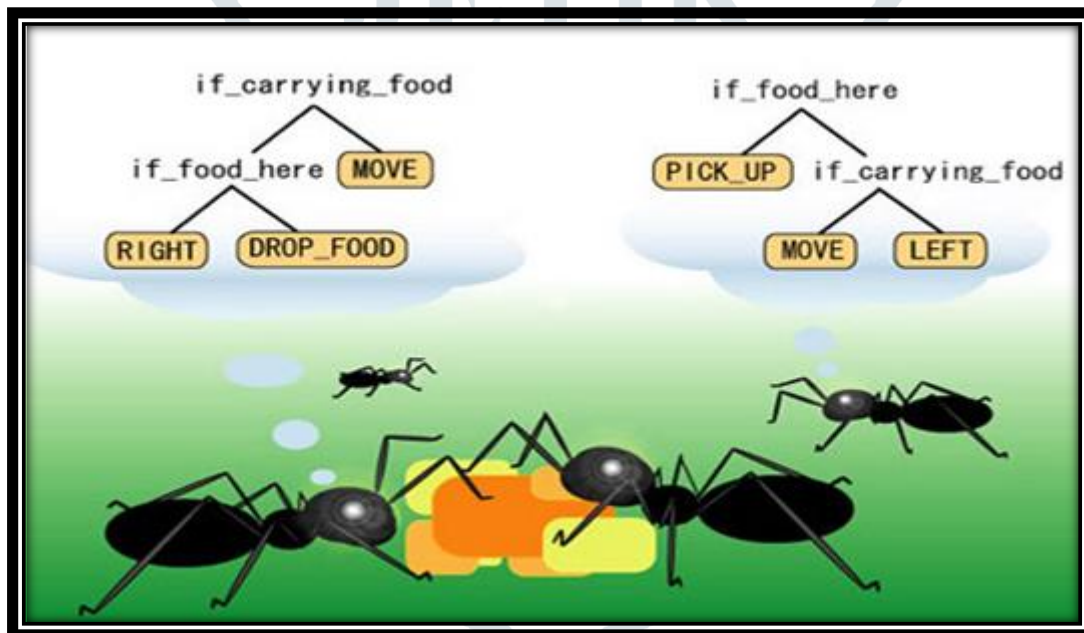


Fig 3 Swarm Intelligence

Molecule has its very own rate that depends upon its past rate (the idleness fragment), the affinity towards the past near and dear best position (the longing section), and its tendency towards a general neighborhood perfect or local neighborhood perfect (the social portion). Particles so travel through a three-d house and over the long haul converge towards a degree between the world best and their own best. [3]

Molecule swarm upgrade algorithms are associated with different improvement issues, and to unattended learning, redirection learning, and programming applications.

In a comparative vein, pismire algorithms demonstrate the pursuit direct of pismire states. to search out the most ideal path between the home and a supply of sustenance, ants yield roaming correspondence by egg laying a release route in transit back to the home in case they found sustenance, severally following the centralization of pheromones if they're checking for sustenance. Pismire algorithms are with advancement associated with a spread of combinatorial upgrade issues over obvious interest areas.[3]

## II. RELATED WORK

R. K. Tan and Ş. Bora, [7] Analytical courses of action are ridiculous in view of the unconventionality and immense scale educational lists of complex frameworks. In order to empower the assessment of these frameworks, master based showing and reenactment strategies are much of the time used. Right when mulls over done starting late are broke down, it is seen that meta-heuristic algorithms are normally used for development with showing and diversion. In this assessment, Artificial Bee Colonies algorithm is investigated for meta-heuristic algorithms for parameter arrangement in complex frameworks with an improvement

issue. The achievement of the parameter arrangement procedure of complex frameworks has been attempted with the Modified Artificial Bee Colonies Algorithm, which has been shown in this work.

J. Compartment, W. Zou and J. Duan [8] The passed on stage flowshop booking issue (DPFSP) has basic applications in current organizations. This paper shows a discrete counterfeit bumble bee region (DABC) algorithm for appreciating the DPFSP with full scale stream time standard. We use the action change based depiction to address the confident courses of action. The expansion executive is changed in accordance with make neighboring plans in the interest procedure. We re-structure the request stages including use bumble bees, bystander bumble bees, and scout bumble bees according to the issue unequivocal data. A total computational fight reliant on the 720 benchmark cases displays the feasibility of the proposed DABC algorithm for understanding the DPFSP with the total flowtime basis.

Y. Gao, [9] Aiming at the shortcoming of poor get together execution of PSO and counterfeit swarm algorithm, an upgraded cream algorithm is proposed to overcome the lacks of complex progression issues. Through the preliminary of four standard limit by hybrid algorithm and differentiated the result and standard molecule swarm progression (PSO) algorithm and Artificial Bee Colony (ABC) algorithm, the blend rate and intermixing exactness of the crossbreed algorithm are both superior to those of the standard molecule swarm algorithm and Artificial Bee Colony algorithm, demonstrating an unrivaled perfect execution.

Y. Lvshan, Y. Dongzhi and Y. Weiyu, [10] The movement shop booking issue (JSSP) is a model of creation arranging. The goal is to deal with the issue how to use the limited resources for plan the solicitation and time of the workpiece and equipment to meet the distinctive creation objectives with various shows. In this paper, the counterfeit bumble bee settlement algorithm united with the hereditary algorithm, handle the JSSP. The proposed procedure beat their shortcomings and comprehend the comparing focal points and get a continuously capable workshop arranging plan.

J. Yu, F. Ding, X. Zhao and F. Zhou, [11] In view that the prerequisites of downsizing, low power usage and negligible exertion for the course structure, mindset estimation using magnetometer could well meet the above necessities. In any case, the estimation precision of geomagnetic field is very affected by the outside alluring field, which would construct air figuring botch. Thus, it is basic to do bungle compensation for the yield of magnetometer. In this work, a novel mix-up compensation method for magnetometer for aura estimation using changed counterfeit bumble bee colony(ABC) is proposed. In the wake of looking at the bungle wellsprings of the sensor, a proportionate slip-up presentation is developed. ABC is used to evaluate the compensation parameters of the botch show. Nevertheless, it's computing pace is excessively moderate in perspective on the basic sustenance source is discretionarily made and not reasonable.

By then, a blend algorithm for obtaining the compensation parameters is organized, in which the recursive least square algorithm is taken to change the fundamental estimation of ABC Comparing with the regular parameter estimation algorithm, the modified ABC has higher accuracy and snappier viability. In the numerical diversion, the bumble show coefficients procured by the changed algorithm are close to the speculative coefficients. The results show that the alluring field power after update is basically dependable with the genuine geomagnetic field control. Finally, the changed slip-up pay method is used to address the yield of magnetometers. In this way, the pitch point screw up is diminished from  $\pm 6^\circ$  to  $\pm 0.8^\circ$ , the move edge error is decreased from  $\pm 15^\circ$  to  $\pm 1^\circ$  by the compensation. The estimation exactness of attitude edge is upgraded very nearly multiple times, which can be used for conventional course structure.

A. Rekaby, A. A. Youssif and A. Sharaf Eldin, [12] Artificial Bee area algorithm is a forefront swarm intelligence algorithm. This paper proposes a changed adjustment of counterfeit bumble bee area algorithm called "Adaptable Artificial Bee Colony" (AABC). This paper contemplates between standard bumble bee state algorithm and the proposed adaptable bumble bee settlement algorithm through voyaging deals rep issue. Voyaging deals rep issue is a champion among the most generally perceived issues in the looking methods evaluation, so the paper considers it an experiment for the algorithms' execution detachment. The tests were reiterated transversely over different benchmarks. The proposed flexible counterfeit bumble bee settlement algorithm displays more capability than standard fake bumble bee region algorithm. The last game plan wellbeing regard is improved by around 8% in adaptable counterfeit bumble bee region algorithm diverging from standard fake bumble bee express algorithm's answer.

Y. Wang, [13] In solicitation to deal with the astounding scale issue of voyaging deals rep, this paper propels a kind of swarm clever cross breed algorithm of blend of counterfeit bumble bee region and molecule swarm algorithm and presents fake resistant algorithm. In order to overcome the issue of extensive scale TSP appropriate to be gotten in neighborhood optima, it has unimaginable limit of overall looking and better interest association. The amusement exploratory data relationship exhibits that the upgraded cream algorithm looks results better than the tantamount algorithms, and it has worthy results associated in enormous scale TSP.

### III. PROPOSED WORK

The proposed modified Bees algorithm works on the concept of the feasibility analysis of the factors which are taken into the consideration of the bees algorithm.

The pseudo code for the proposed Bees Algorithm

```

1 for i=1,...,ns
  i scout[i]=Initialise_scout()
  if scout[i]>=parameter1 then
    ii flower_patch[i]=Initialise_flower_patch(scout[i])
2 do until stopping_condition=TRUE
  i Recruitment()
  ii for i =1,...,nb
    if Local_search(flower_patch[i]) >=parameter2 then
      flower_patch[i]=Local_search(flower_patch[i])
    [End of the If structure]
    If Site_abandonment(flower_patch[i])>= parameter3 then
      flower_patch[i]=Site_abandonment(flower_patch[i])
    [End of the If structure]
    If Neighbourhood_shrinking(flower_patch[i])>=paramter4 then
      flower_patch[i]=Neighbourhood_shrinking(flower_patch[i])
    [End of the if structure]
  iii for i = nb,...,ns
    1 flower_patch[i]=Global_search(flower_patch[i])

```

The parameter 1 is used for determining the feasibility of the scout the value which is undertaken is considered after the work analysis of the range factor which is suitable as scout.

The parameter 2 is used for finding out the local search which will be determined by the radius area taken into the consideration.

The parameter 3 is used for determining the site abandonment, in which the restricting of the sites which are not useful up to the limit is considered.

The parameter 4 is used for determining the neighborhood shrinking on the basis of the distance and the time involved in the selection of the neighborhood.

### IV. IMPLEMENTATION AND RESULT ANALYSIS

The implementation of the proposed work is done in Java using the IDE Eclipse and simulations are presented using the test data and the results which is obtained is shown in the figures in the corresponding section





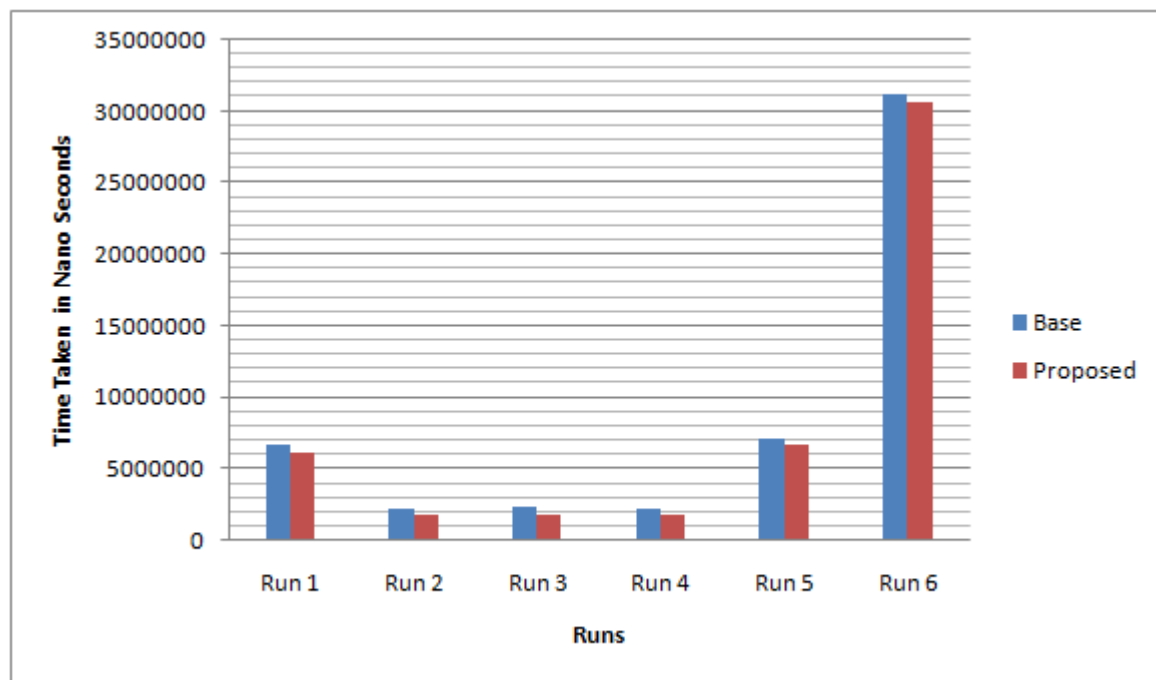


Fig 6. Comparison Graph

## V. CONCLUSION

The parameter based counterfeit honey bee settlement algorithm is another proposed parameters filtration algorithm dependent on ABC algorithm. The proposed algorithm work process is like ABC algorithm yet with contrast of the parameters based chosen criteria in the means of the counterfeit honey bees algorithms. It acts more powerfully than ABC because of the filtration of the sections and the parts which does not fit in the determination criteria. The time taken in the proposed algorithm is decreased to the thought sum and this will further expands the effectiveness of the algorithm as looked at against ABC algorithm in NQueens issue. The parameters are taken for applying the channels on the Scout Local search Filtration ,Site abandonment , Neighborhood Shrinking Basis. Investigations were executed to pass judgment on the proposed algorithm upgrades utilizing different benchmarks information. As indicated by these investigations, The proposed algorithm displays all the more progressively, versatile, and effective execution than ABC algorithm.

## REFERENCES

- [1]. M. El-Abd. Opposition-based artificial bee colony algorithm. In Proceedings of the 13th annual conference on Genetic and evolutionary computation, ACM, 2011,116.
- [2]. X. Bi and Y. Wang. An improved artificial bee colony algorithm. In Computer Research and Development (ICCRD), 2011 3rd International Conference on, IEEE, 2, 2011, 174-177.
- [3]. Gaowei Yan and Chuangqin Li. An effective refinement artificial bee colony algorithm based on chaotic search and application for PID control tuning, in journal of computational information systems, 7, 2011, 3309-3316.
- [4]. Tarun Kumar Sharma, Millie Pant, Some modification to enhance the performance of artificial bee colony, evolutionary computation (CEC), 2012, 1-8.
- [5]. Dervis Karaboga, Beyza Gorkemli, A quick artificial bee colony (qABC) algorithm for optimization problems, innovations in intelligent systems and applications, 2012, 1-5.
- [6]. Yunfeng Xu, Ping Fan and Ling Yuan. A simple and efficient artificial bee colony algorithm, in mathematical problems in engineering, 2013(526315), 2012, 9.
- [7]. R. K. Tan and S. Bora, "Parameter calibration with Modified Artificial Bee Colonies Algorithm," 2018 26th Signal Processing and Communications Applications Conference (SIU), Izmir, 2018, pp. 1-4.
- [8]. J. Pan, W. Zou and J. Duan, "A Discrete Artificial Bee Colony for Distributed Permutation Flowshop Scheduling Problem with Total Flow Time Minimization," 2018 37th Chinese Control Conference (CCC), Wuhan, 2018, pp. 8379-8383.

- [9]. Y. Gao, "An Improved Hybrid Group Intelligent Algorithm Based on Artificial Bee Colony and Particle Swarm Optimization," 2018 International Conference on Virtual Reality and Intelligent Systems (ICVRIS), Changsha, 2018, pp. 160-163.
- [10]. Y. Lvshan, Y. Dongzhi and Y. Weiyu, "Artificial bee colony algorithm with genetic algorithm for job shop scheduling problem," 2017 International Symposium on Intelligent Signal Processing and Communication Systems (ISPACS), Xiamen, 2017, pp 433-438.
- [11]. J. Yu, F. Ding, X. Zhao and F. Zhou, "Error Compensation Method of Magnetometer for Attitude Measurement Using Modified Artificial Bee Colony Algorithm," 2017 10th International Symposium on Computational Intelligence and Design (ISCID), Hangzhou, 2017, pp. 348-351.
- [12]. A. Rekaby, A. A. Youssif and A. Sharaf Eldin, "Introducing Adaptive Artificial Bee Colony algorithm and using it in solving traveling salesman problem," 2013 Science and Information Conference, London, 2013, pp. 502-506.
- [13]. Y. Wang, "Improving Artificial Bee Colony and Particle Swarm Optimization to Solve TSP Problem," 2018 International Conference on Virtual Reality and Intelligent Systems (ICVRIS), Changsha, 2018, pp. 179-182.
- [14]. A. Tural, G. Yavuz and D. Aydin, "Multi-level image thresholding with global-best distance artificial bee colony algorithm," 2018 26th Signal Processing and Communications Applications Conference (SIU), Izmir, 2018, pp. 1-4..

