Scientific Paper Writing

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PhD, PDF (NUS, Singapore)
SMIEEE, FIETE, MIE (I),SMIACSIT, LMISTE, MIAENG

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- National scientific journal
- International scientific journal
- (general or important)
- SCI/ EI/ ISTP
- SCI: Scientific Citation Index
- EI: Engineering Index
- ISTP: Index of Scientific & Technical Proceedings

Outline

- Brief introduction of scientific paper
- 2. Paper writing
- 3. Paper submitting
- 4. Common mistakes appeared in paper
- 5. Brief introduction of “final examination”

Swarm and Evolutionary Computation 17 (2014) 60–73

Contents lists available at ScienceDirect

Swarm and Evolutionary Computation

journal homepage: www.elsevier.com/locate/swevo

Regular Paper

Directed Bee Colony Optimization Algorithm ← Title

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Department of Electrical Engineering, Malaviya National Institute of Technology, Jaipur 302017, India ← Affiliation

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Harmony Search (HS)
Differential Evolution (DE)
Artificial Bee Colony (ABC)

ABSTRACT

The paper presents a new optimization algorithm inspired by group decision-making process of honey bees. The honeybees search for the best nest site among many possible sites taking care of both speed and accuracy. The nest site selection is analogous to finding the optimality in an optimization process. Such similarities between two processes have been used to cultivate a new algorithm by learning from each other. Various experiments have been conducted for better understanding of the algorithm. A comprehensive experimental investigation on the choice of various parameters such as number of bees, starting point for exploration, choice of decision process etc. has been made, discussed and used to formulate a more accurate and robust algorithm. The proposed Directed Bee Colony algorithm (DBC) has been tested on various benchmark optimization problems. To investigate the robustness of DBC, the scalability study is also conducted. The experiments conducted clearly show that the DBC generally outperformed the other approaches. The proposed algorithm has exceptional property of generating a unique optimal solution in comparison to earlier nature inspired approaches and therefore, can be a better option for real-time online optimization problems.

Introduction

1. Introduction

Nature is a vast source of information which is being used by various species for their survival. The colonies of social insects and species can adapt themselves according to the change in environment. The colonies of ant and bees are the best examples of such cases. The group decision making process used by bees, ants, birds, fishes and swarms for searching out the best food resources among the various possible solutions are the best and robust examples of swarm-based decision methods. These group decisions processes can be mimicked and used for finding out solution for various optimization problems as well as their applications in various engineering fields [32,37].

Main Text

2. Working principle of bee in nature

In the last couple of years, the researchers have paid great attention to study of the behavior of social insects in an attempt to use the Swarm Intelligence concept for developing various artificial systems. Group decisions taken by natural swarms are robust in all senses, as these not only give the best and accurate result but also save a lot of swarm's energy.

Results

4. Experiments and results

In order to determine the impact of control parameters, the author has conducted full factorial experiments for the proposed DBC algorithm for the nine benchmark problems. These benchmark problems are summarized in Tables 1 and 2. The benchmark functions in this section provide a balance between multi-modal with many local minima and functions with only a few local minima as well as easy and difficult functions.

This section is divided into three parts. First, impact of bee decision making on the performance of DBC is studied with experimental results. In the second part, the impact of the number of bees and starting point on the performance of DBC is compiled and discussed. In the third section, the algorithm has been tested

Conclusion

5. Conclusion

The paper first analyzes the nature inspired algorithms and discusses their known problems of consistency in solution and of premature phenomenon. A new optimization algorithm DBC has been proposed and described. The upshot of the proposed algorithm is that it generates better optimal solutions as compared to its counterparts. The algorithm is based on natural swarm group decision method by bees to find next site. One has to select

References

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[8] S. Das, P.N. Suganthan, Differential evolution: a survey of the state-of-the-art, IEEE Trans. Evol. Comput. 15 (1) (2011) 4–31.

Structure of Research Article

1. Title
2. Authors' name (including the author's affiliation)
3. Abstract (including 3~8 keywords)
4. Main text
5. Acknowledgement
6. References
7. Appendix

Paper Writing- Title

- Short sentence, phrase, generally less than 20 words
- The research object (or problem) should be included in the title
- Reflect the main outcome and the approach used in your research work

Title: Meaningful and brief

Directed Bee Colony Optimization Algorithm

is better than

A Novel Nature Inspired Algorithm Incorporating Bee Behavior with Deterministic Frame work for Optimization Problems

Swarm and Evolutionary Computation 17 (2014) 60–73

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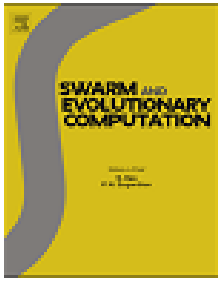
journal homepage: www.elsevier.com/locate/swevo



Regular Paper

Directed Bee Colony Optimization Algorithm

Rajesh Kumar

Department of Electrical Engineering, Malaviya National Institute of Technology, Jaipur 302017, India

Bee Inspired Optimization Algorithm is Proposed with Modifications

(5 words)

Paper Writing- Author's Name

Contribution: The name of the authors, with all initials, the institute or organization, with full address

Example:

Rajesh Kumar
Department of Electrical Engineering
Malaviya National Institute of Technology
Jaipur, India, 302017

Paper Writing- Abstract

- A short summary of a longer article
- Written after the paper is completed, although it is intended to be read first
- Appears on a separate page just after the title page and therefore just before the essay itself

Paper Writing- Abstract

- Decide whether to read an entire article
- Remember key findings on a topic
- Understanding a text
- Index articles

Paper Writing- Abstract

Purpose

Parameters

Tests

Conclusion

A B S T R A C T

The paper presents a new optimizati n algorithm inspire y group decisio making proce f honey bees. The honeybees search for the best nest site among ny possible site taking care of h speed and accuracy. The nest site selection is analogous to findi the optimality an optimizati process. Such similarities between two processes have been used t cultivate a new gorithm by lea ng from each other. Various experiments have been conducted fo better understa ding of the al ithm. A comprehensive experimental investigation on the choice of various parameter s such as numb of bees, starting point for exploration, choice of decision process etc. has been ma e, discussed an used to formulate a more accurate and robust algorithm. The proposed Directed Bee Colony algorithm DBC) has been tested on various benchmark optimization problems. To investigate the robustness of DBC, the scalability study is also conducted. The experiments conducted clearly show that the DBC generally outperformed the other approaches. The proposed algorithm has exceptional property of generating a unique optimal solution in comparison to earlier nature inspired approaches and therefore, can be a better option for real-time online optimization problems.

Paper Writing- Main Text

Introduction:

- What is the problem and why is it interesting?
- Who are the main contributor?
- What did they do?
- What novel thing will you reveal?

Paper Writing- Main Text

Nature is a vast source of information which is being used by various species for their survival. The colonies of social insects and species can adapt themselves according to the change in environment. The colonies of ant and bees are the best examples of such cases. The group decision making process used by bees, ants, birds, fishes and swarms for searching out the best food resources among the various possible solutions are the best and robust examples of swarm-based decision methods. These group decisions processes can be mimicked and used for finding out solution for various optimization problems as well as their applications in various engineering fields [32,37].

A lot of classical methods have been developed and are being used for optimization problem. Golden section search, Fibonacci search, Newton's method and Secant method are some one dimensional search methods. Gradient methods, Newton's method, Conjugate direction method and Neural Networks are commonly used for unconstrained optimization [4]. These methods are problem specific and use gradients. Consequently, they are applicable to a much smaller classes of optimization [26].

Background

Issues

Paper Writing- Main Text

In past decade a vast research has been carried out on the development of nature-inspired optimization algorithms which include Genetic Algorithm (GA), Evolutionary Algorithm (EA), Particle Swarm optimization (PSO), Harmony Search (HS), Differential Evolution (DE), Bacterial Forging Optimization (BFO) and Artificial Bee Colony (ABC) [7,16,1,37]. These algorithms are population based algorithms, a class of meta-heuristics. Population based algorithms trust on iteratively updating a population of candidate solution, while foraging algorithm differs at method espoused for updating and search patterns [32].

Similar Algorithms

Evolution Algorithm (EA) is inspired by the theory of evolution by means of natural selection. Specifically, the technique is inspired by macro-level or the species-level process of evolution (phenotype, hereditary, variation) and is not concerned with the genetic mechanisms of evolution as in case of GA [15,16]. Tournament feature selection with directed mutation has been developed and concluded that such hybrid algorithms overcome some disadvantages of existing one and proves better solvers [9].

Issues

Paper Writing- Main Text

2. Working principle of bee in nature

In the last couple of years, the researchers have paid great attention to study of the behavior of social insects in an attempt to use the Swarm Intelligence concept for developing various artificial systems. Group decisions taken by natural swarms are robust in all senses, as these not only give the best and accurate result but also save a lot of swarm's energy.

In nature, initially some bees go for searching the nectar sources. Upon arrival on nectar site, bee loads a lot of nectar and returns to hive relinquishing the nectar or pollen to store bee and go to "dance floor" to perform waggle dance [29]. This dance gives precise information to other bees regarding the quality, distance and direction of flower patch. Each individual's knowledge of outside

Paper Writing- Main Text

- Experimental procedure or theoretical analysis
- Usually a list of all materials or equipments you used for the experiment
- The theoretical model used in your analysis
- list all steps in the correct order
- Experimental paper: equipment, materials, method
- Modeling paper: assumptions, mathematical tools, method
- Computational paper: inputs, computational tools, method
- Explain what is especially different about your method
- Give sufficient detail that the reader
- Don’t mix method with results or discussion

Paper Writing- Main Text

achieve goals. Following are the assumptions made in the proposed algorithm:

- Bees live and act in a given environment.
- Bees attempt to achieve particular goals or perform particular tasks.
- Information exchange process accompanies no losses.
- Bees will never die and hence number of bees remains constant during the process.

Definition 1. An exploration region $FSR \in \mathscr{R}^d$, $d=1...n$ is a bounded region that represents a feasible solution to some problem.

Definition 2. A grid on FSR, $G=\{E_i\}_{i=1}^{N}$ is defined as a set of elements, E_i, such that $E_i \in \mathscr{R}^d$, $\tilde{E}_i \in \mathscr{R}^d$, $\tilde{E}_i \cap \tilde{E}_j = \Phi$, $i \neq j$ and $\cup E_i = FSR$, where $\tilde{E}_i$ denotes the interior of E_i and Φ is the empty set.

Definition 3. A sub exploration region $E_i = FIV^m$ is a vector of m integers that represents feasible solutions to the problem.

Assumptions

Defination

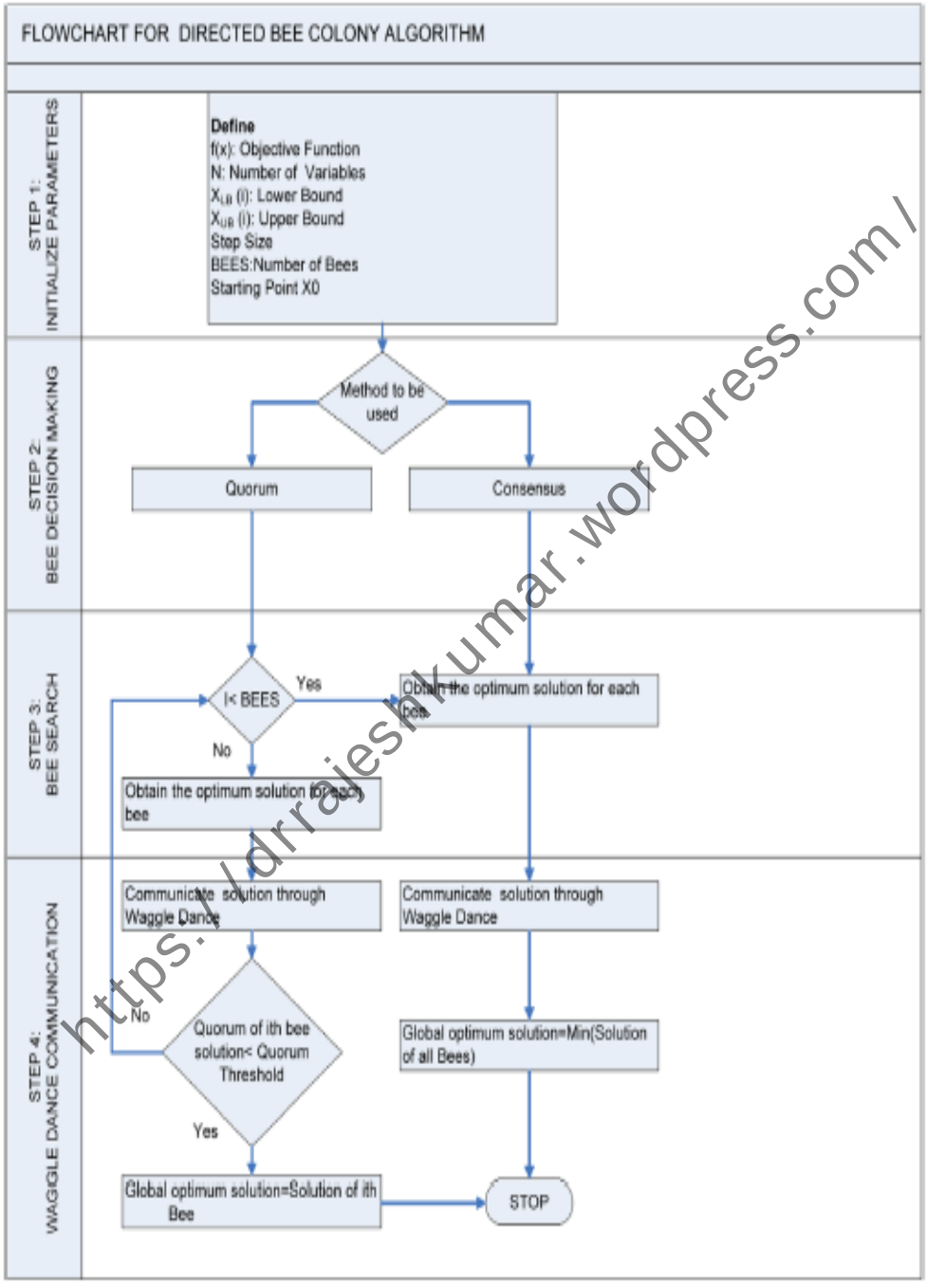


Fig. 6. Flowchart for the proposed DBC algorithm.

Paper Writing- Main Text

4. Experiments and results

In order to determine the impact of control parameters, the author has conducted full factorial experiments for the proposed DBC algorithm for the nine benchmark problems. These benchmark problems are summarized in Tables 1 and 2. The benchmark functions in this section provide a balance between multi-modal with many local minima and functions with only a few local minima as well as easy and difficult functions.

This section is divided into three parts. First, impact of bee decision making on the performance of DBC is studied with experimental results. In the second part, the impact of the number of bees and starting point on the performance of DBC is compiled and discussed. In the third section, the algorithm has been tested

Experimental setup

Various Experiments

Paper Writing- Main Text

4.1. *Impact of bee decision making on the performance of DBC*

Experiments have been carried out to compare the two decision making process in the bees for both consensus as well

4.2. *Impact of parameters on the performance of DBC*

The solution provided by DBC are not same throughout, it depends upon its step size and the range of parameters. Different

4.3. *Comparison with other similar algorithms*

The proposed DBC algorithm has been tested for a number of standard optimization problems of different classes and results

Paper Writing- Main Text

- Discussion:
- Extract principles, relationships, generalizations.
- Present analysis, model or theory.
- Show relationship between the results and analysis, model or theory.

Paper Writing- Main Text

Figures

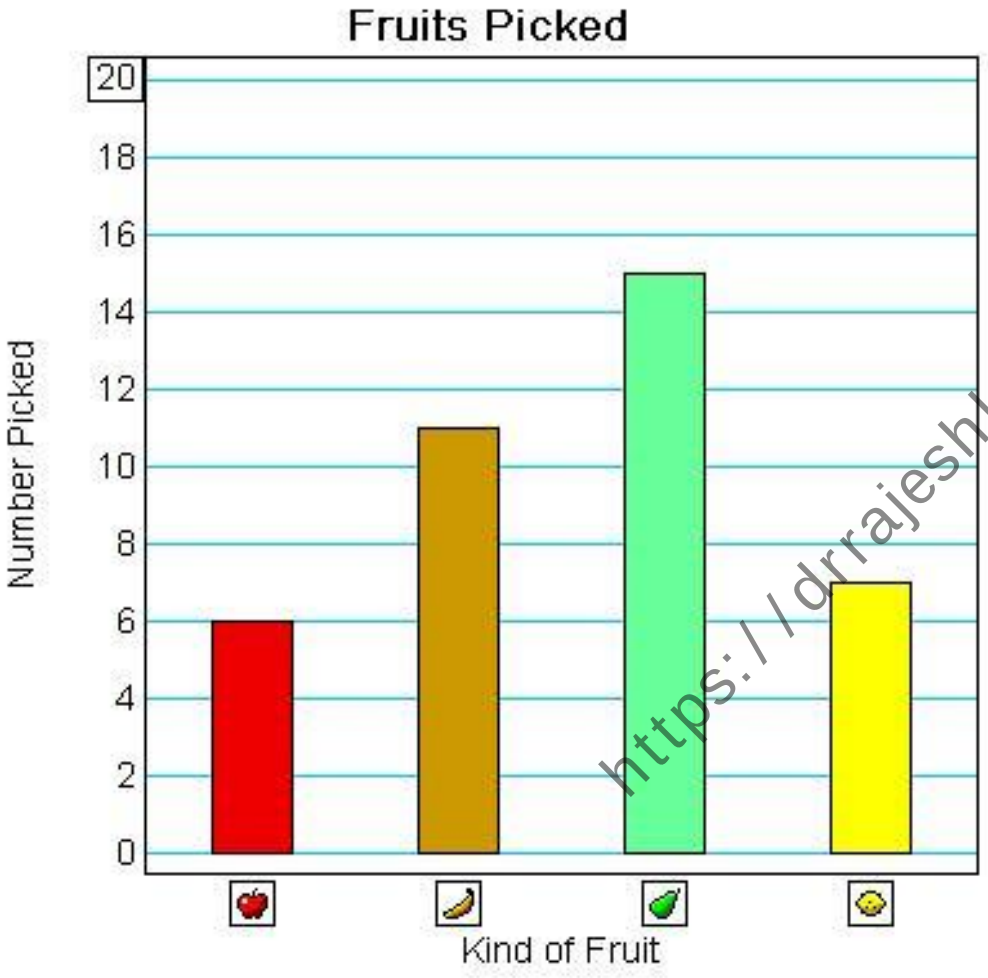
Flow charts show methods, procedures.

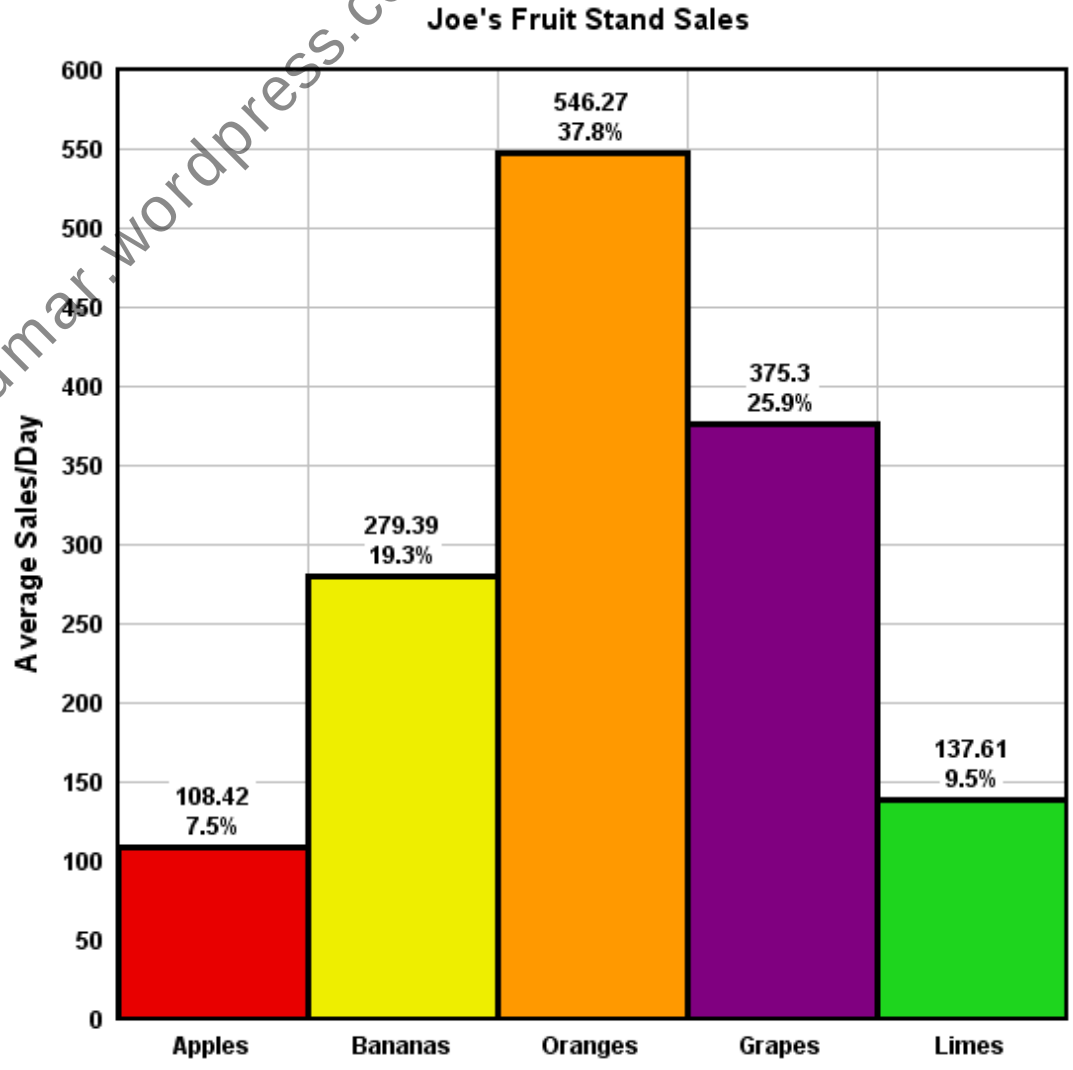
Graphs plot data

Schematics show how equipment works, or illustrate a mechanism or model

Drawings and photographs illustrate equipment, microstructures etc

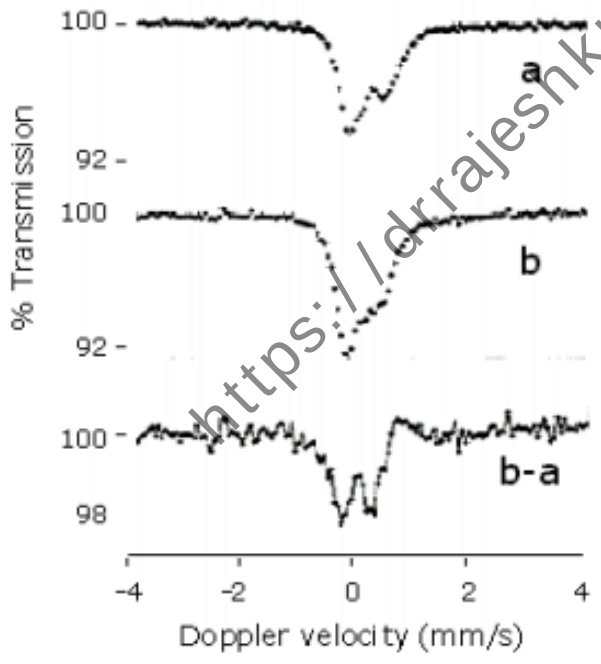
Paper Writing- Main Text



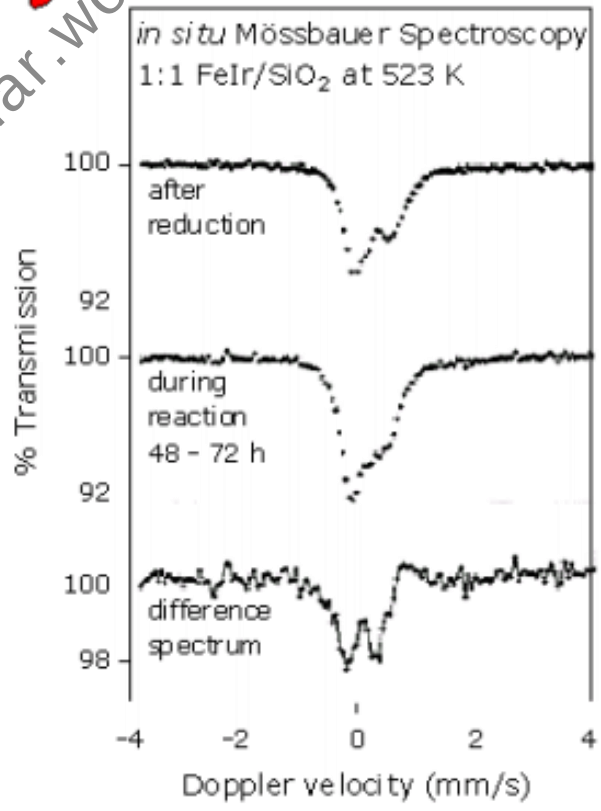


Paper Writing- Main Text

Poor:



Better:



Paper Writing- Main Text

Table 1 A comparison of FIFA World Cup 2002, 2006 and 2010 – the use of medication per match and per tournament.

	2010				2006*				2002*			
	No of players				No of players				No of players			
	Per match		During tournament		Per match		During tournament		Per match		During tournament	
	(n=2944)	(%)	(n=736)	(%)	(n=2944)	(%)	(n=736)	(%)	(n=2944)	(%)	(n=736)	(%)
Any medication	1418	48.2%	528	71.7%	1257	42.7%	508	69.0%	1335	45.3%	500	67.9%
NSAIDs	1020	34.6%	403	54.8%	855	29.0%	399	54.2%	960	32.6%	403	54.8%
Injections*	96	3.3%	54	7.3%	103	3.5%	58	7.9%	120	4.1%	77	10.5%
Analgesics	189	6.4%	109	14.8%	109	3.7%	83	11.3%	131	4.4%	91	12.4%
β-2 agonists	58	2.0%	20	2.7%	31	1.1%	12	1.6%	34	1.2%	8	1.1%
Antihistamines	64	2.2%	42	5.7%	106	3.6%	55	7.5%	60	2.0%	43	5.8%
Any supplement	1019	34.6%	353	48.0%	1041	35.4%	317	43.1%	925	31.4%	314	42.7%

*Corticosteroid and local anaesthetic injections only.[3]
NSAID, non-steroidal anti-inflammatory drugs.

Paper Writing- Main Text

Conclusions

- Must have:
- Summarize the study work
- State outcome (or conclusions) of the research
- May have:
- Make suggestions of further work
- Draw together the most important results and their consequences.
- List any reservations or limitations.
- Don’t duplicate the Abstract as the Conclusions or vice versa.
- Abstract is an overview of the entire paper
- Conclusion is a summing up of the advances in knowledge

Paper Writing- Main Text

optimal results. A set of benchmark functions have been used to test DBC in comparison with GA, EA, PSO, BFO, HS, DE and ABC for both lower dimension and higher dimension. Experimental results prove the robustness and accuracy of DBC over other search based approaches. The results show that DBC performs better and also removes the randomness in the algorithm. All other evolutionary algorithms generate different solutions on different runs whereas DBC generates unique optimum solution. Hence it gives a better option to optimize real-time and on-line optimization problems. Although DBC has proven better algorithm over presented algorithms but other classes of improved, mutated, directed and hybrid algorithms like CLPSO, DM-GA, HSDM, EPSDE are still to be compared and will be agenda for future research.

Acknowledgement

- The author states and expresses the acknowledge for the financial support .
- Thank people who have helped you with ideas, technical assistance, materials or finance.
- Keep it simple, give full names and affiliation, and don’t get sentimental

References

- Provide a reference list at the end of the article or chapter to supplement textual notes; the reference list gives complete citation for all works cited.
- References must be complete: name, initials, year, title, journal, volume, start page and finish-page

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Appendix

- Generally, the appendix is adopted where the content does not directly relate to the discussed topic but useful for understanding the study work.
- Equation derivation and experimental data often included in appendix

Paper Writing

1. The design
2. The market – who are your reader?
3. The concept – making a concept sheet
4. Embodiment – the first draft
5. Detail – grammar, spelling, punctuation, style

Market for Technical Writing

What Writing?	Who are the readers?	How will they use it?
Thesis	Examiners	To judge and rank your work
Paper	Referees Scientifically literate public	To check originality, quality, suitability To extract information
Research proposal	The funding body and…. Its referees	To judge if your aims match the priorities of the funding body To judge quality and promise of the work
Popular article	Intelligent but uninformed public	To be introduced to a new field To be entertained

FINGERPRINT IDENTIFICATION USING MULTIDIMENTIONAL MULTI-LAYER ANN.

TOPIC

* Name of Authors, Institute, Address.

1 Abstract – Motive, Method, key Results, Conclusions
- Not more than 3 sentence on any one
- limit 100 wds.

2 INTRODUCTION
- What is Problem & why it is Interesting.
- Who are main contributors?
- What did they do?
- What novel thing will you reveal?

start with good 1st Sentence.

3 METHOD
- Assumptions, mathematical tools Inputs, computational tools, method
- Explain what is especially different about your method.
- Sufficient detail what you did.

* Dont mix method with result

* Talk about experimental work if any.

4 RESULT.
- Present the output of experiments, model or computation

* Don't mix Result with discussion.

* Report result simply without opinion or interpretation * Define all symbols. Present data in a form other people can use. * Emphasis on most important aspect of Tables, graphs & Figures. * Errors & limits of Graphs * Statistics should be meaningful.

5 DISCUSSION
- Extract principles relations
- Present Analysis, model or theory
- show relationship between result & Analysis

Clear & Concise.

6 CONCLUSION
- Draw together the most important results & their consequences.
- List any reservation or Limitation

7 ACKNOWLEDGEMENTS
- Thanks to people who help you

simple.

8 REFERENCES
- Cite significant Previous work
- Cite sources of theory, data
- Name, initials, year, title, journal, volume . pages

9 FIGURES
- Flow charts
- Graph Plot- data
- schematics show how equipment works
- Drawings & photographs

proper Caption.

10 APPENDICES

Essential material that would interrupt the flow of main text

DR. RAJESH KUMAR.

Look Professional

- Grammar: words, sentence structure
- Punctuation: full stop, comma, question mark
- Style: clear, define everything

Consistent in

- Font size
- Margins
- Spacing
- Table size and format
- Figure size and format
- Neat and Clean!

Acknowledgement

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Wei-Ze Wang, Ph. D

School of Mechanical & Power Engineering

East China University of Science and Technology

for his research, insight and academic contributions used in the presentation

Thanks

Q & A