Flower Pollination Algorithm

DIGITAL ASSIGNMENT REVIEW

SUBMITTED BY

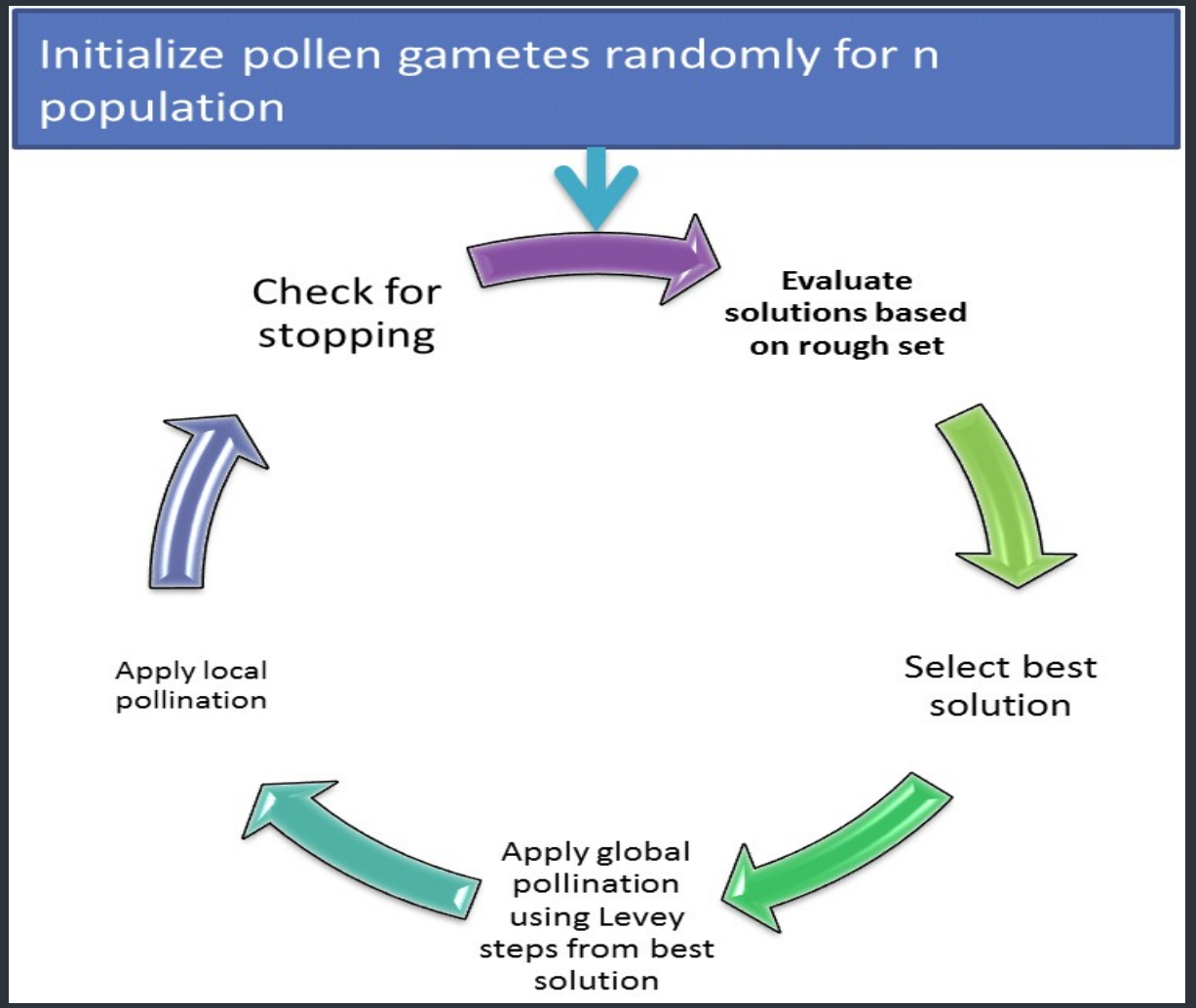
NAVANEETHAN P

18MIS0071

INTRODUCTION

Special characteristic of many natural phenomenon can be converted to an algorithm or mathematical models to solve real world complex problems. Many natural phenomena have been converted to algorithms by researchers to find optimal solutions of optimization problems.flower pollination algorithm (FPA) describing the behaviour of flower reproduction has been proposed by Yang (2012).As 80% of plants are flowering plants and pollination process of plants inspired Yang to simulate this behaviour into an algorithm called flower pollination algorithm (FPA).It is a swarm-based algorithm and needs few parameters to be tuned. FPA shows best results when applied to real world problems of different domain.

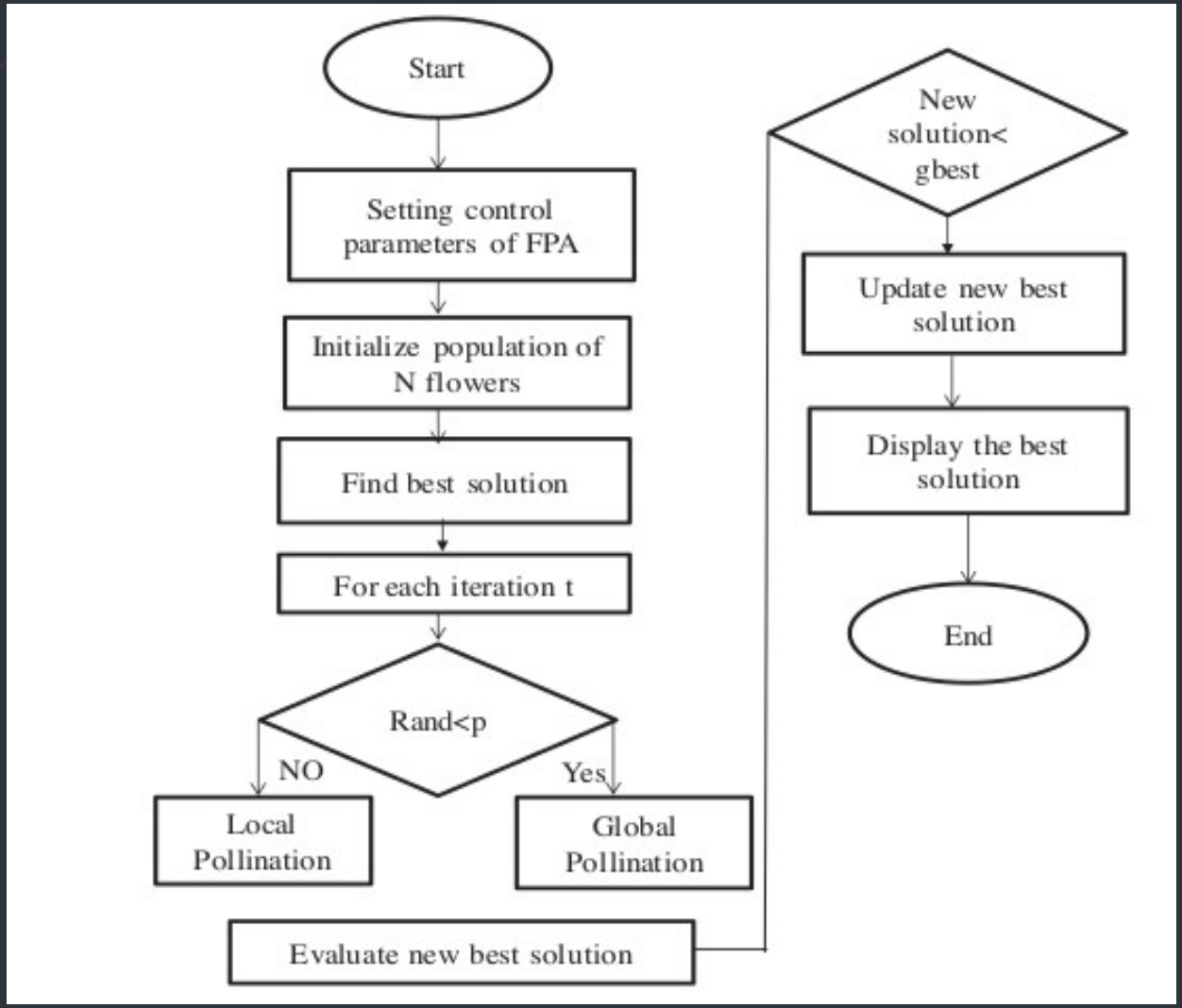
Flower Pollination Algorithm



Rules of FPA:

- Rule 1: Global pollination comprises of biotic and cross pollination by pollinators obeying Levy flight.
- Rule 2: Abiotic and self-pollination causes local pollination.
- Rule 3: Similarity between two flowers is proportional to reproduction probability which is called as flower constancy.
- Rule 4: Local or global pollination can be managed by

FPA Steps:


Start
Setting control parameters of FPA
Initialize population of N flowers
Find best solution
For each iteration t
Rand<p
NO
Yes
Local Pollination
Global Pollination
Evaluate new best solution
New solution< gbest
Update new best solution
Display the best solution
End

Mathematical formulation of FPA:

- Rule 1 and 3 combines to give global pollination as:

$$X_i^{t+1} = X_i^t + L\gamma\left(X_i^t - globalbest\right) \quad (1)$$

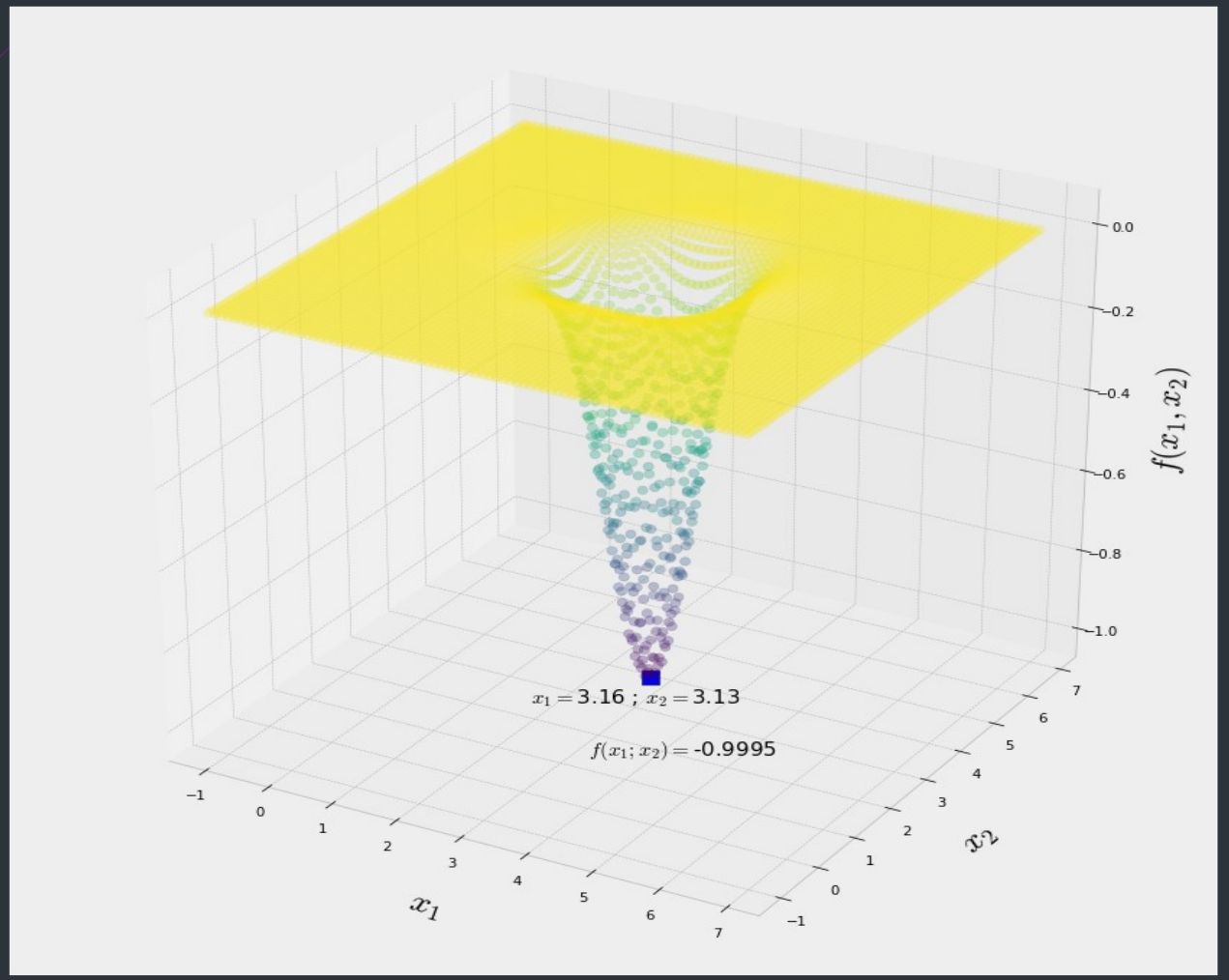
where X_i^{t+1} and X_i^t are t-th iteration solutions, L is Levy flight step, γ is a scaling factor and global best is the present optimal solution.

- Rule 2 and 3 combine to give local pollination as:

$$X_i^{t+1} = X_i^t + \varepsilon\left(X_j^t - X_k^t\right) \quad (2)$$

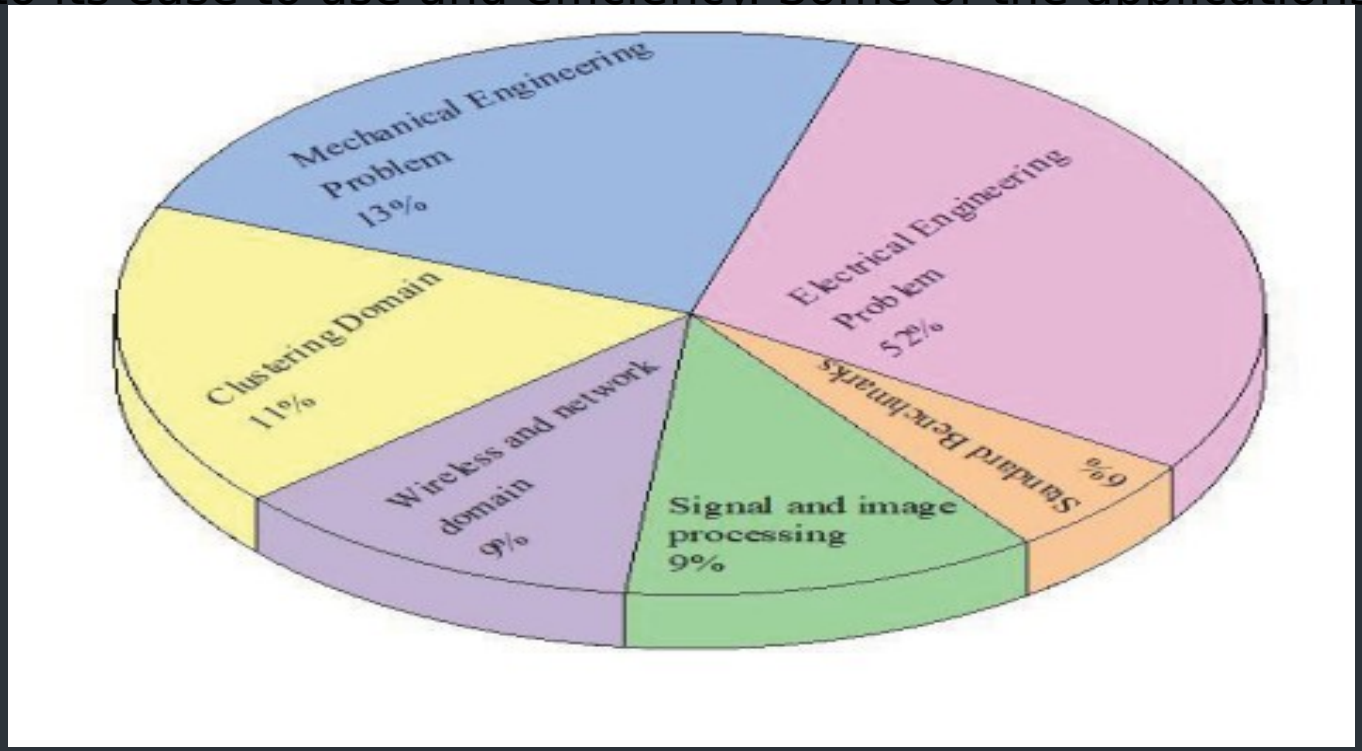
Where X_j^t and X_k^t are randomly generated numbers and ε is a random number between 0 and 1.

SCREENSHOTS



Application:

FPA has been applied to solve real world complex problems of multiple domains due to its ease to use and efficiency. Some of the applications are



CONCLUSION

Variants of FPA are classified in four categories on the basis of modifications in algorithm, hybridization of other techniques with FPA, it’s parameters tuning and multi-objective modified versions of FPA. This Project shows that FPA is an efficient optimization technique to solve multiple real-world problems in different domains particularly parameters estimation problem of PV cells and modules. Additionally, further modifications can improve its performance to give more optimized results

THANK YOU