

NOVEL MATE PREFERENCES IN HUMAN BEINGS INSPIRED OPTIMIZATION AND HYBRIDIZED POMSKY - PYGOSCELIS ANTARCTICUS - PHENGODES SWARM ALGORITHM

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Abstract

Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Pomsky -Pygoscelis antarcticus - Phengodes Swarm algorithm (HPPP) are applied for solving the genuine power loss reduction problem. Mate Preferences in Human beings inspired Optimization Algorithm has been designed mathematically based on the mate preferences in Human beings. Criteria of selecting the mate may be depending on social and economic conditions, physical attractiveness, stable and intellectual deeds. This action is scientifically demarcated in the exploration section of the procedure. In the exploitation division, both men and women analyze about the conditions in intensified mode before making a final decision. Pomsky Optimization Algorithm is based on the skilled movement of the Pomsky in examining process. Extraordinary snort possessed by Pomsky through which it can identify the various aromas and by level of barking will disclose about the intimacy near the examining entity. Pygoscelis antarcticus Optimization algorithm is designed by Pygoscelis antarcticus clustering behaviour. In foraging Pygoscelis antarcticus moves in cluster or group. Phengodes swarm optimization algorithm is a new algorithm which stimulated from the light emission behavior of glow worms to attract prey. Phengodes Swarm Optimization Algorithm incorporated with the parallel hybrid mutation which unites the uniform distribution mutation with the Gaussian distribution mutation. In hybridized Pomsky - Pygoscelis antarcticus - Phengodes Swarm (HPPP) algorithm, course of iterations and extraordinary degree of divergence will be there with the orientation of amplification.

Keywords: Mate; Preferences; Human beings; Pomsky - Pygoscelis antarcticus; Phengodes Swarm algorithm

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Introduction

Various procedures are engaged continually to solve the genuine power loss reduction in electrical power transmission (Abd-El *et al.*, 2022; Habib *et al.*, 2022; Ali *et al.*, 2023).

Numerous researchers around the world applying various procedures (Kumar *et al.*, 2020a; Kumar 2020b; Omelchenko *et al.*, 2020; Pullabhatla *et al.*, 2020; Singh *et al.*, 2021; Kumar *et al.*, 2021; Awaar *et al.*, 2022; Baba *et al.*, 2022; Kumar *et al.*, 2022; Malik *et al.*, 2022; Kumar *et al.*, 2024; Pushkarna *et al.*, 2024) for solving the technical problems.

In this paper Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Pomsky - *Pygoscelis antarcticus* - Phengodes Swarm algorithm (HPPP) are applied for solving the true power loss reduction problem.

Design attributes of the MPHO algorithm

Mate Preferences in Human beings inspired Optimization Algorithm has been designed mathematically based on the mate preferences in Human beings. Mate preferences in Human beings define about how one human selects or not select to mate with another human. Males and females have been perceived dissimilar standards as what creates a noble or ultimate mate. A probable mate's social and economic position is also seen as an important factor, particularly in emerging regions where social standing is extra accentuated. Men and women preference for a mate is many times grounded on physical attractiveness. This aspect links assumed fitness cues by both men and women towards opposite pairs.

General human behaviour

In general human had hypothesis of more physical good-looking is greater in good fitness. Research studies are showing that men and women are attracted to the physical body structure. In the long term relationships trade-off amongst a loving rapport and a companion with ample capitals and position, selecting an expressively steady companion and one that is substantially good-looking, educational features and family stuffs, companion who is friendly and religiously analogous or well-matched. Investigation has been endeavored to evaluate as to which an individual physiognomies men and women frequently select assuming that there are financial restraints. Women were probable to categorize cleverness, and great income, as requirements; contrariwise for men, intelligence as well as physical attraction, as the uppermost primacies.

Balancing the exploration and exploitation

In divergence however, superfluities, could be afforded when a superior financial plan was then postulated, are inspiration and extraordinary aptitudes in women, rendering to the inclinations of men, and imagination in men, rendering to the inclinations of women. Men and women will explore broadly to select the mate. Criteria of selecting the mate may be depend on social and Economic conditions, physical attractiveness, stable and intellectual deeds etc. This action is scientifically demarcated in the exploration section of the procedure. Mate preferences grounded on various factors. In turn it may be short or long term relationships. Few instants below the level of short term break may occur in the relationships. It is necessary to know in detail on what grounds mate preferred and relationships are building sequentially. This feature advances the investigative capability of the procedure. In the Exploitation division, both men and women analyze about the conditions in intensified mode before making a final decision. Examination of situations, matter and affordability of conditions are analyzed in deeper mode by both the genders. Once major things are acceptable a relationship will be built in reasonable mode.

Hybridized Pomsky - *Pygoscelis antarcticus* - Phengodes Swarm algorithm (HPPP)

Pomsky Optimization Algorithm has been designed grounded on the skilled movement of the Pomsky in examining process. Extraordinary snort possessed by Pomsky through which it can identify the various aromas and by level of barking will disclose about the intimacy near the examining entity. Sniffing attitude of the Pomsky is very commanding by that it will search in the examining zone and barking capacity will govern the appropriateness rate. *Pygoscelis antarcticus* Optimization algorithm is prejudiced by *Pygoscelis antarcticus* clustering behaviour, found in New Zealand. *Pygoscelis antarcticus* Optimization algorithm is designed to alter the position of every *Pygoscelis antarcticus* by means of the *Pygoscelis antarcticus* present location and swiftness. Distance among *Pygoscelis antarcticus* (Y_{pa}) is calculated along with temperature outline (θ^*). The industrious goer is demarcated from this and locations of supplementary PAs are altered to attain the global optimum value. In the course of iterations, extraordinary degree of divergence will be there with orientation to amplification. Once the swiftness values are great, functions inspire *Pygoscelis*

antarcticus to regulate their present locations. Phengodes swarm optimization algorithm is a new algorithm which stimulated from the light emission behavior of glow worms to attract prey. Phengodes Swarm Optimization Algorithm incorporated with the parallel hybrid mutation which unites the uniform distribution mutation with the Gaussian distribution mutation. Vibrant stirring step size method can increase the speed of convergence at initial era of the process and it perk up the calculation correctness in the procedure advanced segment. In Hybridized Pomsky - Pygoscelis antarcticus - Phengodes Swarm (HPPP) algorithm, in the course of iterations, extraordinary degree of divergence will be there with orientation to amplification. Once the swiftness values are great, functions inspire Pygoscelis antarcticus to regulate their present locations and augment the exploring activity in the hybrid process. Phengodes Swarm enhances the exploitation activity in the hybridized procedure.

Validation

Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Pomsky -Pygoscelis antarcticus - Phengodes Swarm algorithm (HPPP) are validated in 23 Benchmarking functions, IEEE 30, 354 systems and Delta system (WDTN) 220 KV network.

Attained objectives

Genuine power loss reduction, voltage stability expansion and voltage deviation minimization

Mate Preferences in Human beings inspired Optimization Algorithm

Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm has been designed mathematically based on the mate preferences in Human beings. Mate preferences in Human beings define about how one human selects or not select to mate with another human (Srinivasulu and Venkat, 2017; Nakayama *et al.*, 2020). Males and females have been perceived dissimilar standards as what creates a noble or ultimate mate. A probable mate's social and economic position is also seen as an important factor, particularly in emerging regions where social standing is extra accentuated. Men and women preference for a mate is many times grounded on physical attractiveness. This aspect links assumed fitness cues by both men and women towards opposite pairs. In general human had hypothesis of more physical good-looking is greater in good

fitness. Research studies are showing that men and women are attracted to the physical body structure. In the long term relationships trade-off amongst a loving rapport and a companion with ample capitals and position, selecting an expressively steady companion and one that is substantially good-looking, educational features and family stuffs, companion who is friendly and religiously analogous or well-matched. Investigation has been endeavored to evaluate as to which an individual physiognomies men and women frequently select assuming that there are financial restraints. Women were probable to categorize cleverness, and great income, as requirements; contrariwise for men, intelligence as well as physical attraction, as the uppermost primacies. In divergence however, superfluities, could be afforded when a superior financial plan was then postulated, are inspiration and extraordinary aptitudes in women, rendering to the inclinations of men, and imagination in men, rendering to the inclinations of women.

Population of Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm is created as,

$$M = \begin{bmatrix} M_1 \\ \vdots \\ M_i \\ \vdots \\ M_N \end{bmatrix}_{N \times m} = \begin{bmatrix} m_{1,1} & \cdots & m_{1,m} \\ \vdots & \ddots & \vdots \\ m_{N,1} & \cdots & m_{N,m} \end{bmatrix} \quad (1)$$

$M \rightarrow \text{population}$

$N \rightarrow \text{members}$

$m \rightarrow \text{variables}$

$$u_{i,j} = \min_j + R(\max_j - \min_j) \quad (2)$$

$\max_j, \min_j \rightarrow \text{limits}$

$R \in [0,1]$

Rate of objective function is computed as,

$$F = \begin{bmatrix} F_1 \\ \vdots \\ F_i \\ \vdots \\ F_N \end{bmatrix}_{N \times 1} = \begin{bmatrix} F(M_1) \\ \vdots \\ F(M_i) \\ \vdots \\ F(M_N) \end{bmatrix}_{N \times 1} \quad (3)$$

Men and women will explore broadly to select the mate. Criteria of selecting the mate may be depend on social and Economic conditions, physical attractiveness, stable and intellectual deeds etc. This action is scientifically demarcated in the exploration section of the procedure.

$$M_{i,j}^{L1} = M_{i,j} + R \cdot (Z_j - R_1 \cdot M_{i,j}) \quad (4)$$

$M_{i,j}^{L1} \rightarrow \text{new location of the } i\text{th entity}$

$Z_j \rightarrow \text{men and women location in } j\text{th dimension}$

$$R \in [0,1]$$

$$R_1 \in \{1,2\}$$

$$M_i = \begin{cases} M_i^{L1}, F_i^{L1} \leq F_i \\ M_i, Else \end{cases} \quad (5)$$

Mate preferences grounded on various factors. In turn it may be short or long term relationships. Few instants below the level of short term break may occur in the relationships. It is necessary to know in detail on what grounds mate preferred and relationships are building sequentially. This feature advances the investigative capability of the procedure and it methodically determined as,

$$MX_i = \{M_k, F_k > F_i\} \quad (6)$$

$$k = 1, 2, 3, \dots, N$$

$$i = 1, 2, \dots, N$$

$MZ_i \rightarrow$ analyze the grounds of preferences

$$M_{i,j}^{L2} = M_{i,j} + R \cdot (M_{i,j} - R_2 \cdot Y_{i,j}) \quad (7)$$

$M_{i,j}^{L2} \rightarrow$ new location of the i th entity

$$R \in [0,1]$$

$$R_2 \in \{1,2\}$$

$Y_{i,j} \rightarrow$ nature of relationship

$$M_i = \begin{cases} M_i^{L2}, F_i^{L2} \leq F_i \\ M_i, Else \end{cases} \quad (8)$$

In the Exploitation division, both men and women analyze about the conditions in intensified mode before making a final decision. Examination of situations, matter and affordability of conditions are analyzed in deeper mode by both the genders. Once major things are acceptable a relationship will be built in reasonable mode. This facet has been technically determined as,

$$M_{i,j}^{L3} = M_{i,j} + R \cdot (1 - 2 \cdot R) \cdot \frac{\max_j - \min_j}{t} \quad (9)$$

$M_{i,j}^{L3} \rightarrow$ new location of the i th entity

$$R \in [0,1]$$

$t \rightarrow$ iter. count

$$M_i = \begin{cases} M_i^{L3}, F_i^{L3} \leq F_i \\ M_i, Else \end{cases} \quad (10)$$

When conditions are not smooth and transparent, both the genders may skip and search for suitable partners further. This aspect linked to Lévy flight strategy (Lenin, 2023) and combined into the algorithm

$$U(i+1) = Q(i) - |e(t)| \times A \times L(d) \quad (11)$$

$$L(s) \sim |s| - 1 - \beta$$

$$0 < \beta < 2$$

$$L(s, \gamma, \mu) = \begin{cases} \sqrt{\frac{\gamma}{2\pi}} \exp\left[-\frac{\gamma}{2(s-\mu)}\right] \frac{1}{(s-\mu)^{3/2}} \\ 0 \text{ if } s \leq 0 \end{cases}$$

Sometimes it will be chaotic and both the men and women will face the complexity when the relationship becomes complex due to known or unknown factors. This is technically defined as chaotic sequences (Lenin, 2023) and it is amalgamated in the procedure

$$p_{t+1} = p_t^2 - q_t^2 + a \cdot p_t + b \cdot q_t$$

$$q_{t+1} = 2p_t q_t + c \cdot p_t + d \cdot q_t$$

- a. Start
- b. Fix the variables
- c. Produce the population

$$d. \quad M = \begin{bmatrix} M_1 \\ \vdots \\ M_i \\ \vdots \\ M_N \end{bmatrix}_{N \times m} = \begin{bmatrix} m_{1,1} & \dots & m_{1,m} \\ \vdots & \ddots & \vdots \\ m_{N,1} & \dots & m_{N,m} \end{bmatrix}$$

- e. Calculate the objective function

$$f. \quad F = \begin{bmatrix} F_1 \\ \vdots \\ F_i \\ \vdots \\ F_N \end{bmatrix}_{N \times 1} = \begin{bmatrix} F(M_1) \\ \vdots \\ F(M_i) \\ \vdots \\ F(M_N) \end{bmatrix}_{N \times 1}$$

- g. Exploration of men and women

$$h. \quad M_{i,j}^{L1} = M_{i,j} + R \cdot (Z_j - R_1 \cdot M_{i,j})$$

$$i. \quad M_i = \begin{cases} M_i^{L1}, F_i^{L1} \leq F_i \\ M_i, Else \end{cases}$$

- j. Define the nature of relationship

$$k. \quad MX_i = \{M_k, F_k > F_i\}$$

$$l. \quad M_{i,j}^{L2} = M_{i,j} + R \cdot (M_{i,j} - R_2 \cdot Y_{i,j})$$

$$m. \quad M_i = \begin{cases} M_i^{L2}, F_i^{L2} \leq F_i \\ M_i, Else \end{cases}$$

- n. Define deep analyse of conditions

$$o. \quad M_{i,j}^{L3} = M_{i,j} + R \cdot (1 - 2 \cdot R) \cdot \frac{\max_j - \min_j}{t}$$

$$p. \quad M_i = \begin{cases} M_i^{L3}, F_i^{L3} \leq F_i \\ M_i, Else \end{cases}$$

$$q. \quad \text{Apply Lévy flight strategy } U(i+1) = Q(i) - |e(t)| \times A \times L(d)$$

$$r. \quad L(s) \sim |s| - 1 - \beta$$

$$s. \quad L(s, \gamma, \mu) =$$

$$\begin{cases} \sqrt{\frac{\gamma}{2\pi}} \exp\left[-\frac{\gamma}{2(s-\mu)}\right] \frac{1}{(s-\mu)^{3/2}} \\ 0 \text{ if } s \leq 0 \end{cases}$$

- t. Integrate chaotic sequences

$$u. \quad p_{t+1} = p_t^2 - q_t^2 + a \cdot p_t + b \cdot q_t$$

$$v. \quad q_{t+1} = 2p_t q_t + c \cdot p_t + d \cdot q_t$$

- w. End for

$$x. \quad t = t + 1$$

- y. Output the finest solution

- z. End

hybridized Pomsky - Pygoscelis antarcticus - Phengodes Swarm Optimization algorithm

Pomsky Optimization Algorithm is based on the skilled movement of the Pomsky in examining process. Extraordinary snort possessed by Pomsky through which it can identify the various aromas and by level of barking will disclose about the intimacy near the examining entity. Sniffing attitude of the Pomsky is very commanding by that it will search in the examining zone and baking capacity will govern the appropriateness rate. Premium location is found based on the high sound level of the Pomsky in the particular zone area. Pomsky passages in diminutive phases with deference to aroma and it will adventure the local exploration zone then the exploration in that precise zone has been completed and which has been recognized with orientation to the capacity of barking. Pomsky quad D^M which owns set of "M" Pomsky and it competent for operative examination. Then the potential key vector (V^F) designates the specific location of the Pomsky group in Pomsky squadron D^M . At that moment $V \in Actual\ number^M$ represents the urinary coloration done by Pomsky squadron D^M . At that juncture the sniffing stuff of the Pomsky (SD) will be signified as directory rate by SD; $D \rightarrow actual\ number$. Then snuffling and drive stuff of the Pomsky is $\rho(Q, Nq_{snq})$; $D \rightarrow D$ which is the probabilistic operative which capriciously adjusts the Pomsky key vector (V^E)- entirely grounded on the fitness assessment of drive (Nq_{snq}) and capacity of barking D. Then the snuffling and drive stuff of the Pomsky is described as,

$$V_i^j(t+1) = \begin{cases} V_{peak\ rate\ of\ barking\ sound}^j, q \leq Nq_{snq} \\ V_i^j + Actual\ number(0,1) \\ \times step(i), q > Np_{snq} \end{cases} \quad (12)$$

$$step(i) = \omega \times K(0,1) \times (V_i^j - V_{high\ volume\ of\ barking}^j) \quad (13)$$

At that point barking and drive of the do is defined as $\sigma(g, h, \beta)$; $D^U \rightarrow D$ which is the probabilistic operative and it randomly alter the Pomsky vector (V^E) with $u \in (1, 2, 3, \dots, E)$. Where β represent the other noises which come from D.

Modification in Pomsky vector (V^u) is defined as,

$$V_i^j(t+1) = \begin{cases} V_t^j, g \leq \beta \\ V_i^j(t) + D_M \times Actual\ Number \\ (0,1) \times step(i), g > \beta \end{cases} \quad (14)$$

$$D_M = (V_{peak\ rate\ of\ barking\ sound} - V_u) \quad (15)$$

At that time the D exchange function is written as

$$(M, E, \rho, \sigma, Nq_{snq}); D^M \rightarrow D^M \quad (16)$$

D exchange has been happening by computing (V^E) and (SD).

Then $D = (A, \mu, B)$ which discover the solution for the optimization problem as three tuple approach. $A: \rightarrow \{D^I; SD^I\}$ Which will create initial D with orientation to that SD will be computed. μ - designates the exchange function, then by exploiting the motif done by the urination of the Pomsky the parameter "A" will be implemented with engendering the capricious numbers. $B: D^I \rightarrow \{R, W\}$ - will be perform as termination norm where R - Right and W-Wrong.

- a. Begin
- b. Initialized every D location
- c. $A: \{D^I; SD^I\}$
- d. Exploitation segment: D will change its rate based on (V^E)
- e. For ($i = 1$ to M) do
- f. If ($K < Np_{snq}$)
- g. $V_i^j(t+1) = V_{peak\ rate\ of\ barking}^j$
- h. $s(i) = \omega \times K(0,1) \times (V_i^j - V_{peak\ rate\ of\ barking}^j)$
- i. End for
- j. Exploration segment; D make a change with orientation to the extraordinary capacity of barking
- k. For ($i = 1$ to M) do
- l. $K = R(0,1)$
- m. $D_M = (V_{peak\ rate\ of\ barking} - V_u)$
- n. End

Pygoscelis antarcticus Optimization algorithm is prejudiced by Pygoscelis antarcticus clustering behaviour, found in New Zealand. In foraging behaviour, Pygoscelis antarcticus moves in cluster or group. The atypical aspect for the period of foraging is clustering deeds. Consequently, the main objective is to discover an effective goer from the swarm in the scientific design. Distance among Pygoscelis antarcticus (Y_{pa}) is calculated along

with temperature outline (θ^*). The industrious goer is demarcated from this and locations of supplementary PAs are altered to attain the global optimum value.

Pygoscelis antarcticus temperature outline (θ^*) is defined as,

$$\theta^* = \left(\theta - \frac{T}{t-T} \right) \quad (17)$$

where t is current iteration, T is maximum iteration

$$\theta = \begin{cases} 0 & \text{if } \text{Random} > 0.50 \\ 1 & \text{if } \text{Random} < 0.50 \end{cases} \quad (18)$$

Meanwhile Pygoscelis antarcticus habitually cluster together to maintain the temperature, cautious deterrents necessity be taken to guard them from collisions between the neighborhoods. Aimed at this motive, two vectors ($\vec{P}$) and ($\vec{Q}$) are included in the procedure.

$$\vec{P} = \{ \text{Movement} \times (\theta^* + Y_{\text{Grid}}(\text{Precision})) \times \text{Random}() \} - \theta^* \quad (19)$$

$$\vec{Q} = \text{Random}() \quad (20)$$

$$Y_{\text{Grid}}(\text{Precision}) = |\vec{Y} - \vec{Y}_{pa}| \quad (21)$$

$$\text{where } \vec{Y}_{pa} \in [0,1] \quad (22)$$

Distance among Pygoscelis antarcticus (PAs) is defined as,

$$\overrightarrow{\text{Distance}}_{pa} = |\{C(\vec{P}) \cdot \vec{Y}(y) - (\vec{Q}) \cdot \vec{Y}_{pa}(y)\}| \quad (23)$$

$$C(\vec{P}) = \sqrt{(a \cdot e^{-H/b} - e^{-H})^2} \quad (24)$$

wher

e C is communal force and

a, b are control parameters

Pygoscelis antarcticus positions are updated by,

$$\vec{Y}_{pa}(y+1) = \vec{Y}(y) - \vec{P} \cdot \overrightarrow{\text{Distance}}_{pa} \quad (25)$$

Then Pygoscelis antarcticus Optimization algorithm is designed to alter the position of every Pygoscelis antarcticus by means of the Pygoscelis antarcticus present location and swiftness. In the range $[0, 1]$ the Pygoscelis antarcticus swiftness values are transformed into probability standards in S transfer function as follows,

$$\text{Transfer function}(s_k^i(t)) = \frac{1}{1+e^{-s_k^i(t)}} \quad (26)$$

where $s_k^i(t)$ indicate the swiftness of the k th

Pygoscelis antarcticus at iteration t

Then the position of the Pygoscelis antarcticus which is based on Transfer function($s_k^i(t)$) is modernized as follows,

$$z_k^i(t+1) = \begin{cases} 1 & \text{if } \text{Transfer function}(s_k^i(t)) > \text{Random} \\ 0 & \text{otherwise} \end{cases} \quad (27)$$

$z_k^i(t+1) \rightarrow k$ th Pygoscelis

Antarctica position at iteration $t+1$

The swiftness values of the to calculate the probability and it given by,

$$\text{Transfer function}(s_k^i(t)) = |\text{Tanh}(s_k^i(t))| \quad (28)$$

$$z_k^i(t+1) = \begin{cases} 1 - z_k^i(t) & \text{if } \text{Transfer function}(s_k^i(t+1)) > \text{Random} \\ z_k^i(t) & \text{otherwise} \end{cases} \quad (29)$$

For function $S1$ to $S4$; $S -$

shaped transfer function and for $V1$ to $V4$, the $V -$ shaped transfer function defined as,

$$S1 = \frac{1}{1+e^{-2s}}, S2 = \frac{1}{1+e^{-s}}, S3 = \frac{1}{1+e^{(\frac{-s}{2})}}, S4 = \frac{1}{1+e^{(\frac{-s}{3})}}, V1 = \left| \text{erf}\left(\frac{\pi}{2}s\right) \right|, V2 = |\text{Tanh}(s)|, V3 = |s/\sqrt{1+s^2}|, V4 = \left| \frac{2}{4} \arctan\left(\frac{\pi}{2}s\right) \right| \quad (30)$$

Transfer functions $S1, S2, S3, S4, V1, V2, V3$, and $V4$ indicate the position changing in high and low probability mode. In the course of iterations, extraordinary degree of divergence will be there with orientation to amplification. Once the swiftness values are great, functions inspire Pygoscelis antarcticus to regulate their present locations.

- Start
- Initialization of population
- while ($t < \text{max. number of iter}$)
- Each Pygoscelis antarcticus fitness value computed
- With reference to fitness value find the most excellent Pygoscelis antarcticus
- For each Pygoscelis antarcticus do
- Calculate the parameter a
- Engender the clustering actions

- i. Transform the operative goer into the probability
- j. Present position of *Pygoscelis antarcticus* is updated
- k. End for
- l. Calculate the fitness value of all *Pygoscelis antarcticus*
- m. Return the most excellent solution
- n. End

Phengodes beetles are under the superfamily of Elateroidea. Members of this family have bioluminescent organs on the larvae, and occasionally adults. In Phengodes Swarm Optimization algorithm, Phengodes is arbitrarily dispread in the exploration space, it endures a radiant quantity named as Bioluminescence and this parameter domain is $cr_d^i = (0 < cr_d^i \leq cr_s)$. Phases are acting vibrant part initial distribution of Phengodes are; Bioluminescence in streamlining sector, Drive sector, and Compatriot variety revitalization sector. Bioluminescence in appraisal is defined as,

$$E_i(t) = (1 - \rho)B_i(t - B) + \gamma J(z_i(t)) \quad (31)$$

In drive sector, every Phengodes picks a compatriot and then vicissitudes in the direction with assured probability,

$$Pb_{ij}(t) = \frac{B_j(t) - B_i(t)}{\sum_{k \in N_i(t)} B_k(t) - B_i(t)} \quad (32)$$

Subsequent to the drive, Phengodes location is rationalized by,

$$z_i(t + 1) = z_i(t) + ss * \left(\frac{z_j(t) - z_i(t)}{\|z_j(t) - z_i(t)\|} \right) \quad (33)$$

Compatriot range transformation is defined as,

$$cr_d^i(t + 1) = \min \left\{ cr_s, \max \left\{ 0, cr_d^i(t) + \beta(n_t - |N_i(t)|) \right\} \right\} \quad (34)$$

In the projected Phengodes Swarm Optimization Algorithm (PGSO) a mutation parameter applied to unify the constant distribution with Gaussian.

Mutation capacity rate for each individual is defined as,

$$Mr_i = 0.05 + 0.5 \frac{(\exp(5(i-1)/(ps-1))-1)}{\exp(5)-1} \quad (35)$$

Vibrant stirring step size method can increase the speed of convergence at initial era of the process and it perk up the calculation correctness in the procedure advanced segment,

$$s(t) = ss * \left(1 - \frac{t}{g} \right) + 10^{-s} \quad (36)$$

In the proposed procedure Phengodes will be placed in the standard distribution disparity and its location will not be altered.

$$z_i(t + 1) = R(0, st(t) * z_i(t)) \quad (37)$$

- a. Start
- b. Parameters values are assigned
- c. Set the dimension
- d. Fix the number of Phengodes
- e. *While* ($t \leq iter_max$) *do*:
- f. *For every Phengodes i do*
- g. Rationalize the Bioluminescence in
- h. *For every Phengodes i do*
- i. Validate the Compatriot set
- j. Compute the probability of the drive
- k. Select a Compatriot and appraise Compatriot range
- l. If the location of Phengodes “i” is not altered
- m. Then standard distribution disparity is
- n. $z_i(t + 1) = R(0, st(t) * z_i(t))$
- o. *If* $R \leq Pu$
- p. $Zi(t) = (1 + R) * Zi(t)$
- q. Else
- r. $Zi(t) = G() * Zi(t)$
- s. End

In order to enhance the exploration and exploration rate to get the optimal solution Pomsky Optimization Algorithm, *Pygoscelis antarcticus* Optimization algorithm and Phengodes Swarm Optimization Algorithm are hybridized. In Hybridized Pomsky - *Pygoscelis antarcticus* - Phengodes Swarm (HPPP) algorithm, in the course of iterations, extraordinary degree of divergence will be there with orientation to amplification. Once the swiftness values are great, functions inspire *Pygoscelis antarcticus* to regulate their present locations and augment the exploring activity in the hybrid process. Phengodes Swarm enhances the exploitation activity in the hybridized procedure.

Hybridized Pomsky - *Pygoscelis antarcticus* - Phengodes Swarm (HPPP) algorithm

- a. Begin
- b. parameters are fixed
- c. Initialized every D location

- d. $A: I\{D^F; SD^I\}$
- e. Each *Pygoscelis antarcticus* fitness value computed
- f. With reference to fitness value find the most excellent *Pygoscelis antarcticus*
- g. *For each* *Pygoscelis antarcticus* *do*
- h. Calculate the parameter a
- i. Engender the clustering actions
- j. Exploitation segment; D will change its rate based on (V^E)
- k. *For* $(i = 1 \text{ to } M)$ *do*
- l. *If* $(K < Np_{snq})$
- m. $V_i^j(t+1) = V_{\text{peak rate of barking}}^j$
- n. $s(i) = \omega \times K(0,1) \times (V_i^j - V_{\text{peak rate of barking}}^j)$
- o. $V_i^j + \text{Actual Number}(0,1) \times s(i), p > Np_{snq}$
- p. End for
- q. Exploration segment; D make a change with orientation to the extraordinary capacity of barking
- r. $m_f = m_{vi} + Pe \times O_7 \times \delta \times a_i$
- s. *For* $(i = 1 \text{ to } M)$ *do*
- t. $K = R(0,1)$
- u. $D_M = (V_{\text{peak rate of barking}} - V_u)$
- v. $V_i^{t+1} = V_i(t) + D_M \times K$
- w. Transform the operative goer into the probability
- x. $z_k^i(t+1) = \begin{cases} 1 & \text{if Transfer function} \\ (s_k^i(t)) > \text{Random} \\ 0 & \text{otherwise} \\ 1 - z_k^i(t) & \text{if TF} \end{cases}$
- y. $z_k^i(t+1) = \begin{cases} (s_k^i(t+1)) > \text{Random} \\ z_k^i(t) & \text{otherwise} \end{cases}$
- z. Present position of *Pygoscelis antarcticus* is updated
- aa. $\vec{Y}_{wp}(y+1) = \vec{Y}(y) - \vec{P} \cdot \overrightarrow{\text{Distance}_{wp}}$
- bb. End for
- cc. Calculate the fitness value of all *Pygoscelis antarcticus*
- dd. Fix the number of Phengodes
- ee. Apply the Step size
- ff. $z_i(t)$ be the location of Phengodes “i” at time “t”
- gg. Phengodes distribution sector
- hh. *For* $i = 1 \text{ to } n$ *do*; $B_i(0) = B_0$
- ii. $cr_i^d = cr_s$
- jj. Set maximum iteration number = $iter_max$
- kk. $t = 1$
- ll. *While* $(t \leq iter_max)$ *do*:
- mm. *For every* Phengodes i *do*
- nn. Rationalize the Bioluminescence in
- oo. $E_i(t) = (1 - \rho)B_i(t - B) + \gamma J(z_i(t))$
- pp. *For every* Phengodes i *do*
- qq. Authenticate the Compatriot set
- rr. $Pb_{ij}(t) = \frac{B_j(t) - B_i(t)}{\sum_{k \in N_{i(t)}} B_k(t) - B_i(t)}$
- ss. Compute the probability of the drive
- tt. $z_i(t+1) = z_i(t) + ss * \left(\frac{z_j(t) - z_i(t)}{\|z_j(t) - z_i(t)\|} \right)$
- uu. Select a Compatriot range
- vv. $cr_d^i(t+1) = \min\{cr_s, \max\{0, cr_d^i(t) + \beta(n_t - |N_i(t)|)\}\}$
- ww. If the location of Phengodes “i” is not altered
- xx. Then standard distribution disparity is
- yy. $z_i(t+1) = R(0, st(t) * z_i(t))$
- zz. *For* $i = 1:ps$
- aaa. *If* $\text{ceil}(Mri + R - 1) = 1$
- bbb. *If* $R \leq Pu$
- ccc. $Zi(t) = (1 + R) * Zi(t)$
- ddd. Else
- eee. $Zi(t) = G() * Zi(t)$
- fff. Output the solution
- ggg. End

Results

Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Pomsky -Pygoscelis antarcticus - Phengodes Swarm algorithm (HPPP) are validated in 23 benchmark functions (Unimodal-7, Multimodal-6, fixed-dimension multimodal- 10) (Tudose *et al.*, 2021), Table 1 show the result MPHO, HPPP in 23 benchmark functions.

Application of algorithm to power loss reduction problem

Objective function of genuine power loss reduction is defined as,

$$\text{Min } \tilde{F}(\bar{g}, \bar{h}) \quad (38)$$

$$g = [VLG_1, \dots, VLG_{Ng}; QC_1, \dots, QC_{Nc}; T_1, \dots, T_{Nr}]$$

$$h = [PG_{slack}; VL_1, \dots, VL_{N_{load}}; QG_1, \dots, QG_{Ng}; SL_1, \dots, SL_{Nr}]$$

$$F_1 = P_{Min} = \text{Min} \left[\sum_m^{NTL} G_m [V_i^2 + V_j^2 - 2 * V_i V_j \cos \theta_{ij}] \right]$$

$$F_2 = \text{Min} \left[\sum_{l=1}^{N_{LB}} |V_{Lk} - V_{Lk}^{desired}|^2 + \sum_{i=1}^{Ng} |Q_{GK} - Q_{KG}^{Lim}|^2 \right]$$

Table 1. Result of MPHO, HPPP

B F	STASSA (Tudose <i>et al.</i> , 2021)	ESTSSA (Tudose <i>et al.</i> , 2021)	MPHO	HPPP
1	6.38×10-12	6.96×10-9	6.24×10-12	6.24×10-12
2	3.08×10-7	5.48×10-6	3.03×10-7	3.03×10-7
3	2.53×10-1	4.35×10-10	2.42×10-1	2.42×10-1
4	6.71×10-7	1.19×10-5	6.51×10-7	6.51×10-7
5	4.110208	4.11726	4.11015	4.11015
6	3.19×10-10	4.50×10-10	3.04×10-10	3.04×10-10
7	2.23×10-5	0.002002	2.13×10-5	2.13×10-5
8	-2877.61	-3052.87	-2862.31	-2862.31
9	1.01×10-12	22.85084	1.00×10-12	1.00×10-12
10	4.79×10-7	0.810233	4.72×10-7	4.72×10-7
11	5.91×10-12	0.33718	5.73×10-12	5.73×10-12
12	2.56×10-12	0.051897	2.44×10-12	2.44×10-12
13	0.000366	0.001099	0.000355	0.000355
14	0.998004	0.998004	0.998001	0.998001
15	0.000307	0.000829	0.000292	0.000292
16	-1.03163	-1.03163	-1.03153	-1.03153
17	0.397887	0.397887	0.397884	0.397884
18	3	3	3	3
19	-3.86278	-3.86278	-3.86275	-3.86275
20	-3.23084	-3.21497	-3.23074	-3.23074
21	-10.1532	-8.80506	-10.1523	-10.1523
22	-10.0486	-8.46635	-10.0472	-10.0472
23	-10.5364	-9.28557	-10.5351	-10.5351

$$\begin{aligned}
F_3 &= \text{Minimize } L_{\text{Maximum}} \\
L_{\text{Max}} &= \text{Max}[L_j]; j = 1; N_{LB} \\
\left\{ \begin{aligned} L_j &= 1 - \sum_{i=1}^{NPV} F_{ji} \frac{V_i}{V_j} \\ F_{ji} &= -[Y_1]^1 [Y_2] \end{aligned} \right. \quad (39)
\end{aligned}$$

Parity constraints

$$0 = PG_i - PD_i - V_i \sum_{j \in N_B} V_j [G_{ij} \cos[\theta_i - \theta_j] + B_{ij} \sin[\theta_i - \theta_j]] \quad (40)$$

$$0 = QG_i - QD_i - V_i \sum_{j \in N_B} V_j [G_{ij} \sin[\theta_i - \theta_j] + B_{ij} \cos[\theta_i - \theta_j]] \quad (41)$$

Disparity constraints

$$P_{\text{gsl}}^{\min} \leq P_{\text{gsl}} \leq P_{\text{gsl}}^{\max} \quad (42)$$

Reactive power generation (QGi)

$$Q_{\text{gi}}^{\min} \leq Q_{\text{gi}} \leq Q_{\text{gi}}^{\max}, i \in N_g \quad (43)$$

Load bus voltage (VLi)

$$VL_i^{\min} \leq VL_i \leq VL_i^{\max}, i \in NL \quad (44)$$

Transformers tap setting (Ti)

$$T_i^{\min} \leq T_i \leq T_i^{\max}, i \in N_T \quad (45)$$

Switchable reactive power compensations (QCi)

$$Q_c^{\min} \leq Q_c \leq Q_c^{\max}, i \in N_C \quad (46)$$

$$|SL_i| \leq S_{L_i}^{\max}, i \in N_{TL} \quad (47)$$

Generator bus voltage (VGi)

$$VG_i^{\min} \leq VG_i \leq VG_i^{\max}, i \in N_g \quad (48)$$

$$\begin{aligned}
F + r_i F_2 + u F_3 &= F_1 + \left[\sum_{i=1}^{NL} x_v [VL_i - VL_i^{\min}]^2 \right. \\
&\quad \left. + \sum_{i=1}^{NG} r_g [QG_i - QG_i^{\min}]^2 \right] + r_f F_3 \\
VL_i^{\text{minimum}} &= \begin{cases} VL_i^{\max}, & VL_i > VL_i^{\max} \\ VL_i^{\min}, & VL_i < VL_i^{\min} \end{cases} \quad (49) \\
QG_i^{\text{minimum}} &= \begin{cases} QG_i^{\max}, & QG_i > QG_i^{\max} \\ QG_i^{\min}, & QG_i < QG_i^{\min} \end{cases} \quad (50)
\end{aligned}$$

Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Ponsky-Pygoscelis antarcticus - Phengodes Swarm algorithm (HPPP) are validated in IEEE 30 bus system (Illinois Center for a Smarter Electric Grid (ICSEG)) Table 2 shows the Genuine Power Loss (GPS (MW)), Voltage deviation (VVT (PU)) and Stability (VSB (PU)). Figure 1 - Figure 3 show the estimation.

Table 2. Estimation of results (IEEE30 BUS)

Technique	GPS(MW)	VVT(PU)	VSB(PU)
TC (Mandal <i>et al.</i> , 2013)	4.6862	0.1354	0.1271
EDTLBO (Mouassa <i>et al.</i> , 2017)	4.5777	0.0913	0.1180
SMFS (Li <i>et al.</i> , 2019)	4.5135	0.0896	0.1252
ISMFS (Duong <i>et al.</i> , 2020)	4.5284	0.0891	0.1245
SPDE (Pg <i>et al.</i> , 2022)	4.6482	0.0802	0.1004
TECFW (Abd-El <i>et al.</i> , 2022)	4.9448	0.1212	0.1232
SPOA (Habib <i>et al.</i> , 2022)	4.5677	0.1250	0.1135
SPPT (Ali <i>et al.</i> , 2023)	4.8395	1.2663	0.1259
SRS (Ali <i>et al.</i> , 2023)	5.1328	1.0240	0.1287
SAV (Ali <i>et al.</i> , 2023)	4.5464	1.9889	0.1294
MPHO	4.4908	0.0097	0.1534
HPPP	4.4899	0.0094	0.1551

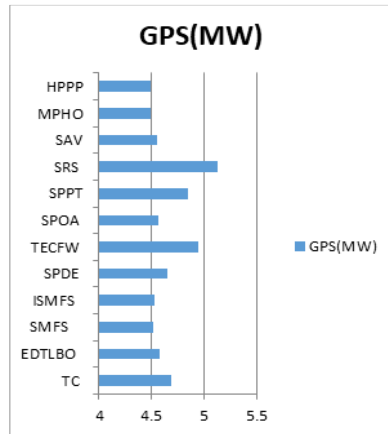


Figure 1. GPS (MW) appraisal (IEEE30 BUS)

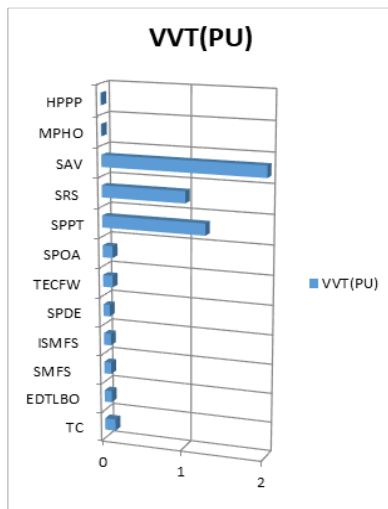


Figure 2. VVT (PU) appraisal (IEEE30 BUS)

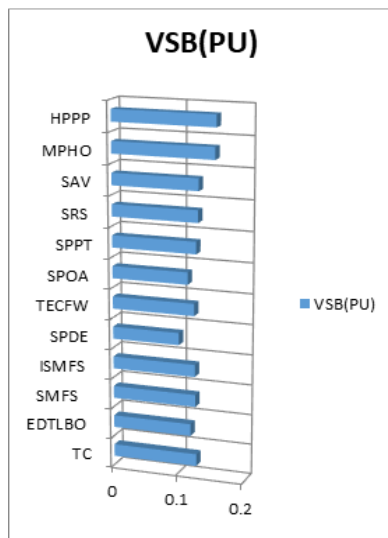


Figure 3. VSB (PU) appraisal (IEEE30 BUS)

Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Pomsby -Pygoscels antarcticus - Phengodes Swarm algorithm (HPPP) are validated in IEEE 354 bus test system (PSTCA, Power Systems Test Case Archive, University of Washington (2023)). Table 3 and Figure 4 and Figure 5 shows the valuation.

Table 3. Assessment of result (IEEE354 BUS)

Technique	GPS(MW)	VVT(PU)
IAI (Mouassa <i>et al.</i> , 2019)	337.374	0.4978
IAI1 (Mouassa <i>et al.</i> , 2019)	338.71	0.5117
ICS (Mouassa <i>et al.</i> , 2019)	339.325	0.5216
ISO (Karthik <i>et al</i> 2021)	341.001	0.5354
MSO (Karthik <i>et al</i> 2021)	341.123	0.6395
MPHO	332.298	0.4492
HPPP	331.898	0.4459

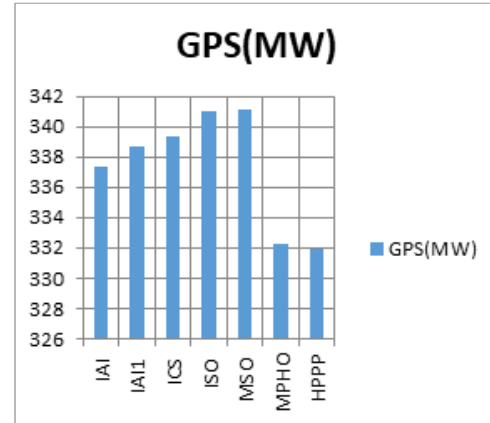


Figure 4. GPS (MW) appraisal (IEEE354 BUS)

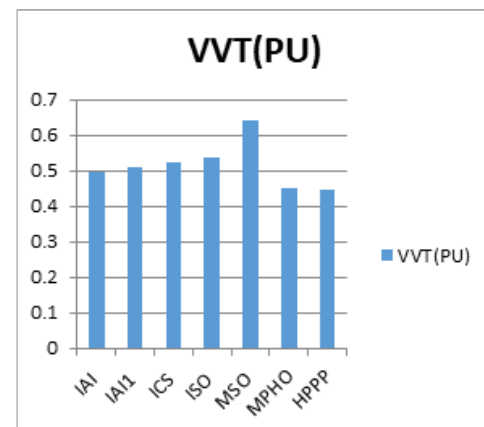


Figure 5. VVT (PU) appraisal (IEEE354 BUS)

Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Pomsky -Pygoscelis antarcticus - Phengodes Swarm algorithm (HPPP) are validated in Delta system (WDSTN) 220 KV (El-Ela *et al.*, 2019). Table 4 and Figure 6 and Figure 7 shows the assessment.

Table 4. Estimation of result 220 KV

Technique	GPS(MW)	VVT(PU)
ISO (Mouwafi <i>et al.</i> , 2022)	32.31400	0.580000
IRBA (Mouwafi <i>et al.</i> , 2022)	33.87500	0.632700
BRBA (Mouwafi <i>et al.</i> , 2022)	30.78600	0.675100
MPHO	27.12894	0.512385
HPPP	27.08998	0.512019

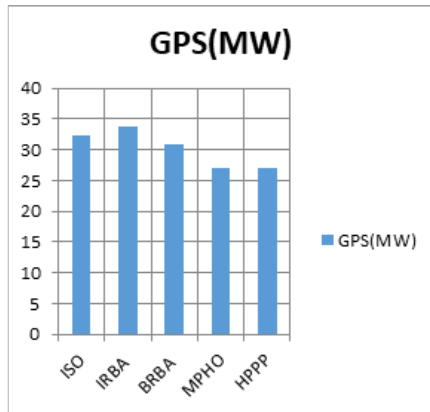


Figure 6. GPS (MW) appraisal (WDSEETN) 220 KV

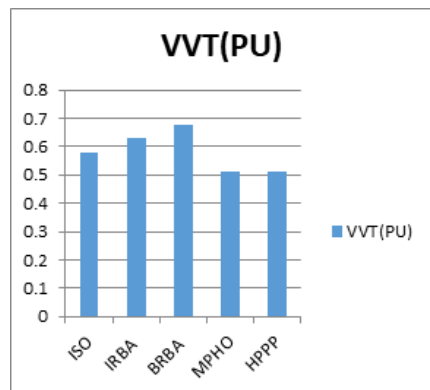


Figure 7. VVT (PU) appraisal (WDSTN) 220 KV

Table 5 and Figure 8 show the time taken by Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Pomsky -Pygoscelis antarcticus - Phengodes Swarm algorithm (HPPP)

Table 5. Time taken by MPHO, HPPP

Method	30 BUS T(S)	354 BUS T(S)	220KV T(S)
MPHO	15.21	71.84	16.87
HPPP	15.72	72.31	17.09

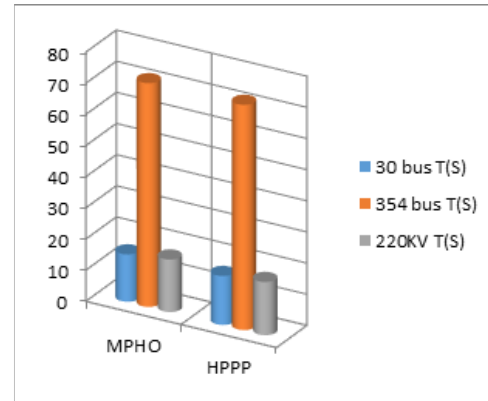


Figure 8. Time taken by MPHO, HPPP

Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Pomsky -Pygoscelis antarcticus - Phengodes Swarm algorithm (HPPP) are validated in IEEE 30, 354 bus systems and practical Delta system (WDSTN) 220 KV Egyptian grid network. In standard IEEE system as well as practical system proposed MPHO and HPPO algorithms performed very well in reducing the genuine power loss and minimized the voltage deviation. Tables 2, 3 and 4 shows the comparative analysis of the proposed MPHO and HPPP algorithms with other standard reported algorithms.

Conclusion

Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Pomsky -Pygoscelis antarcticus - Phengodes Swarm algorithm (HPPP) solved genuine power loss reduction problem proficiently. Investigation has been endeavored to evaluate as to which an individual physiognomies men and women frequently select assuming that there are financial restraints. Women were probable to categorize cleverness, and great income, as requirements; contrariwise for men, intelligence as well as physical attraction, as the uppermost primacies. Men and women will explore broadly to select the mate. Criteria of selecting the mate may be depend on social and Economic conditions, physical attractiveness, stable and intellectual deeds etc. This action is scientifically demarcated in the exploration section of the procedure. Mate preferences

grounded on various factors. In turn it may be short or long term relationships. In the Exploitation division, both men and women analyze about the conditions in intensified mode before making a final decision. Pomsky Optimization Algorithm has been framed grounded on the skilled movement of the Pomsky in examining process. Extraordinary snort possessed by Pomsky through which it can identify the various aromas and by level of barking will disclose about the intimacy near the examining entity. Sniffing attitude of the Pomsky is very commanding by that it will search in the examining zone and barking capacity will govern the appropriateness rate. In *Pygoscelis antarcticus* Optimization algorithm during foraging period *Pygoscelis antarcticus* moves in cluster or group. The atypical aspect for the period of foraging is clustering deeds. Consequently, the main objective is to discover an effective goer from the swarm in the scientific design. *Pygoscelis antarcticus* Optimization algorithm is designed to alter the position of every *Pygoscelis antarcticus* by means of the *Pygoscelis antarcticus* present location and swiftness. Phengodes Swarm Optimization Algorithm incorporated with the parallel hybrid mutation which unites the uniform distribution mutation with the Gaussian distribution mutation. In order to enhance the exploration and exploration rate to get the optimal solution Pomsky Optimization Algorithm, *Pygoscelis antarcticus* Optimization algorithm and Phengodes Swarm Optimization Algorithm are hybridized. In Hybridized Pomsky -*Pygoscelis antarcticus* - Phengodes Swarm (HPPP) algorithm, in the course of iterations, extraordinary degree of divergence will be there with orientation to amplification. Once the swiftness values are great, functions inspire *Pygoscelis antarcticus* to regulate their present locations and augment the exploring activity in the hybrid process. Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Pomsky - *Pygoscelis antarcticus* - Phengodes Swarm algorithm (HPPP) are validated in 23 Benchmarking functions, IEEE 30, 354 systems and Delta system (WDTN) 220 KV network. Genuine power loss reduction, voltage stability expansion and voltage deviation minimization

Future scope of work

In future proposed Mate Preferences in Human beings inspired Optimization (MPHO) Algorithm and Hybridized Pomsky -*Pygoscelis antarcticus* - Phengodes Swarm algorithm (HPPP) can be applied for diagnostic of cancer disease in the human beings.

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