

LAMPIRAN

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clc; clear; close all;

%%Input Function
User.Function = 'PIDfun';
User.NumbVars = 3;
User.RangeVars = [0,10];

%%PID Init
PID.LRange = [0.1,0.5];
PID.TRange = [0.1,2];

%%Fireflies Input
User.Fireflies = 3;
User.Iteration = 15;

%%Attraction Fireflies
User.Beta0 = 0.36;
User.Gamma = 1;
User.Alpa = 0.2;
User.m = 2;

%Damping Input
User.Damp = 0.99;

%%Initializing the Firefly Algorithm
InitFirefly.Position = [];
InitFirefly.Cost = [];
Firefly = repmat(InitFirefly,User.Fireflies,1);

BestFirefly.Cost = inf;
for i = 1:User.Fireflies
    L = unifrnd(PID.LRange(1),PID.LRange(2));
    T = unifrnd(PID.TRange(1),PID.TRange(2));
    KP = 1.2*(T/L);KI = (KP/(2*L));KD = (KP*(0.5*L));
    Firefly(i).Position =[KP,KI,KD];
    FireflyX = Firefly(i).Position;
    Firefly(i).Cost = feval(User.Function,FireflyX);
    if Firefly(i).Cost <= BestFirefly.Cost
        BestFirefly = Firefly(i);
    end
end
%%Main loop MFA
BestFireflyCost = zeros(User.Iteration,1);
for Iter = 1:User.Iteration
    NewFirefly = Firefly;
    for i = 1:User.Fireflies

        for j = 1:User.Fireflies
            if Firefly(j).Cost <= Firefly(i).Cost

                Distance = norm(Firefly(i).Position - Firefly(j).Position);

                Beta = User.Beta0*exp(-User.Gamma*Distance^User.m);

                e = unifrnd(-0.05*(User.RangeVars(2)-User.RangeVars(1))...
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        ,0.05*(User.RangeVars(2)-User.RangeVars(1)) ...
        , [1,User.NumbVars]);
NewE = e*exp(1-((10^-4)/(1.^((Iter-1)^2))) ...
        .^(1/User.Fireflies));

NewFirefly(i).Position = Firefly(i).Position...
        +Beta*(Firefly(j).Position-Firefly(i).Position)...
        +User.Alpa*NewE;

NewFirefly(i).Position = max(NewFirefly(i).Position...
        ,User.RangeVars(1));
NewFirefly(i).Position = min(NewFirefly(i).Position...
        ,User.RangeVars(2));

FireflyX = NewFirefly(i).Position;
NewFirefly(i).Cost = feval(User.Function...
        ,FireflyX);

if NewFirefly(i).Cost <= BestFirefly.Cost
    BestFirefly = NewFirefly(i);
end
end
end
end

Firefly = [NewFirefly
        Firefly
        BestFirefly];%#ok
[~,SortOrder] = sort([Firefly.Cost]);
Firefly = Firefly(SortOrder);
Firefly = Firefly(1:User.Fireflies);

User.Alpa = User.Alpa*User.Damp;

BestFireflyCost(Iter) = BestFirefly.Cost;
BestFirefly.Position = FireflyX;

disp(['Iteration',num2str(Iter)...
        ,':BestCost = ',num2str(BestFireflyCost(Iter))]);
end

figure;
%plot(P,'LineWidth',2);
%xlabel('Iteration')
%ylabel('Daya');
plot(BestFireflyCost,'LineWidth',2);
xlabel('Iteration')
ylabel('BestCost');

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Lampiran 1. Coding MFA-PID