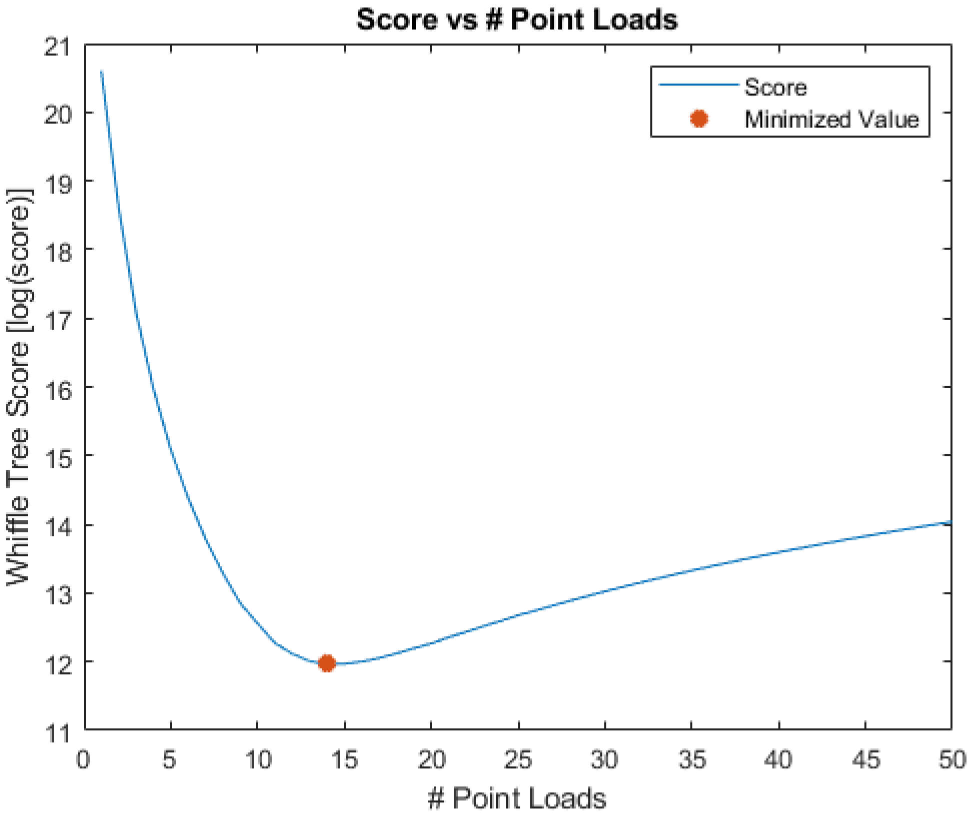
```
% moment_error(x,27.25,2001)
errors = loopWeight(2001,27.25);
plot((1:50),log(errors))
title("Score vs # Point Loads")
xlabel("# Point Loads")
ylabel("Whiffle Tree Score [log(score)]")
hold on
errorV = zeros(50,2);
for v = (1:50) % used to find the point load value for the minimum
 score
    errorV(v,1) = v;
    errorV(v,2) = errors(v);
end
location = errorV(errorV(:,2) == min(errors)); % calculation for point
 load value
plot(location,log(errors(location)),"*","LineWidth",4)
legend("Score","Minimized Value")
hold off
x = discretize_load(location,27.25,2001);
format shortG
```

Functions

```
function resForce = discretize_load(p,L,w) % using geometry to resolve
 the distributed load
    dx = L/p;
    for i = 1:p
        rectangle(i,2) = dx * 2001 * (1 - (dx*i)/L);
        triangle(i,2) = dx * .5 * (2001 - (2001 * (1 - (dx)/L)));
        resForce(i,2) = rectangle(i,2) + triangle(i,2);
        rectangle(i,1) = (dx * 2*i) / 2 - dx/2;
        triangle(i,1) = (dx * 2*i) / 2 - (2*dx)/3;
        resForce(i,1) = (rectangle(i,1) * rectangle(i,2) +
 triangle(i,1) * triangle(i,2)) / (rectangle(i,2) + triangle(i,2));
    end
end
function error = moment_error(matrix,L,w,point)
    holderMatrix = matrix(matrix(:,1) >= point,:); % look at all
 values above the point
    newMatrix = [holderMatrix(:,1) - point, holderMatrix(:,2)]; %
 create a matrix of those point forces
    Mpoint = 0;
    for d = 1:size(newMatrix,1)
        Mpoint = Mpoint + (newMatrix(d,1) * newMatrix(d,2)); % sum all
 force * lever arm (moments)
    end
    Mpoint;
    Mdist = (1/6) * (((-w / L) * point^3) + (3 * w * point^2) - (3 * w
 * point * L) + (w * L^2)); % Matt's equation for moment
    error = abs(Mpoint - Mdist); % absolute value of the difference is
 the error
end
function weight = loopWeight(w,L)
```

```
  % weightVec = zeros(1:50);
  for k = 1:50
    MSE = 0;
    f = discretize_load(k,L,w); % discretize the load with the
 current value of k
    for j = 1:100
      x = (L/100) * j;
      holder = moment_error(f,L,w,x); % pass that discretized
 load and the current value of x to find error
      MSE = MSE + holder^2; % sum the errors
    end
    C = 500 * k^2; % find the cost from the given equation
    weightVec(k) = C + (1/100) * MSE; % score is the combination
 of these
  end
  weight = weightVec;
end
```



Published with MATLAB® R2020a