

MATLAB Program for Energy of Some Graphs

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Abstract

In this paper we have investigated MATLAB program to find the energy of the some graphs. The energy of the graph $E(G)$ of G is the sum of absolute value of its eigen values. There are lots of research publication on energy of the graph, here we investigated the MATLAB program for finding energy of complete, pan, cycle path cycle and cyclic graphs for n values and we consider example of all the graph for $n \geq 10$.

Keywords: MATLAB program, energy graph, complete, pan, cycle path cycle, cyclic graph .

AMS Subject Classification: 05C50.

INTRODUCTION

Throughout this paper we consider simple, finite and undirected graphs, for standard terminology and notation we follow Balakrishnan and Ranganathan [2]. In 1978 Gutman [3] defined the energy of a graph G as the sum of absolute values of the eigen value of graph G and denoted it by $E(G)$ i.e., $E(G) = \sum_{i=1}^n |\lambda_i|$.

Here we have investigated the MATLAB program for finding the energy of some simple graph in generalized form. With the help of these programs, we can achieve the result for any value of n .

ALGORITHMS

Algorithm 2.1: To generate the MATLAB program for finding the energy of complete graph for $n \geq 3$.

Open Matlab Editor window and write the following program and save the program, here we save as completegraph. To run the program completegraph(n), we will get our Complete graph K_n and achieve the energy of K_n . The program is as follows:

```
function[Energy] = completegraph(n)
```

```
% To write the program to find the energy of complete graph.
```

```
% 'A' is the adjacency matrix of complete graph.
```

```
% 'K' is the eigen value of the graph.
```

```
% 'E' is the energy of the graph.
```

```
A = ones(n) - eye(n);
```

```
G = graph(A);
```

```
K = eig(A);
```

```
E = sum(abs(K))
```

```
plot(G)
```

```
title(['Complete graph for n = ' num2str(n)]) gtext(['Energy = ' num2str(E)])
```

To illustrate above program see below example. In command window write completegraph(23), then press enter, the output will be E=44.

To illustrate above program see following example. In command window write pangraph(30), then press enter, the output will be E=37.9670.

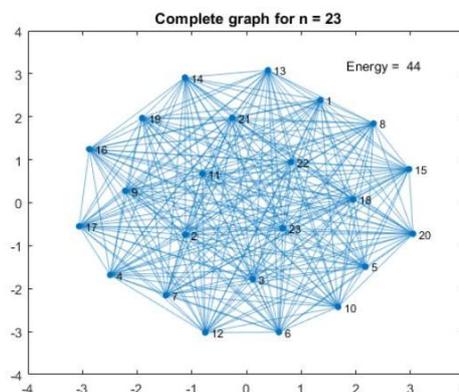


Figure 1: Complete graph K_{23}

Algorithm 2.2: To generate the MATLAB program for finding the energy of Pan graph.

Open MATLAB Editor window and write the following program and save the program, here we save as pangraph. To run the program pangraph(*n*) we will get our Pan graph and achieve the energy of pan graph for *n*. The program is as follows:

```
function[Energy] = pangraph(n)
% To write the program to find the energy of pan graph.
% v be the number of vertices.
% e be the number of edges.
% 'A' will give you Adjacency Matrix.
% 'K' will give eigen values.
% 'E' results energy of the graph.
v = [1 : n];
e = [2 : n, 2];
G = graph(v, e);
A = adjacency(G);
B = full(A);
K = eig(B);
E = sum(abs(K))
plot(G)
title(['Pan graph for n = ' num2str(n)]) gtext(['Energy = '
num2str(E)])
```

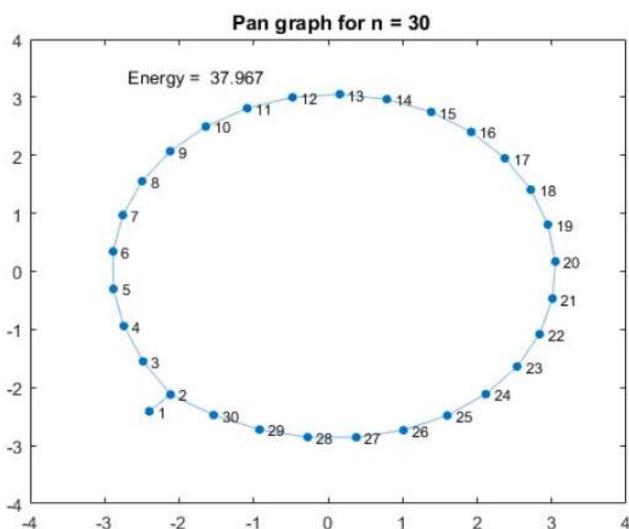


Figure 2: pan graph n = 30

Algorithm 2.3: To generate the MATLAB program for finding the energy of Cycle Path Cycle graph.

Open MATLAB Editor window and write the following program and save the program, here we save as cyclepathcycle. To run the program cyclepathcycle(*n*) we will get our cycle path cycle graph and achieve the energy of cycle path cycle graph for *n*. The program is as follows:

```
function[Energy] = cyclepathcycle(n)
% To write the program to find the energy of cycle path cycle graph.
% v be the number of vertices.
% e be the number of edges.
% 'A' will give you Adjacency Matrix.
% 'K' will give you eigen Values.
% 'E' results energy of the graph.
v = [1 : 2*n];
e = [2 : n, 1, n + 2 : 2* n, n + 1];
G = graph(v,e);
I = addedge(G, n, n + 1);
A = adjacency(I);
B = full(A);
K = eig(B);
E = sum(abs(K)) plot(I)
title(['Cycle Path Cycle graph for n = ' num2str(n)])
gtext(['Energy = ' num2str(E)])
```

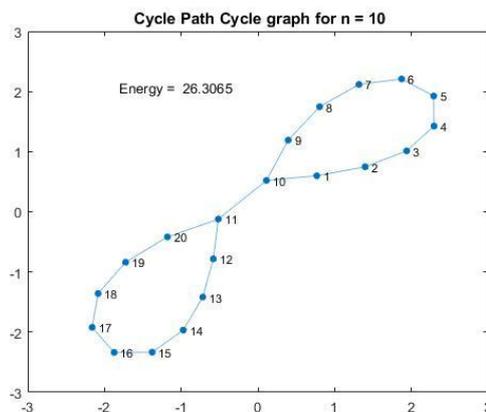


Figure 3: Cycle path cycle graph n = 10

To illustrate above program see following example. In command window write *cyclepathcycle(10)*, then press enter, the output will be *E=26.3065*.

```
% 'K' will give Eigen values.
% 'E' results Energy of the graph.
v = [1 : 2* n];
e = [2 : n, 1,n + 2 : 2 *n,n];
G = graph(v, e);
I = addedge(G, n,n + 1);
A = adjacency(I);
B = full(A);
K = eig(B);
E = sum(abs(K))
plot(I)
title(['Cyclic graph for n =' num2str(n)]) gtext('Energy = '
num2str(E))
```

To illustrate above program see following example. In command window write `cyclicgraph(12)`, then press enter, the output will be `E=30.7616`.

Algorithm 2.4: To generate the MATLAB program for finding the energy of cyclic graph.

Open MATLAB Editor window and write the following program and save the program, here we save as

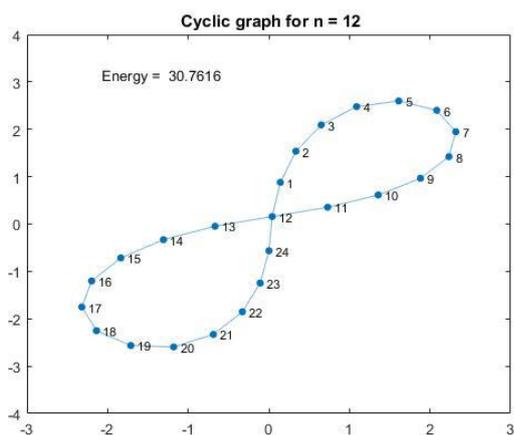


Figure 4: Cyclic graph $n = 12$ as `cyclicgraph`. To run the program `cyclicgraph(n)`.

we will get our cyclic graph and achieve the energy of cyclic graph for n . The program is as follows:

```
function[Energy] = cyclicgraph(n)
% To write the program to find the energy of cyclic graph.
% 'v' be the number of vertices.
```

```
% 'e' be the number of edges.
% 'A' will give you Adjacency Matrix.
```

CONCLUSION

The programs provide here to find the energy of the graph is very easy task for any big value of n , manually which is unmanageable. The energy of many graph is known, to investigate the similar program, is the open research area.

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