

Steps to Generate an Undirected Graph Represented by Adjacency Matrix

- Generated a C program.
- Found the number of edges and degrees for **n=1000,2000,3000,4000 and 5000**.
- Using **MATLAB** to draw a graph of computational time vs n and found an approximate time complexity as a function of **n**.
- Theoretically determined the computational time complexity.
- Compared the theoretical and the practical time complexity.

Results

<pre>The Number of Total Degrees is: 499468 The Number of Total Edges is: 249734 The Number of Edges is=(Summation of Total Degree/2)=(499468/2)=249734 According to the Handshaking Theorem, Every edge produces 2 degrees. Therefore Handshaking Theorem is Proved Execution time : 51040.000000 ms Process returned 0 (0x0) execution time : 58.764 s Press any key to continue.</pre>	<pre>The Number of Total Degrees is: 1999998 The Number of Total Edges is: 999999 The Number of Edges is=(Summation of Total Degree/2)=(1999998/2)=999999 According to the Handshaking Theorem, Every edge produces 2 degrees. Therefore Handshaking Theorem is Proved Execution time : 191337.000000 ms Process returned 0 (0x0) execution time : 195.537 s Press any key to continue.</pre>
n=1000	n=2000

```

The Number of Total Degrees is: 4498964

The Number of Total Edges is: 2249482

The Number of Edges is=(Summation of Total Degree/2)=(4498964/2)=2249482

According to the Handshaking Theorem, Every edge produces 2 degrees.

Therefore Handshaking Theorem is Proved

Execution time : 437720.000000 ms

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n= 3000

```

The Number of Total Degrees is: 7998462

The Number of Total Edges is: 3999231

The Number of Edges is=(Summation of Degree/2)=(7998462/2)=3999231

According to the Handshaking Theorem, Every edge produces 2 degrees.

Therefore Handshaking Theorem is Proved

Execution time : 664952.000000 ms

Process returned 0 (0x0)  execution time : 668.285 s
Press any key to continue.

```

n=4000

```

The Number of Total Degrees is: 12498074

The Number of Total Edges is: 6249037

The Number of Edges is=(Summation of Total Degree/2)=(12498074/2)=6249037

According to the Handshaking Theorem, Every edge produces 2 degrees.

Therefore Handshaking Theorem is Proved

Execution time : 1145153.000000 ms

Process returned 0 (0x0)  execution time : 1159.805 s
Press any key to continue.

```

n=5000

Data table for the graph

Vertices	1000	2000	3000	4000	5000
Time(ms)	0.05×10^6	0.19×10^6	0.4×10^6	0.6×10^6	1.1×10^6

Procedure of Generating Graph

```

>> x=[1000 2000 3000 4000 5000];
>> y=[0.05 0.2 0.4 0.6 1.1];
>> plot(x,y)
>>
>> title('graph');
>>
>> xlabel('vertices');
>> ylabel('time');
>>

```

Graph

