

Assignment - 2

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A. Write a Python program to load and read a binary dataset from a CSV file and draw the corresponding graph considering the dataset as an adjacency matrix.

This part of the code reads a CSV file containing a binary adjacency matrix and visualizes it as an unweighted graph.

Objective: To load a binary dataset from a CSV file and draw the corresponding graph.

Steps:

- **Load Data:** The script reads the CSV file into a data table using the **pandas** library.

```
binary_csv_path = "soham_binary.csv"

binary_df = pd.read_csv(binary_csv_path, header=None)
```

- **Create Matrix:** This table is converted into a standard numerical matrix.

```
binary_adj_matrix = binary_df.values
```

- **Build Graph:** The **networkx** library interprets the matrix, creating a node for each row and connecting nodes where a '1' is present.

```
G_binary = nx.from_numpy_array(binary_adj_matrix)
```

- **Visualize:** **matplotlib** draws the final network, showing all the nodes and their connections.

```
plt.figure(figsize=(6, 6))

nx.draw(G_binary, with_labels=True, node_color='lightgreen',
node_size=800, font_size=10)
```

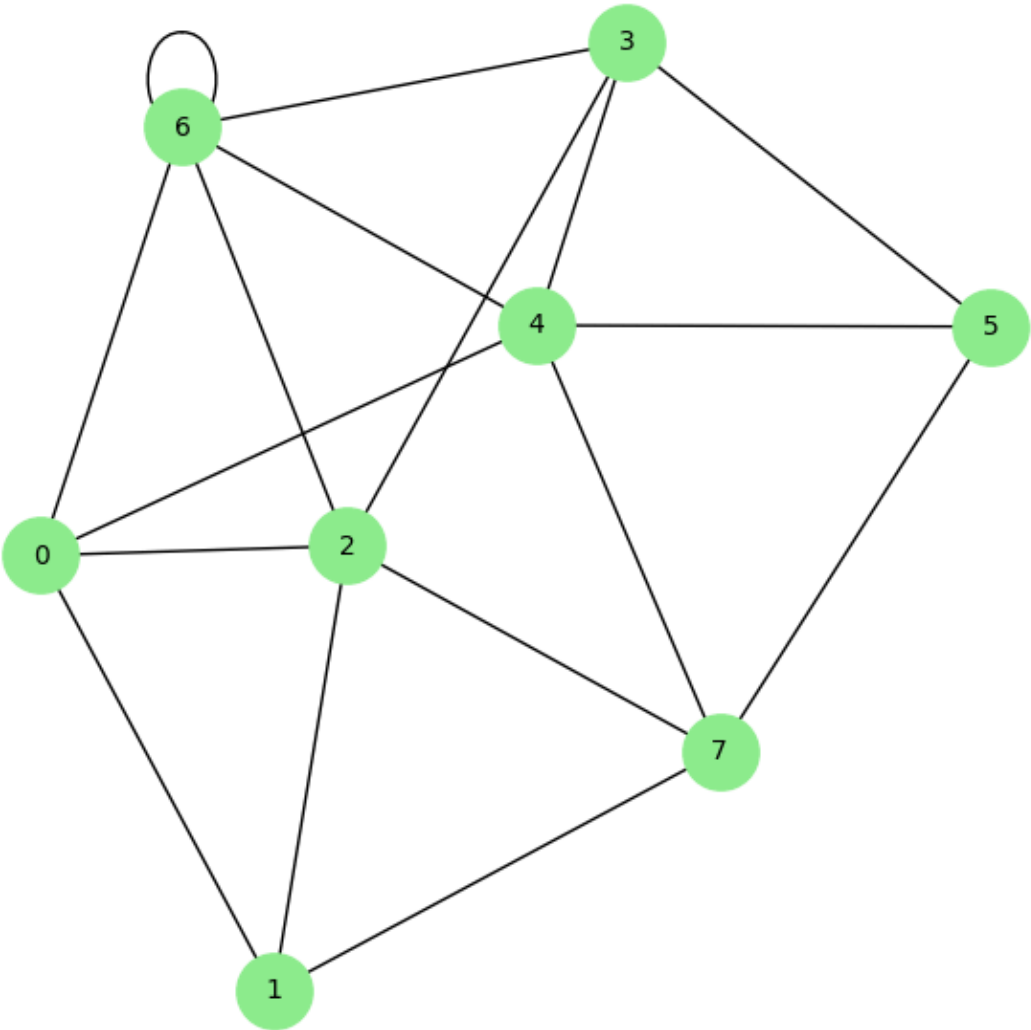
```
plt.title("Graph from Binary Adjacency Matrix")  
  
plt.show()  
  
print(binary_adj_matrix)
```

Input: **soham_binary.csv**

0	1	1	0	1	0	1	0
1	0	1	0	0	0	0	1
1	0	0	0	0	0	1	1
0	0	1	0	1	0	1	0
1	0	0	0	0	1	1	1
0	0	0	1	0	0	0	1
1	0	0	0	0	0	1	0
0	0	1	0	1	0	0	0

Output Graph

Graph from Binary Adjacency Matrix



B. Write a Python program to load and read a numerical dataset from a CSV file and draw the corresponding graph considering the dataset as an adjacency matrix.

This part of the code reads a CSV file containing a numerical adjacency matrix and visualizing it as a weighted graph, where edge labels represent the weights.

Objective: To load a numerical dataset from a CSV file and draw the corresponding weighted graph.

Steps:

- **Load Data:** The script reads the numerical CSV file into a data table using **pandas**.

```
numerical_csv_path = "soham_numeric.csv"

numerical_df = pd.read_csv(numerical_csv_path, header=None)
```

- **Create Matrix:** The table is converted into a numerical matrix.

```
numerical_adj_matrix = numerical_df.values
```

- **Build Weighted Graph:** **networkx** builds a graph, treating non-zero values as connections and storing them as edge 'weights'.

```
G_numerical = nx.from_numpy_array(numerical_adj_matrix)
```

- **Visualize & Label:** **matplotlib** draws the network and adds the stored 'weight' values as labels on each connection line.

```
plt.figure(figsize=(6, 6))

pos = nx.spring_layout(G_numerical)

nx.draw(G_numerical, pos, with_labels=True, node_color='lightgreen',
node_size=800, font_size=10)

edge_labels = nx.get_edge_attributes(G_numerical, 'weight')

nx.draw_networkx_edge_labels(G_numerical, pos,
edge_labels=edge_labels)

plt.title("Weighted Graph from Numerical Adjacency Matrix")
```

```
plt.show()
```

Input: **soham_numeric.csv**

0 5 0 0 0 0 0 1

5 0 0 0 2 0 0 0

0 0 0 0 4 0 4 3

0 3 8 0 0 0 0 0

0 0 3 0 1 0 0 0

5 0 0 9 0 0 7 0

0 3 5 0 0 0 0 6

1 0 0 0 5 0 0 0

Output Graph

Weighted Graph from Numerical Adjacency Matrix

