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Graphs associated with some semigraphs

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Abstract: In this paper, the well known concept of semigraph in graph theory has been discussed. Given a semigraph, we construct graphs like end vertex graph S_e, adjacency graph S_a, consecutive adjacency graph S_{ca}, and one end vertex graph S_{1e}.

Keywords: Semigraph, End vertex graph S_e, Adjacency graph S_a, Consecutive adjacency graph S_{ca} and One end vertex graph S_{1e}.

I. INTRODUCTION

The notion of the semigraph is a new concept introduced by sampatkumar [12], generalizing the concept of a graph. Semigraph resembles graph when drawn on a plane and every concept/results in graph can be easily generalized yielding a rich variety of corresponding results. Road networks, Projective geometry, Steiner's triple systems are the some examples of semigraphs. Many authours [1,5,10,13,14] have studied properties of semigraph.

II. PRELIMINARIES

Definition 2.1

A ***semigraph*** S is a pair (V, X) where V is a nonempty set whose elements are called vertices of S, and X is a set of ordered n-tuples, called edges of S, of distinct vertices, for various $n\geq2$, satisfying the following conditions:

SG1: Any two edges have atmost one vertex in common.

SG2: Two edges $E_1=(u_1 ,u_2 ,\ldots u_m)$ and $E_2=(v_1,v_2,\ldots v_n)$ are considered to be equal if and only if

1. m=n
2. Either $u_i=v_i$ for $1\leq i\leq n$ or $u_i=v_{n-i+1}$ for $1\leq i\leq n$.

Thus the edge $(u_1, u_2, {}_su_3\ldots u_m)$ is the same as $(u_m, u_{m-1},\ldots u_m)$. u_1 and u_m are said to be the end vertices of the edge E_1 while $u_2, u_3, \ldots u_{m-1}$ are said to be the middle vertices of E_1.

Graphs associated with a given semigraph.

Let S=(V,X) be a given semigraph. Following are the four graphs associated with S, each having the same vertex set as that of S.

a) End vertex graph S_e:

Two vertices in S_e are adjacent if they are the end vertices of an edge in S.

b) Adjacency graph S_a:

Two vertices in S_a are adjacent if they are adjacent in S.

c) Consecutive adjacency graph S_{ca}:

Two vertices in S_{ca} are adjacent if they are the consecutively adjacent in S.

d) One end vertex graph S_{1e}:

Two vertices in S_{1e} are adjacent if one of them is an end vertex in S of an edge containing the two vertices.

Example:

Let S=(V, X) be a semigraph where V={1,2,3,4,5,6,7}and X={(1,2,3),(2,6),(3,4),(4,5,6,7)}. In S, 1,3,4,7 are end vertices, 5 is middle vertex and 2, 6 are middle-end vertices. The vertex 2 is middle vertex in (1,2,3) and end vertex in (2,6). The vertex 6 is middlevertex in the edge(4,5,6,7) and end vertex in (2,6). Hence the edge (2,6) is joined by an edge with a small tangent drawn to the circle at vertex 2 and 6.

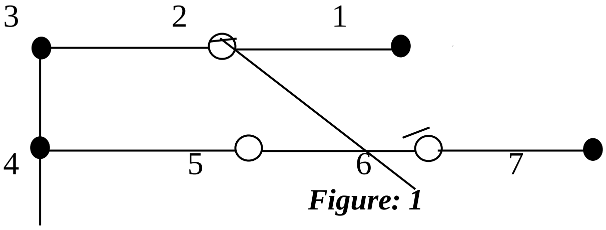
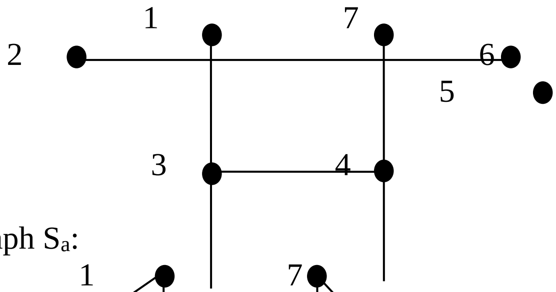


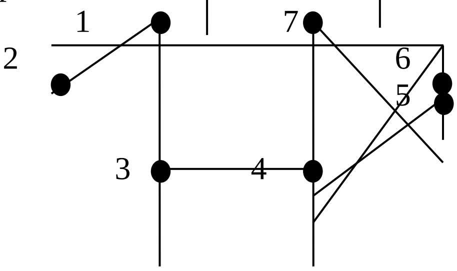
Figure: 1

The various graph associated with the semigraph.

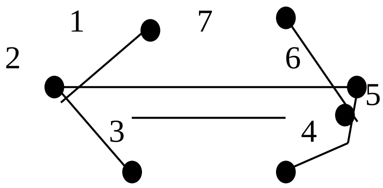
a). End vertex graph S_e:



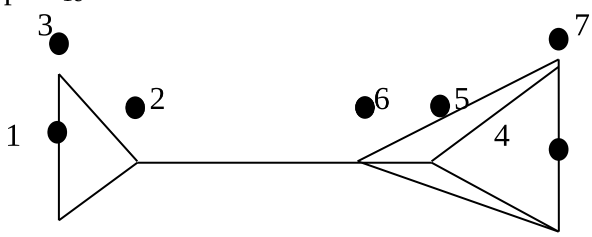
b) Adjacency graph S_a:



c) Consecutive adjacency graph S_{ca}:

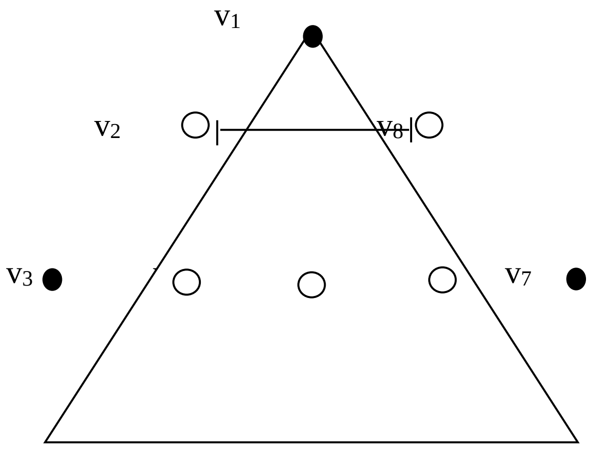


d) One end vertex graph S_{1e}:



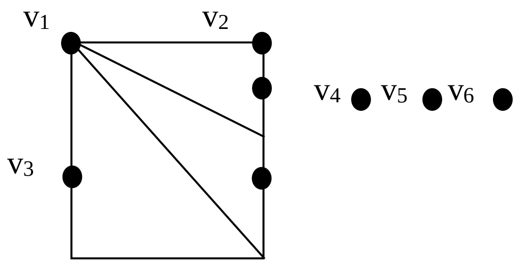
Problem: 1

A semigraph, where the vertices v_1, v_3, v_7 are end vertices v_4, v_5, v_6 are the middle vertices $v_{2,} v_8$ are middle-end vertices.

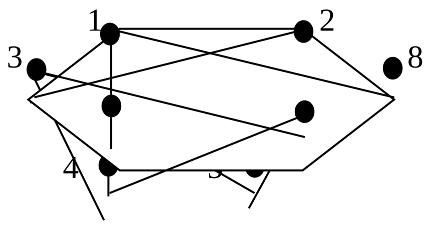


Solution:

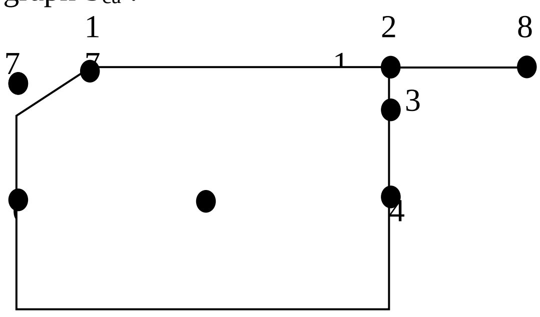
a) End vertex graph S_e:



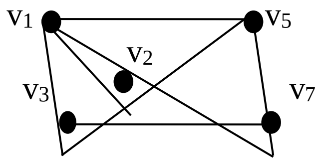
b) Adjacency graph S_a:



c) Consecutive adjacency graph S_{ca} :



d) One end vertex graph S_{1e}:



Problem: 2

Let G=(V,X) be a semigraph where V={$v_1,v_2,v_3,v_4,v_5,v_6,v_7$} and X={($v_1,v_2,v_3$),($v_1,v_4,v_5$),($v_3,v_6$),($v_5,v_6,v_7$)} as shown in the figure: 3 given below

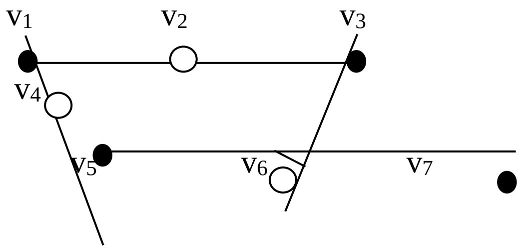
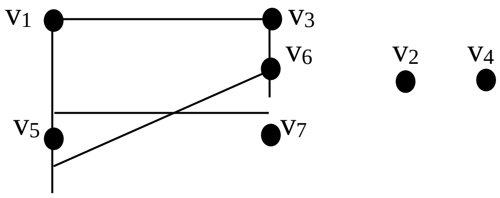
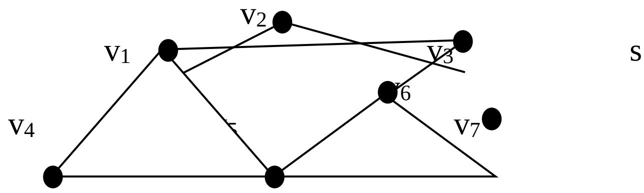


Figure: 3

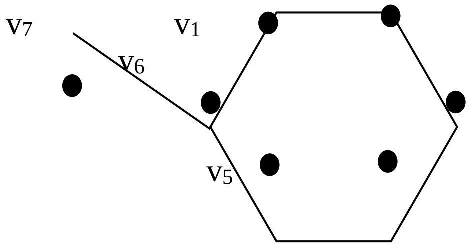
a) End vertex graph S_e:



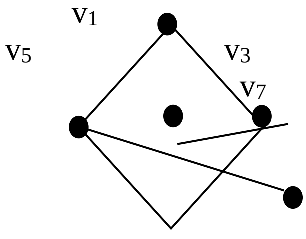
b) Adjacency graph S_e:



c) Consecutive adjacency graph S_{ca}:



d) One end vertex graph S_{1e}:



III. CONCLUSION

In this paper, we constructed End vertex graph S_e, Adjacency graph S_a, Consecutive adjacency graph S_{ca} and One end vertex graph S_{1e} from semigraphs. From this above graph we construct the bipartite graphs for further research.

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