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Set And Its Operations

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Abstract

The kind of set which is based on edges, is introduced. The analysis on this set is done in the matter of operation which are the classes of graphs. The general notion which is related to this concept, is up. The set of edges is seen in the matter of common vertex, entitled neighbor edges and the set of edges which has specific condition on the vertices of graphs, entitled ghost set. The kind of viewpoint when the edges are up so the kind of efforts to assign some notions which get the sensible result of edges which make sense about these two types of notions. Notions of having some attributes about vertices concerning edges and edges' attributes to get result about edges in the matter of vertices.

Keywords: Set, Ghost Set, Edge, Neighbor Edges.
AMS Subject Classification: 05C17, 05C22, 05E45, 05E14

1 Outline Of The Background

I'm going to refer to some books which are cited to the necessary and sufficient material which are covering the introduction and the preliminary of this outlet so look [**Ref.** [1], **Ref.** [2], **Ref.** [3], **Ref.** [4]] where **Ref.** [1] is about the textbook, **Ref.** [2] is common, **Ref.** [3] has good ideas and **Ref.** [4] is kind of disciplinary approaches in the good ways. Further references could be referred and could be addressed in **Refs.** [5–11].

2 Definition And Its Clarification

Definition 2.1. Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. A set $\mathcal{B} \subseteq \mathcal{E}$ is **GHOST SET** if for any of vertex, there's the edge belongs to $\mathcal{B}$, which the vertex is one of its endpoint.

3 Relationships And Its illustrations

Theorem 3.1. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. Then $\mathcal{E}$ is **GHOST SET**.*

Theorem 3.2. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. If $\mathcal{B}$ is **GHOST SET**, then $\mathcal{A} \subseteq \mathcal{B}$ is **GHOST SET**.*

Theorem 3.3. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. If $\mathcal{A}, \mathcal{B}$ is **GHOST SET**, then $\mathcal{A} \cup \mathcal{B}$ is **GHOST SET**.*

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Theorem 3.4. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a complete graph. Then the set of vertex's all edges is **GHOST SET**.*

Theorem 3.5. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a complete bipartite graph. Then the set of vertex's all edges belongs to every part, is **GHOST SET**.*

Theorem 3.6. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a complete multipartite graph. Then the set of vertex's all edges belongs to every part, is **GHOST SET**.*

Theorem 3.7. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be graph. If $\delta = \Delta = n - 1$, then the set of vertex's all edges, is **GHOST SET**.*

Theorem 3.8. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a path graph. Then the set of non-neighbor edges, is **GHOST SET**.*

Theorem 3.9. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a cycle graph. Then the set of non-neighbor edges, is **GHOST SET**.*

4 Results And Its Beyond

Definition 4.1. Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. Edges belong to **GHOST SET** are **NEIGHBOR EDGES**.

Theorem 4.2. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. If degree of a vertex is Δ, then there's Δ number of **NEIGHBOR EDGES**.*

Theorem 4.3. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be an even path graph. Then there's $\frac{n}{2}$ number of **NEIGHBOR EDGES**.*

Theorem 4.4. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be an odd path graph. Then there's $\frac{n-1}{2}$ number of **NEIGHBOR EDGES**.*

Theorem 4.5. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be an even cycle graph. Then there's $\frac{n}{2}$ number of **NEIGHBOR EDGES**.*

Theorem 4.6. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be an odd cycle graph. Then there's $\frac{n-1}{2}$ number of **NEIGHBOR EDGES**.*

Theorem 4.7. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a wheel graph. Then there's Δ number of **NEIGHBOR EDGES** and **GHOST SET** has Δ elements.*

Theorem 4.8. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a star graph. Then there's only Δ number of **NEIGHBOR EDGES** and **GHOST SET** has Δ elements.*

Theorem 4.9. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a star graph. Then there's only $n - 1$ number of **NEIGHBOR EDGES** and **GHOST SET** has $n - 1$ elements.*

Theorem 4.10. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a complete graph. Then for any vertex, there's only $\Delta = n - 1$ number of **NEIGHBOR EDGES** and **GHOST SET** has $\Delta = n - 1$ elements.*

Theorem 4.11. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. for any vertex, there's only $\Delta = n - 1$ number of **NEIGHBOR EDGES** and **GHOST SET** has $\Delta = n - 1$ elements if and only if it's complete.*

Theorem 4.12. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. For any vertex, there's only $\Delta = n - 1$ number of **NEIGHBOR EDGES** and there's only one **GHOST SET** has $\Delta = n - 1$ elements if and only if it's star.*

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Theorem 4.13. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a Peterson graph. For any vertex, there's only* 3 *number of* ***NEIGHBOR EDGES*** *and there's* ***GHOST SET*** *has* $\Delta = 10$.

Theorem 4.14. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. Then For any vertex, number of* ***NEIGHBOR EDGES*** $\leq n-1$ *and there's* ***GHOST SET****'s element is* $\leq \frac{n}{2}$.

Theorem 4.15. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. If* ***GHOST SET****'s element is* $\frac{n}{2}$, *then there's matching.*

Theorem 4.16. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. If* ***GHOST SET****'s element is* $\frac{n}{2}$, *then there's embedding ladder graph.*

Theorem 4.17. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. If* ***GHOST SET****'s element is* $\frac{n}{2}$, *then there's* $\frac{n}{2}$ *numbers of path graph with 2 vertices and one edge.*

Theorem 4.18. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. If* ***GHOST SET****'s element is* $n-1$, *then it's star.*

Theorem 4.19. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. If* ***GHOST SET****'s element is* $n-1$, *then it's complete.*

Theorem 4.20. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. If* ***GHOST SET****'s element is* $n-1$, *then it's wheel.*

Theorem 4.21. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. If $\mathcal{A} \cap \mathcal{B}$ is* ***GHOST SET****, then $\mathcal{A}, \mathcal{B}$ are* ***GHOST SET****.*

Theorem 4.22. *Let $\mathcal{G} = (\mathcal{V}, \mathcal{E})$ be a graph. If $\mathcal{A} - \mathcal{B}$ is* ***GHOST SET****, then $\mathcal{A}$ is* ***GHOST SET****.*

References

1. R. Balakrishnan, K. Ranganathan, **A Textbook of Graph Theory**, New York, 2012.
2. Adrian Bondy, U.S.R Murty, **Graph Theory**, New York, 2008.
3. Michael Capobianco, and John C. Molluzzo, **Examples and counterexamples in graph theory**, New York, 1978.
4. Chris Godsil, and Gordon Royle, **Algebraic Graph Theory**, New York, 2001.
5. Henry Garrett, **Big Sets Of Vertices**, Preprints 2021, 2021060189 (doi: 10.20944/preprints202106.0189.v1).
6. Henry Garrett, **Locating And Location Number**, Preprints 2021, 2021060206 (doi: 10.20944/preprints202106.0206.v1).
7. Henry Garrett, **Metric Dimensions Of Graphs**, Preprints 2021, 2021060392 (doi: 10.20944/preprints202106.0392.v1).
8. Henry Garrett, **New Graph Of Graph**, Preprints 2021, 2021060323 (doi: 10.20944/preprints202106.0323.v1).
9. Henry Garrett, **Numbers Based On Edges**, Preprints 2021, 2021060315 (doi: 10.20944/preprints202106.0315.v1).
10. Henry Garrett, **Matroid And Its Outlines**, Preprints 2021, 2021060146 (doi: 10.20944/preprints202106.0146.v1).
11. Henry Garrett, **Matroid And Its Relations**, Preprints 2021, 2021060080 (doi: 10.20944/preprints202106.0080.v1).