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# Learning graphs and 1-uniform dcsl graphs

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A distance compatible set labeling (dcsl) of a connected graph $G$ is an injective set assignment $f : V(G) \rightarrow 2^X$, $X$ being a non-empty ground set, such that the corresponding induced function $f^\oplus : E(G) \rightarrow 2^X \setminus \{\phi\}$ given by $f^\oplus(uv) = f(u) \oplus f(v)$ satisfies $|f^\oplus(uv)| = k^f_{(u,v)} d_G(u,v)$ for every pair of distinct vertices $u, v \in V(G)$, where $d_G(u,v)$ denotes the path distance between $u$ and $v$ and $k^f_{(u,v)}$ is a constant, not necessarily an integer, depending on the pair of vertices $u, v$ chosen. A dcsl $f$ of $G$ is $k$-uniform if all the constants of proportionality with respect to $f$ are equal to $k$, and if $G$ admits such a dcsl then $G$ is called a $k$-uniform dcsl graph. The family $\mathcal{F}$ is well-graded family, if there is a tight path between any two of its distinct sets. A learning graph is an $\mathcal{F}$-induced graph of a learning space. In this paper, we initiate a study on subgraphs of 1-uniform graphs which lead to the study of Knowledge Structures, Learning Spaces and Union-closed conjecture using graph theory techniques.

*Keywords*: dcsl graphs; 1-uniform dcsl graphs; wg-family of sets; learning graphs.

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## 1. Introduction

Acharya [1] introduced the notion of vertex set valuation as a set analogue of number valuation. For a graph $G = (V, E)$ and a non-empty set $X$, Acharya defined a set valuation of $G$ as an injective set valued function $f : V(G) \rightarrow 2^X$, and he defined a set-indexer as a set valuation such that the function $f^\oplus : E(G) \rightarrow 2^X \setminus \{\phi\}$ given by $f^\oplus(uv) = f(u) \oplus f(v)$ for every $uv \in E(G)$ is also injective, where $2^X$ is the set of all the subsets of $X$ and $\oplus$ is the binary operation of taking the symmetric difference of subsets of $X$.

Acharya and Germina, who has been studying topological set valuation, introduced the particular kind of set valuation for which a metric, especially the