Discrete Mathematics, Algorithms and Applications
Vol. 9, No. 4 (2017) 1750046 (9 pages)

DOI: 10.1142/S179383091750046X

World Scientific
www.worldscientific.com

Learning graphs and 1-uniform dcsl graphs

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Received 21 March 2016
Revised 7 February 2017
Accepted 19 June 2017
Published 27 July 2017

A distance compatible set labeling (dcsl) of a connected graph G is an injective set assignment $f : V(G) \to 2^X$, X being a non-empty ground set, such that the corresponding induced function $f^{\oplus} : E(G) \to 2^X \setminus \{\phi\}$ 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.

Mathematics Subject Classification 2010: 05C22

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 $f : V(G) \to 2^X$, and he defined a set-indexer as a set valuation such that the function $f^{\oplus} : E(G) \to 2^X \setminus \{\phi\}$ 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