

Functions on discrete spaces - A note on Dirichlet, Poisson and Neumann problems on infinite graphs

Amulya Smyrna C.¹ and Nathiya N¹

¹Vellore Institute of Technology

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Abstract

By a discrete space , we mean here a collection of finite or a countable infinite number of vertices which has a graph structure provided by a set of edges (finite or countable infinite in number). In many cases, the varying graph structures (connectivity type problems) are themselves very interesting and important. However, there are some important examples where the study of the intricate role of functions on is essential (example: potential functions, effective resistance, Kirchhoff problem in electrical networks; and escape probability, Dirichlet functions, hitting time in random walks). In this survey article we review a part of the function theory developed by some researchers in this field and present a cohesive narrative. We have placed special emphasis on different discrete versions of the Dirichlet problem, the Neumann problem and the Poisson equation.

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