

DMS Faculty Make Progress on Million Dollar Problem

Given a list of cities and the distances between each pair of cities, what is the shortest path that visits each city exactly once and returns to its starting point? This is the famous “travelling salesman” problem, a seemingly simple problem in graph theory that remains unsolved to this day. Due to its obvious application to shipping industries worldwide, the Clay Mathematics Institute has offered a \$1 Million prize to anyone who can crack the puzzle.

While DMS Faculty members Dr. Ranjan Naik Dr. Jawahar Pathak have not found a complete solution, they have proven two new theorems in the field of Graph Theory that make progress towards solving this famous puzzle.

Graph theory is the abstract study of nodes and connections (called vertices and edges), which can be used to represent computer networks, friend clusters, or in this case, locations and roads. In this field of study, mathematics call a path that hits every cluster once a “Hamiltonian” path. Since this is the first requirement in the travelling salesman problem, understanding Hamiltonian paths is a key component in claiming this elusive \$1 million prize.

Supported by a Faculty Development Grant, our two professors found two new ways to identify Hamiltonian paths when the number of cities involved is prime. Since all numbers are built out of prime numbers, there is a good chance these results can be expanded to find new Hamiltonian paths for any collection of cities.

Congratulations to Drs. Naik and Pathak for their progress in this field. It is knowledge like this that helps our economy run more efficiently. The department would also like to thank the Office of Faculty Affairs for awarding the grant that supported this research.



Dr. Ranjan Naik



Dr. Jawahar Pathak