

# Quantum GIS Based Optimal Evacuation Route Identification During Flood Disaster

Dr. R.D. Garg<sup>1</sup>, Dr. D.S. Arya<sup>1</sup>, Dr. S.P. Aggarwal<sup>2</sup> and Anurag Aeron<sup>1</sup>  
IIT Roorkee<sup>1</sup> and IIRS, Dehradun<sup>2</sup>

[rdgarg@gmail.com](mailto:rdgarg@gmail.com), [dsarya@gmail.com](mailto:dsarya@gmail.com), [spa@iirs.gov.in](mailto:spa@iirs.gov.in), [anuragaeron@gmail.com](mailto:anuragaeron@gmail.com)

**Abstract:** This paper presents an improved evacuation route method during flood disaster. It first constructs a weighted parameter model by considering road quality and environmental factors. Cost of road quality factor is based on road length, road width and road condition. Cost of environmental factor consists of traversal speed, safe zones, water depth and safe zone density. These parameters are given as input to the analytical hierarchy process (AHP) for building the weighted model based on the minimum time consumption with safety. Then using the Dijkstra's algorithm, calculate the most suitable path for safe and speedy evacuation. In a flood scenario the shortest path is not always the best path for rescue operation. The water depth and the availability of high altitude building or area are the most important factors for immediate rescue. Path around the outskirts of urban areas can have low vehicle flow rate, compare to highways. So the optimal path is not the shortest path. This method finds the lowest impedance on path based on various factors which are important during flood. This method was applied on Kendrapara roads. The results are found according to the criteria involved. Experiments are carried out on some example data and it produces the optimal evacuation path during the flood. Future research will be focus on more realistic factors to develop more accurate models and to achieve high quality results. More widely experiments can help to verify the accuracy and applicability of the method for the flood scenario. The primary objective of this research is to develop a web based spatial Geographic Information Systems (GIS) application, which would help people to find the optimal evacuation route during flood. People who live in flood plains, can locate the point at higher altitude and less vulnerable to the flood water. The prime outcome of this research is a web based GIS system that can provide appropriate information to the public and local authorities. The timely and easy to understand information will help flood managers and emergency services to take appropriate decision at right time. The user friendly interface is developed in open source software. It provides an easy way to query so a non-GIS person can also view and explore its maps and results and can understand it in detail. Future work will focus on real time disaster conditions, to achieve more reliable results from online web GIS which will be more effective in emergency situations

**Keywords:** AHP, Flood, Disaster, Optimal path, QGIS.