PREFACE

The state of Uttarakhand in northern India, characterized by its diverse topography ranging from the towering Himalayas to the fertile plains, has long been prone to natural disasters, particularly floods. These recurrent floods pose significant threats to life, infrastructure, and the economy, necessitating effective management strategies. This paper, "Flood Susceptibility Mapping of Uttarakhand Using Machine Learning Algorithms," aims to address this critical issue by leveraging the advancements in machine learning to create accurate and reliable flood susceptibility maps.

Flood susceptibility mapping is an essential tool for disaster management and planning, as it identifies areas at high risk of flooding, thereby facilitating timely and targeted interventions. Traditional methods of flood risk assessment, while valuable, often fall short in handling the complexity and variability inherent in geographical and climatic data. The advent of machine learning offers a transformative approach, capable of integrating vast datasets, identifying intricate patterns, and producing precise predictions.

In this work, we explore various machine learning algorithms, including Decision Trees, Random Forests, Support Vector Machines, and Neural Networks, to develop comprehensive flood susceptibility models for Uttarakhand. By incorporating a range of environmental variables such as topography, hydrology, soil characteristics, and land use, these models aim to enhance the accuracy of flood risk predictions. Additionally, the integration of remote sensing data and Geographic Information Systems (GIS) further enriches the analysis, providing a spatial dimension to the susceptibility mapping.

The findings of this research are intended to serve multiple stakeholders, including government agencies, urban planners, environmentalists, and local communities. By providing a scientifically grounded and technologically advanced tool for flood risk assessment, we hope to contribute to more effective disaster preparedness and mitigation strategies in Uttarakhand. Moreover, this study seeks to inspire further research and application of machine learning in the field of disaster management, underscoring the potential of these technologies to address complex environmental challenges.