RESEARCH ARTICLE

A Data-Intelligent Scheme Toward Smart Rescue and Micro-Services

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ABSTRACT A considerable portion of the world frequently experiences flooding during the monsoon season. As a result of this catastrophic event, hundreds of individuals have become homeless. In addition, rescuers are not usually effective enough to rescue the majority of victims. This is due to inadequate rescue operations infrastructure, a severe flaw in today's technologically advanced society. This manuscript proposes a microservice-dependent secure rescue framework that uses geographic information system mapping with a K-Means clustering algorithm to identify flood-prone regions. Numerous microservices, such as fleet management, cloud computing, and data security, integrate and execute the framework in pre- and post-flood situations. Labeling data from the proposed framework generates a support vector machine-based classifier for predicting flood risk. Furthermore, a hybrid A* algorithm is developed to find an optimal route for the rescue operation. Based on the K-means clustering results, which reduced the variance by 89.2 percent overall, dividing the data into six clusters was the best option for this study. The smoothness of the suggested hybrid algorithm is also used to verify its superiority.

I. INTRODUCTION

Natural disasters that occur around the globe are adverse events which are caused by natural factors in our environment that can have a massive impact on human lives [1], economic losses, and the overall welfare of any given society. Some examples of natural disasters are hurricanes, landslides, tsunamis, earthquakes, floods, and tornadoes. From these various events, floods are one of the most common forms of natural disaster that is inflicted on many parts of the world. This regularly occurs due to heavy rainfall, causing rivers to get overwhelmed with water, resulting in the river banks

breaking out, and water starts to flood the dry lands (floodplains) closest to the river [2].

Although located in a stable tropical region, several countries face floods as the most persistent natural disaster. This tends to recur annually due to the prolonged heavy monsoon rains that come about as a cycle during the end of the year. Apart from monsoon floods, flash floods are another type that tends to take place in areas that are undergoing heavy and rapid development. Flash floods are normally made up of high-velocity water that rises very quickly with a lot of additional debris. In contrast with monsoon floods which can take up to multiple weeks for the water flow to return back to normal, flash floods may only take less than a day to recover [3].

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