Scan-Drop: Aerial Integrated Flood Search and Rescue (SAR) With Specialized Flood Victim Detection System to Assist Rescuers

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This research proposes Scan-Drop as an aerial integrated response during the flood search and rescue missions. This integrated response provides emergency support through proactive observation, navigation, and AI-assisted flood victim detection, along with an aerial deployment mechanism for life-saving equipment. Scan-Drop uses YOLOv8 to train the flood victim detection model with a total of 138.5 thousand labels, which contain flood victims in different flood scenarios from news videos and our quadcopter's footage, achieving a mean accuracy of 93.98% and IOU score = 0.8068. A feature extractor to provide IDs tracking to the victim is trained using PyTorch and attains an accuracy of 90.5%. A flask web is developed for the rescuers which contains the video stream of the quadcopter and victims' information such as IDs, images as well as the location of the victims. Scan-Drop's angle mode allows stable flight and hovering when working with the aerial deployment mechanism with the optimal angle for pitch and roll set at 55° for windy flights. Scan-Drop's aerial deployment mechanism can release the rescue equipment to the targets accurately, with the equipment landing within arm's reach of the target at an average distance of 20.77 cm. Furthermore, the GPS has an average stray distance of 6.5 m. These results indicate that Scan-Drop can provide flood victims or rescuers with the required equipment accurately. This study shows that Scan-Drop will be able to assist rescue teams in challenging situations during floods and provide rescuers with crucial intel for their operations.

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