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TREO

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Shelter Opening On the Verge of Hurricanes: An Intelligent Decision Support System Using Deep Reinforcement Learning

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Prior to a hurricane's arrival, a critical strategic decision that emergency managers face is when to open which shelters to host vulnerable populations. If too few shelters are opened or shelters are opened too late, fewer people can be housed during a given disaster event. But, if too many shelters are opened or shelters are opened too early, unnecessary operational costs and potential supply shortages may appear. To address such a problem, recent advances in Artificial Intelligence (AI) such as Deep Reinforcement Learning (DRL) can be introduced to optimize shelter opening strategies during a hurricane while accounting for potential risks to support pre-disaster preparation and response. However, it remains challenging to apply DRL to complex problems in disaster response across new disaster events and impact areas. In particular, there is a distinct lack of information systems utilizing DRL that optimize shelter opening strategies during a hurricane while accounting for general hurricane risks to support pre-disaster preparation and response. To this end, we propose an intelligent decision support Information System (IS) to automatically generate optimized shelter opening strategies based on a custom objective function, aiming to minimize operational costs as well as taking into account sheltering risk, damaging wind, and storm surge during transportation. The purpose of this TREO is to discuss options for testing and validating the robustness of the DSS, as well as general principles used while developing this system which can be applied to IS research for disaster management.

References

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