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Multi-Criteria Group Decision-Making (MCGDM) for Verification of HydroGIS Model Development Framework

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Expert review is the best method for the verification of flood management frameworks. However, when verifying a building-block software framework for urban flood management HydroGIS model development (HydroGIS Framework), the framework is always subjected to more arguable or marginal acceptance because the development process is less observed by the expert evaluators and a higher possibility of localised thinking limited to experts' field of studies. Therefore, in such scenarios, the multi-criteria group decision-making (MCGDM) method gets popular as it mainly analysis the group of experts' view on a set of alternatives (options) following the same set of criteria. However, the MCGDM method directly does not support the present verification. Therefore, the present work aims to modify the MCGDM method for verification of the present HydroGIS framework. For that, it studied different works on MCGDM and formulate a general map of integrated processes. Then analyse the HydroGIS framework components' integration depths using spatial analysis method (area comparison) and attention theory explanation, to select a suitable fuzzy type to be used in MCGDM. After that present work map, the framework verification attributes to the MCGDM model and carry out the verification. As result, it developed a verified relation map of various fuzzy concepts, formulated a generalised process map of the MCGDM process, identified Type-1 fuzzy concept is substantial to expert preferences demodulation, and demonstrated how it can employ modified MCGDM method to evaluate the urban flood management framework satisfactorily. The present work shows how MCGDM can be utilised for flood management framework verification.

Keywords: *multi-criteria group decision-making, Hydrogis tool, urban flood management framework, fuzzy concept, expert review*