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## **Graph Acceleration and Contextual Analysis in Radioactive Source Localisation**

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Within the nuclear industry the ability to effectively map and estimate the activity of radiological sources is paramount to ensuring that facilities remain safe, hazardous material is kept secure, and that trust in the nuclear sector from the general public remains high. Activity quantification and source localisation has uses in a wide range of security applications from border security to non-proliferation and decommissioning with significant variation in scanning times, acquisition areas and activities.

In order to maximise the performance of source localisation across a wide range of scenarios, UC Berkeley utilises MLEM algorithms in conjunction with LIDAR mapping and RGB photogrammetry, this provides additional context to the reconstructions but comes with significant computational overheads. Through a collaboration between the University of Liverpool and UC Berkeley a scoping study was performed to evaluate the use of graph acceleration and contextual analysis to produce a more efficient and informative description of a scanned environment. These hierarchical descriptions provide more efficient descriptions of geometrical objects for faster localisation and quantification of hazardous radioactive material and through the use of AI can improve detection accuracy and quantification through improved contextual analysis.

It is hoped that this work will further improve the capability of scene data fusion and make it a more easily accessible option to the nuclear security sector, further accelerating the use of these technologies in both the US and UK.

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