Case Study

MetroVista Data Informs Hyper-Resolution Flood Risk Modelling

Client:

PYRAMID (Platform for dynamic, hyper-resolution, near-real time flood Risk Assessment Integrating repurposed and novel Data sources) is a near-real-time flood forecasting and flood risk management platform. PYRAMID is a collaboration between researchers from Newcastle University's School of Engineering, Loughborough University and the Urban Observatory which operates the largest sensor deployment in the UK collating the largest set of open environmental monitoring data in the world.

urban observatory

Industry:

Academia

Product:

MetroVista

"The Bluesky data provides accuracy and detail that enable us to include information that is simply not available from another single source. For example, we can consider the impact of property age and type of construction, we can look at the permeability of a front garden and even individual door thresholds – all important considerations in flood risk assessment and mitigation at this scale."

Dr Luke Smith, Lecturer and Deputy Director of the Urban Observatory at Newcastle University

Summary:

Researchers from the Urban Observatory and the Universities of Loughborough and Newcastle are developing advanced computer modelling to assess the flood risk of individual properties using LiDAR data and oblique aerial photography.

PYRAMID will use artificial intelligence (AI) to extract information from various types of data, including old reports and flood asset registers, and combine this with feeds from weather and traffic sensors, for example, to provide a dynamic platform for hyper local, near real-time flood risk assessments.

Challenge:

In 2012 Newcastle experienced the worst flooding in living memory. Referred to as 'Thunder Thursday' and the 'Toon Flood' this exposed a number of weaknesses in existing flood modelling.

Specifically, existing operational flood risk forecasting and risk management tools do not model the critical causes of failure in flood protection systems and may not capture localised factors that could influence larger-scale flood dynamics and the impacts of flood events.

Whilst a wealth of data is available; flood reports, drainage plans, asset management records, remote and in-situ sensing, citizen science and sub property level factors identified using AI, it is often disparate, fragmented and of inconsistent quality. This makes the process of extracting and integrating valuable information a huge challenge.

Solution:

Captured using the world's first large format imagery and LiDAR hybrid sensor, MetroVista data includes simultaneously captured oblique and vertical aerial photography. MetroVista datasets also include geographically accurate, photo textured, mesh models ready for use in 3D GIS, CAD and other modelling software as well as visualisation, gaming and virtual reality workflows.

PYRAMID is a near-real-time flood forecasting and flood risk management platform that demonstrates new methodologies and tools for assessing, analysing, monitoring and forecasting the state of flood risk at higher spatial and temporal resolutions than previously seen.

Results:

PYRAMID will enable greater capacity to explain and engage with stakeholders around flood risk than previously possible. With fine tuning from project partners, it will lay the foundation for a 'digital twin' for flooding in a single city or catchment area and is easily transferable to other UK locations.

Providing real world context and accuracy, the MetroVista data also enables the visualisation of evolving events. This will allow flood risk managers to employ just in time maintenance and alleviation methods, such as clearing blocked drains or setting up mobile defences.

Specification	Aerial Photography	Obliques	LiDAR	Mesh Models
Resolution	5cm	5cm	16 - 100 PPM	Derived from 5cm
Coverage	Selected cities across Great Britain			
Accuracy XY	± 10cm rmse	± 10cm rmse	± 15cm rmse	± 25cm rmse
Accuracy Z	-	-	± 10cm rmse	± 25cm rmse
Formats	Include: JPG, TIFF, ECW, SID, KMZ	Include: JPG, TIFF, ECW, SID, KMZ	Include: ASCII Grid, ASCII XYZ, DXF Point, GeoTiff, LAS	Include: OBJ, FBX, I3s, 3DML, SLPK, Cesium
Standard Projection	British National Grid			

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