Leveraging Location-Enabled Street Photos and Machine Learning to Automate Large-Scale Data Collection in Support of Property Valuation

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SUMMARY

The core responsibilities of a land valuation department are to discover all property, formulate a fair and equitable market value, and communicate that value to constituents and stakeholders. To fulfill these responsibilities, valuation authorities collect accurate property data, conduct field assessments, and analyze many types of data to make sure all property contributes to tax revenue. The land valuation department must also use this information to increase transparency and maintain the public's trust and confidence. To be successful, the land valuation department must satisfy requirements in all these areas while making continual improvements.

This can be challenging for a lot of reasons. Property data isn't always available, or it's locked up in tabular systems. Inaccurate or incomplete data can result in incorrect property valuations, which lead to time-consuming and costly appeals that jeopardize public trust. Staffing constraints make it harder to value property efficiently and thoroughly, resulting in long field and office backlogs and potentially overlooked value. And through all this, the public is asking for modern access to current, accurate information—and turning to unauthoritative sources if data is too difficult to find or use.

To help address the data divide for property valuation, a proof of concept is proposed that leverages Esri's Property Condition Survey together with artificial intelligence. The Property Condition Survey is a configuration of Esri's Photo Survey application that can be used by local governments to publish street-level photo collections, conduct property surveys, and automate the classification of property condition using machine learning.

The Property Condition Survey leverages location-enabled photos produced by many commercially

available cameras and simplifies data processing, so street-level photo collections can be gathered on a regular basis. Photo collections can then be used in the Property Condition Survey application and/or be classified using Microsoft's Custom Vision service to identify property conditions and related attributes in support of property valuation.

By applying machine learning (ML) to the classification of street-level property photos, valuation authorities can significantly reduce the time and cost associated with performing property assessments in the field. Each photo and associated property automatically receives a classification probability, which can then be used to inform a property valuation model. After performing an initial survey and establishing a baseline, valuation authorities can rapidly resurvey in the future to track property condition and valuation trends over time.