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New Construction Activity Detection and Classification via Satellite Imagery and Machine Learning

Thursday, October 23, 2025 8:50 AM (20 minutes)

The Census Bureau's Survey of Construction provides national and regional statistics on starts and completions of new single-family and multifamily housing units and statistics on sales of new single-family houses in the United States. To reduce the need for costly fieldwork, Reveal developed an end-to-end system using high-resolution satellite imagery and machine learning to detect new residential construction, track progress month-to-month, and classify building type at scale. Monthly 50 cm scenes are captured within five-day window around month-end with quality screens. Two segmentation models drive the workflow: an attention U-Net for construction stage (excavation, foundation, framing, roof) and a DeepLabV3+ model for building type. From the model masks we extract vector "blobs,"remove duplicates across overlapping captures, and apply footprint, road, water/park, and cloud exclusions. A geohash-based matcher links blobs across months to build property timelines from start to completion; where coverage is missing (e.g., clouds), we use documented imputation and a capture-window adjustment to report calendar-month counts. On held-out data, construction-stage segmentation shows strong agreement (mIoU 0.865; accuracy 0.948);building-type classification achieves 0.873 accuracy, with known class-imbalance limits for multifamily and attached units. The pipeline produces place-level and higher-level aggregates suitable for Housing Starts indicators, reducing field workload and tightening reporting latency. We outline current limitations (e.g., large parcel splitting, closely spaced builds) and practical next steps, including targeted labeling, model refinements, and permit data integration.

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Organized Session Details

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