Zero-Shot Building Attribute Extraction from Large-Scale Vision & Language Models

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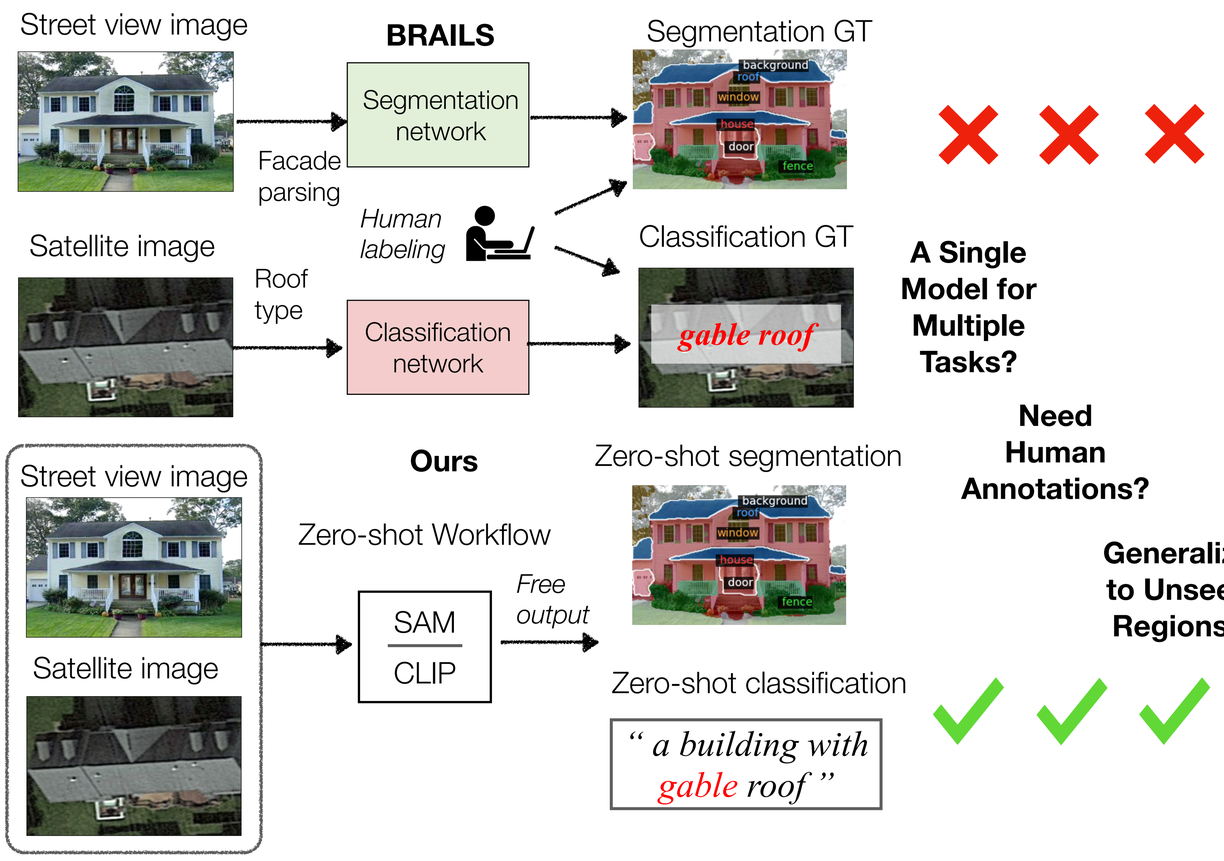
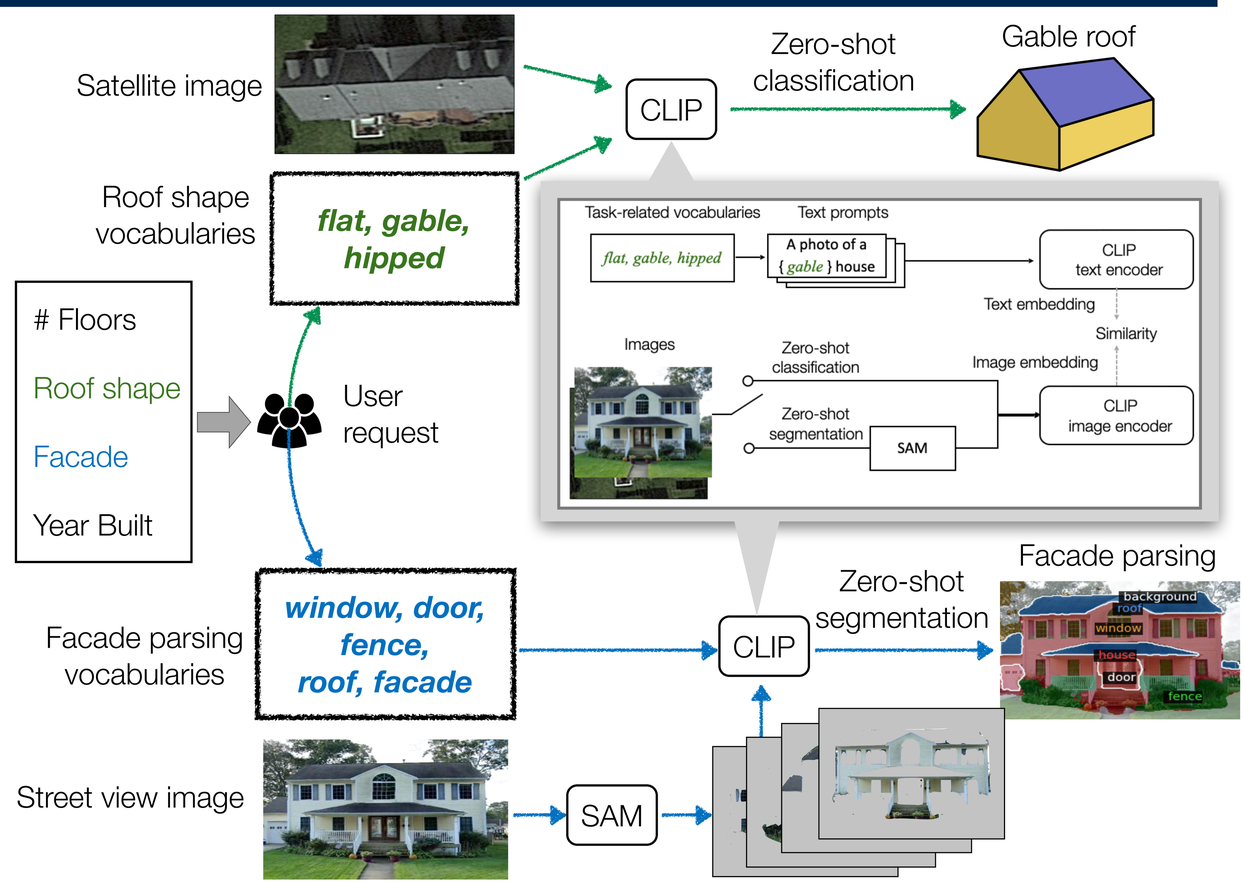
Goal: Versatile, Scalable, Robust Building Info System



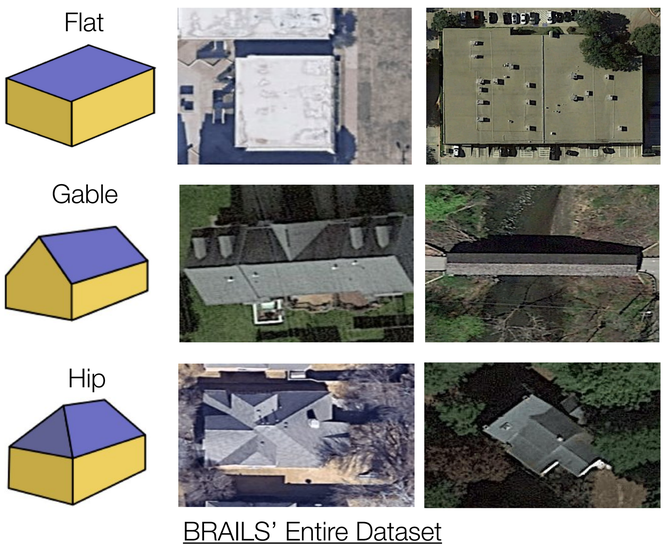
(b) Ours

Our Zero-Shot Workflow



Experiments

Roof Type Classification



BRAILS' Entire Dataset

Accuracy (%)	# Images	BRAILS	Ours	*Our Gain*
Gable type	8449	**99.2**	2.0	-97.2
Hip type	8451	**99.4**	47.8	-51.6
Flat type	8447	**99.6**	98.1	-1.5
Micro-Average		**99.4**	49.2	-50.2
Macro-Average		**99.4**	49.2	-50.2

- Evaluation is from the entire dataset (training + validation).
- BRAILS' accuracies are training accuracies in the close world. Our accuracies are the zero-shot accuracies in the open world.

Year Built Classification

BRAILS' Validation Set

Year range	# Images	BRAILS	Ours	*Our Gain*
Pre 1969	30198	**62.0**	38.7	-23.3
1970 - 1979	10485	**11.6**	0.8	-10.8
1980 - 1989	20519	10.8	**12.8**	+2.0
1990 - 1999	13537	8.3	**46.3**	+38.0
2000 - 2009	19178	**14.0**	0.1	-13.9
Post 2010	5944	**1.6**	0.0	-1.6
Micro-Average		**26.1**	20.7	-5.4
Macro-Average		**18.1**	16.4	-1.7

Pre 1969

1990 - 1999

- It's a difficult task both for BRAILS and ours.
- CLIP's captioning is biased on year built prediction of the hoses, especially of theses built in Pre 1969.

Facade Parsing

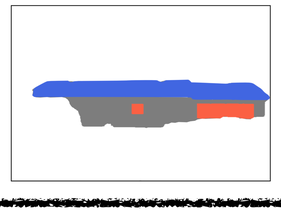
BRAILS' Validation Set

mIoU (%)	Roof	Door	Window	Facade	*Mean*
OVSeg	50.9	66.4	79.1	38.8	57.3
ODISE	53.1	64.1	83.0	44.7	60.2
Ours	**55.6**	**67.9**	**85.5**	**48.6**	**61.5**

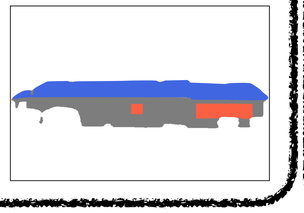
- No annotation.
- No fine-tuning.
- SAM provides stronger guidance.

Image

ODISE



Ours



Floors

BRAILS' Validation Set (West Coast)

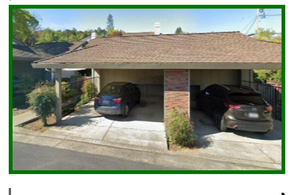
Accuracy (%)	# Images	BRAILS	Ours	*Our Gain*
One-story	2393	**88.5**	80.8	-7.7
Two-story	580	56.4	**57.8**	+1.4
Three-story	16	**56.3**	0.0	-56.3
Micro-Average		**82.0**	75.9	- 6.1
Macro-Average		**67.0**	46.2	-20.8

Novel Domain (East Coast)

Accuracy (%)	# Images	BRAILS	Ours	*Our Gain*
One-story	210	70.7	**77.6**	+6.9
Two-story	198	55.2	**74.0**	+18.8
Three-story	37	33.3	**50.0**	+16.7
Micro-Average		66.5	**76.1**	+9.6
Macro-Average		53.07	**67.2**	+14.13

- BRAILS' accuracies are the validation accuracies in the close world. Our accuracies are the zero-shot accuracies in the open world.
- BRAILS performs well (poorly) when the test data (does't) matches the training data.

BRAILS' Training Set (West Coast)



BRAILS' Validation Set

Novel Domain (East Coast)