



DETECTING URBAN CHANGES WITH RECURRENT NEURAL NETWORKS FROM MULTI-TEMPORAL SENTINEL-2 DATA

Maria Papadomanolaki*, Sagar Verma*, Maria Vakalopoulou, Siddharth Gupta, Konstantinos Karantzalos
 mar.papadomanolaki@gmail.com, {sagar.verma, maria.vakalopoulou}@centralesupelec.fr,
 sid@granular.ai, karank@central.ntua.gr

CHANGE DETECTION

The general problem of monitoring the urban system and discerning changes that are occurring within that system that are of use to urban planners, managers, and researchers [1].

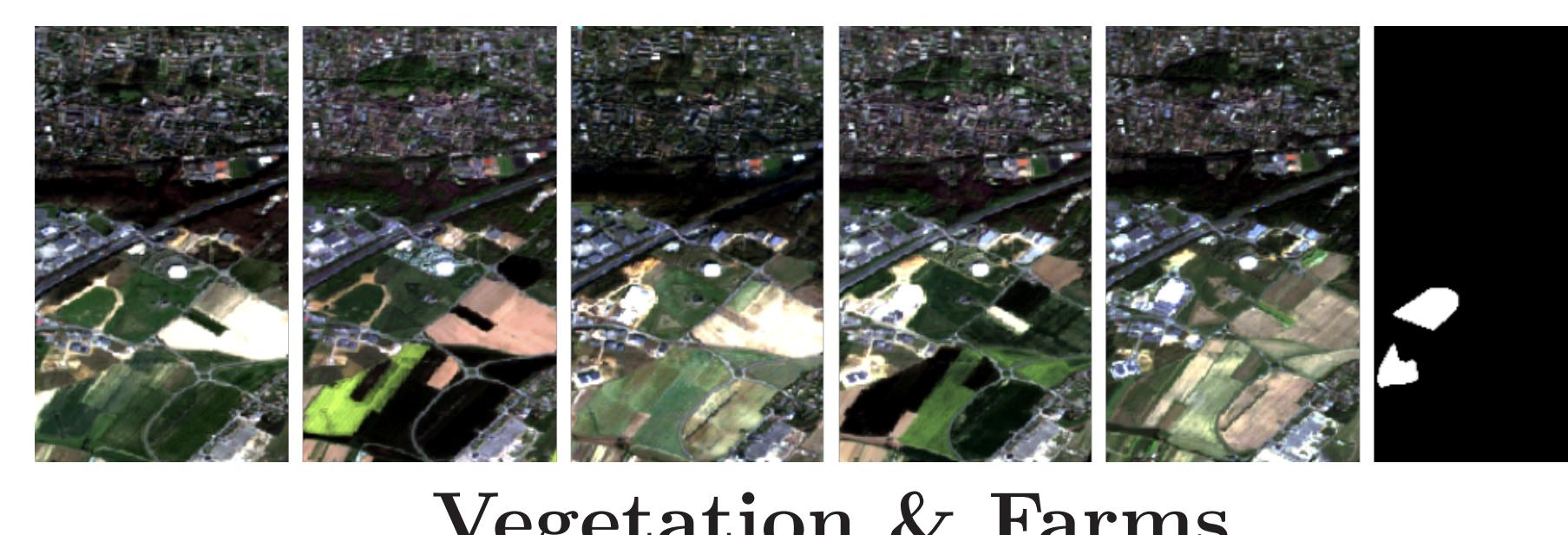


PROBLEM STATEMENT

Using multidate Sentinel-2 images to effectively learn urban changes while minimizing errors due to seasonal changes and clouds.



Clouds & Shadows

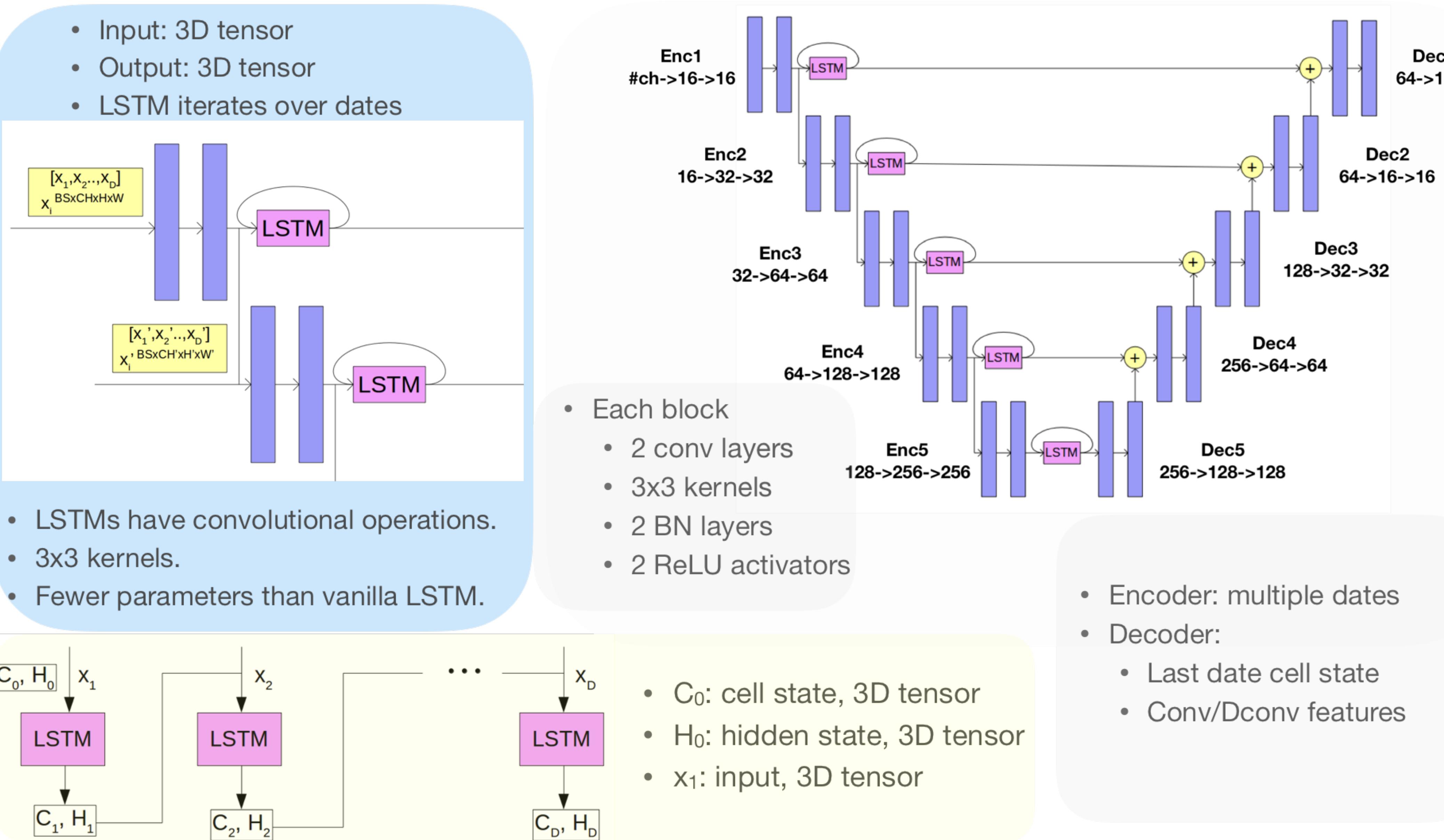


Vegetation & Farms

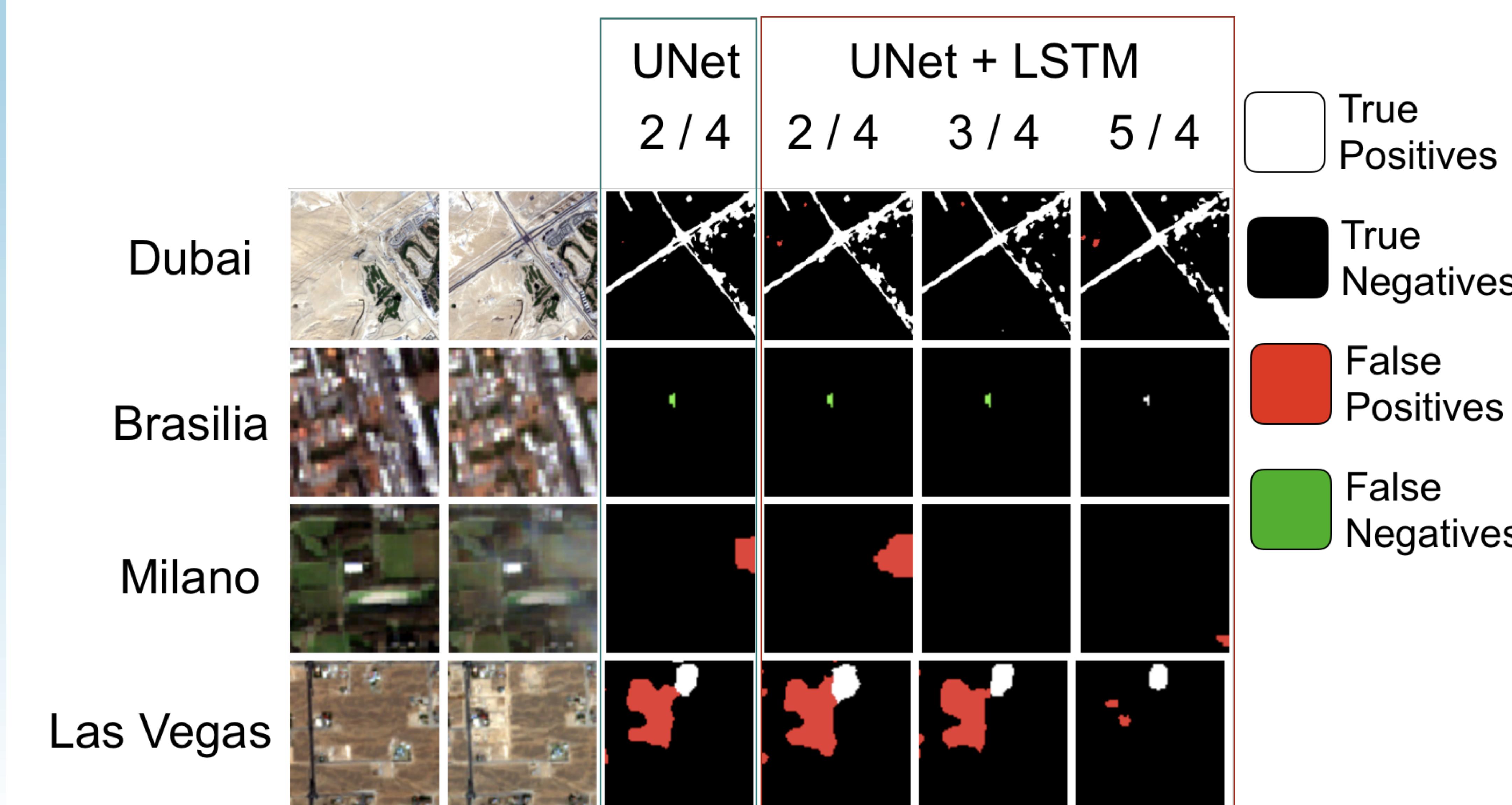
RELATED WORK

- Review Article Digital Change Detection Techniques using Remotely-Sensed Data [2].
- Continuous Change Detection and Classification of Land Cover using all Available Landsat Data [3].
- Learning Spectral-Spatial-Temporal Features via a Recurrent Neural Network for Change Detection in Multispectral Imagery [4].
- Urban Change Detection for Multispectral Earth Observation using Convolutional Neural Networks [5].
- Fully Convolutional Siamese Networks for Change Detection [6].

PROPOSED ARCHITECTURE



QUALITATIVE EVALUATION



QUANTITATIVE RESULTS

Network	Dates / Channels	Precision	Recall	OA	F1
U-Net	2 / 13	60.80	50.51	95.76	55.18
	2 / 4	58.87	53.90	95.67	56.28
	3 / 4	59.28	51.94	95.67	55.36
	5 / 4	61.21	47.57	95.73	53.53
U-Net + LSTM	2 / 4	59.88	54.78	95.77	57.22
Daudt et al.	3 / 4	60.66	50.91	95.76	55.36
	5 / 4	63.59	52.93	96.00	57.78
Daudt et al.	2 / 13	42.39	65.15	93.68	51.36
	2 / 3	42.89	47.77	94.07	45.20

Quantitative evaluation of the proposed framework.

FUTURE WORK

Big change detection: 100+ cities, 10000+ polygons, Multi-task, Multi-resolution, Multi-date



REFERENCES

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- [5] R. Caye Daudt, B. Le Saux, A. Boulch, and Y. Gousseau, "Urban change detection for multispectral earth observation using convolutional neural networks," in *International Geoscience and Remote Sensing Symposium*, July 2018.
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