



Intelligent Abnormal Situation Awareness Platform (i-ASAP)

Biweekly Team Meeting
December 2, 2020

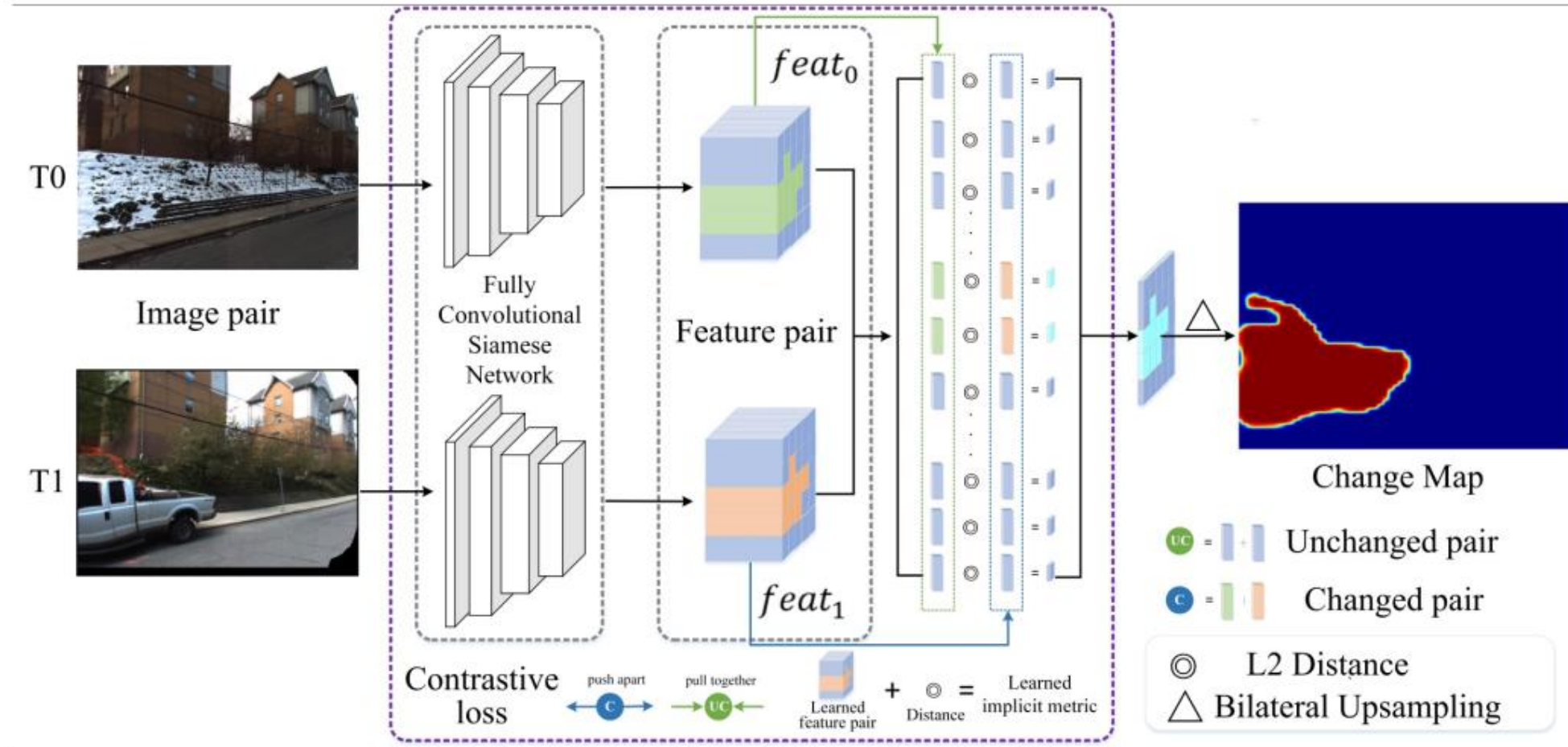
Audience
University of South Carolina, Columbia, SC

Performers
CFD Research Corporation, Huntsville, AL

Overview

- Related work for change/anomaly detection in video
- Anomaly detection and segmentation concept
- Roadmap
- References
- Questions and discussion

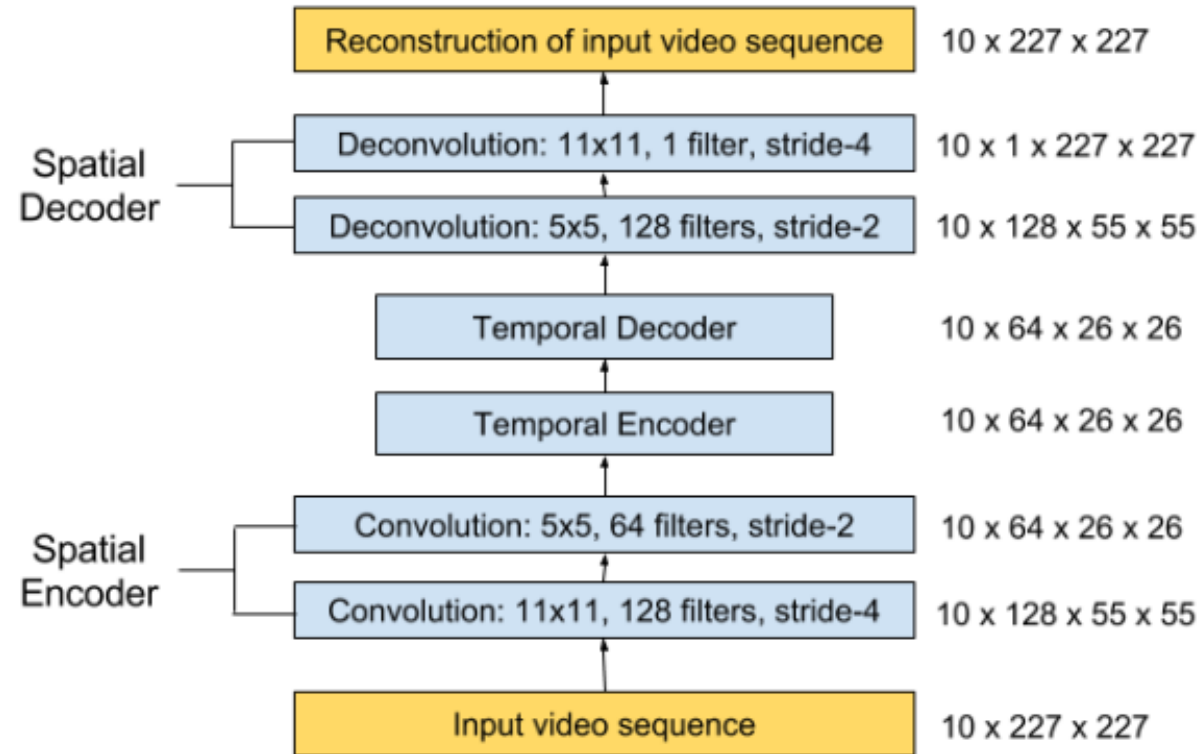
Learning to measure change: Fully convolutional siamese metric networks for scene change detection



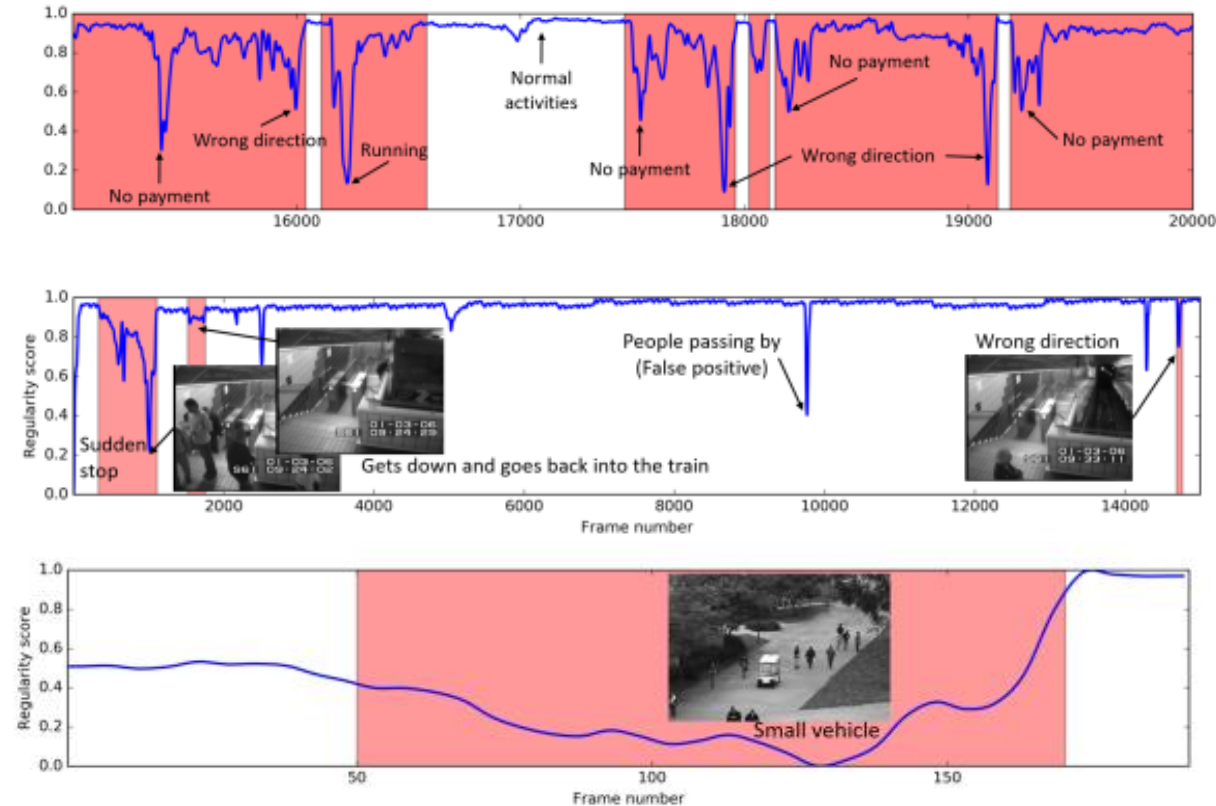
Guo, E., Fu, X., Zhu, J., Deng, M., Liu, Y., Zhu, Q., & Li, H. (2018). Learning to measure change: Fully convolutional siamese metric networks for scene change detection. *arXiv preprint arXiv:1810.09111*.

Abnormal Event Detection in Videos using Spatiotemporal Autoencoder

Model Architecture



Analysis of Regularity Score w.r.t. Truth



Chong, Y. S., & Tay, Y. H. (2017, June). Abnormal event detection in videos using spatiotemporal autoencoder. In *International Symposium on Neural Networks* (pp. 189-196). Springer, Cham.

Anomaly Detection and Segmentation Concept

Training Phase

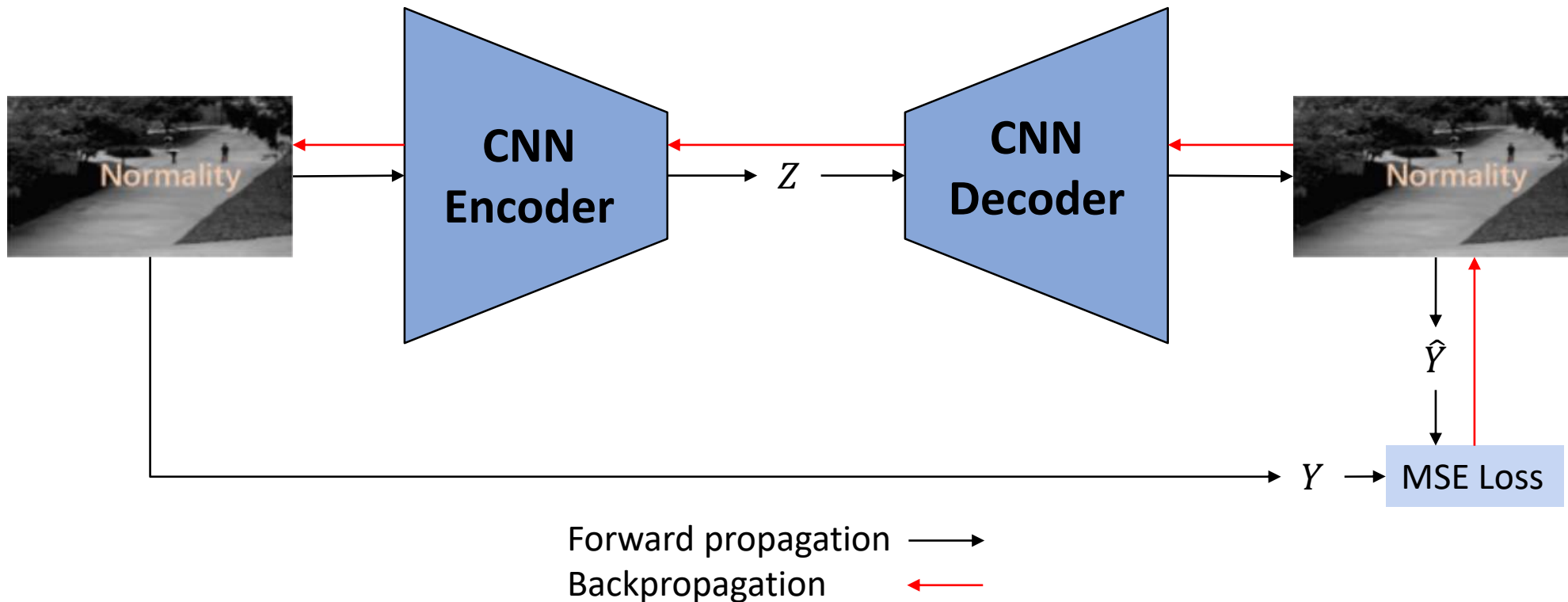
- (1) Train encoder-decoder model on *normal* data
- (2) Validate on *normal* data

Detection Phase

- (1) Detect anomaly
- (2) Look back at latent features of last T frames
- (3) Segment anomalous frame based on anomalous latent features' deviation from normal latent features
 - a. Use most recent *normal* feature vector?
 - b. Average across a history of *normal* features?
 - c. Exponentially-weighted average of *normal* feature history?

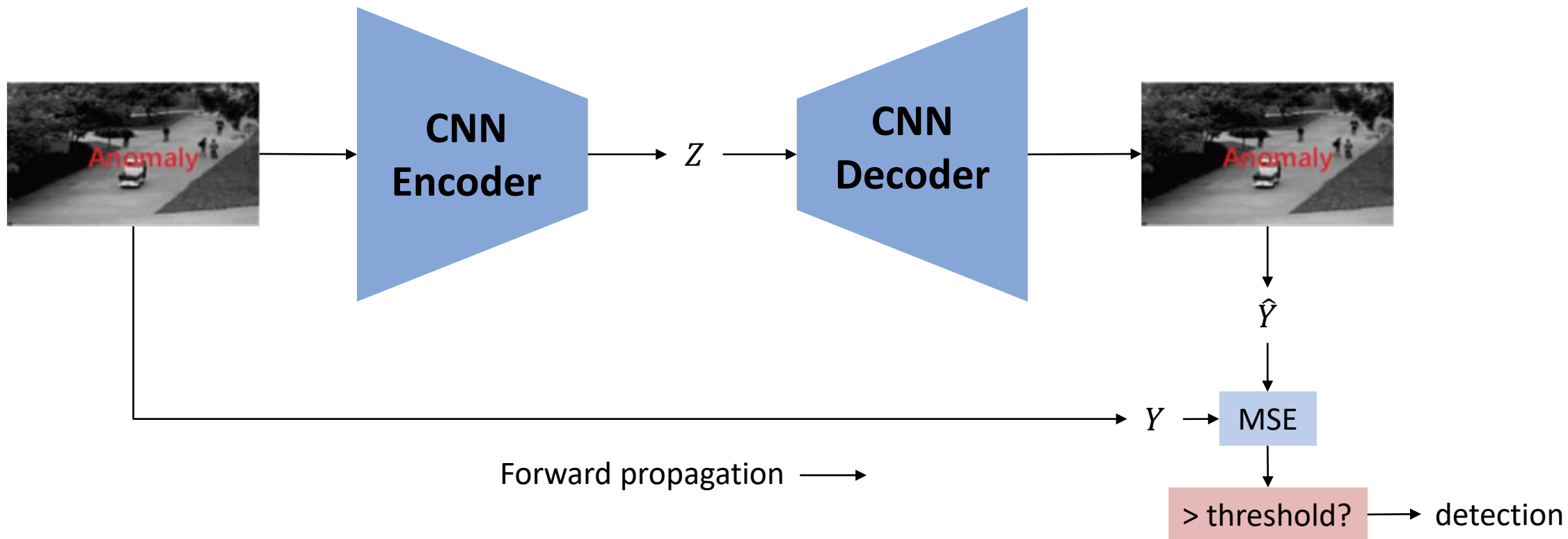
Anomaly Detection and Segmentation Concept

Training Phase



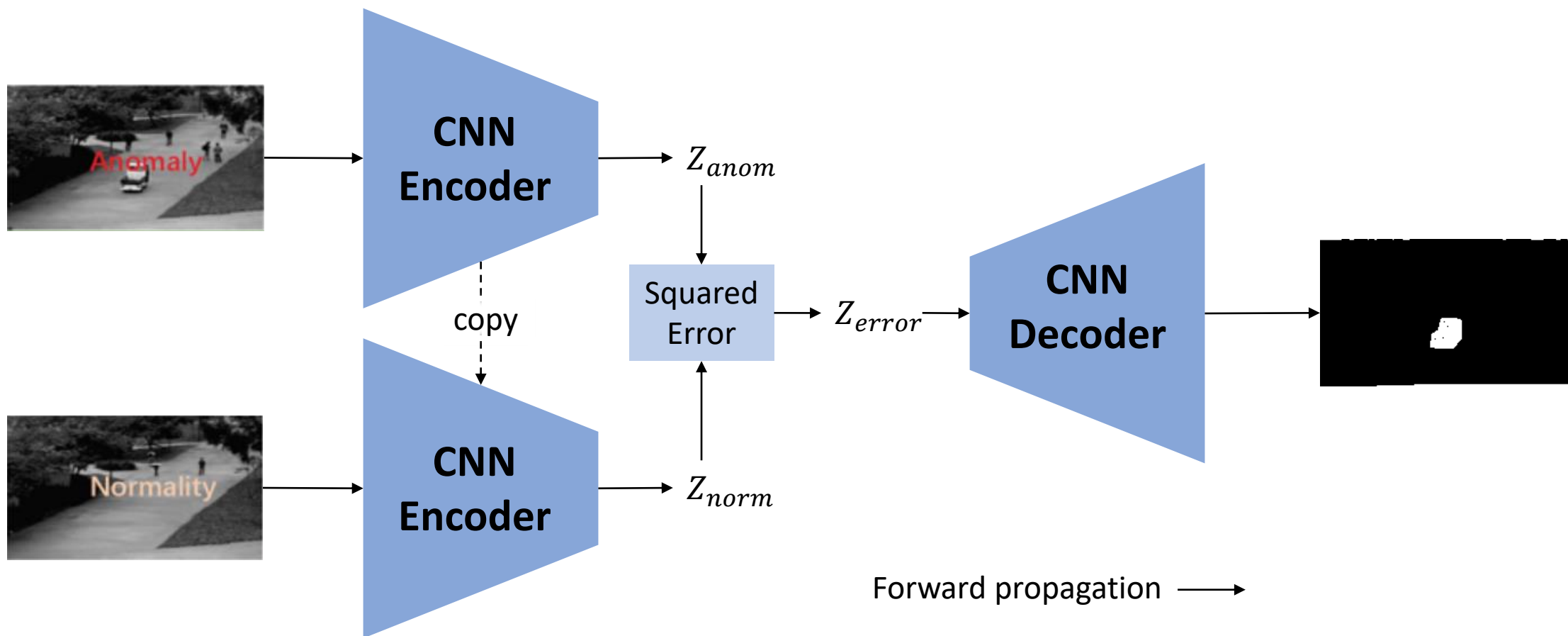
Anomaly Detection and Segmentation Concept

Detection Phase



Anomaly Detection and Segmentation Concept

Segmentation Phase



- Train and evaluate the spatiotemporal autoencoder on public datasets
 - From paper (Chong, Y. S., & Tay, Y. H. 2017)
 - PyTorch code: https://github.com/maksimbolonkin/video_anomaly_detection_pytorch
- Demonstrate anomaly detection on public datasets
 - Utilize regularity score
 - Evaluate other detection signals
- Implement anomaly segmentation
 - Recycle and evaluate components from previous work
 - Bilateral up-sampling (Guo et al. 2018)
 - Squared error reconstruction (previous NASIC work)

1. Guo, E., Fu, X., Zhu, J., Deng, M., Liu, Y., Zhu, Q., & Li, H. (2018). Learning to measure change: Fully convolutional siamese metric networks for scene change detection. *arXiv preprint arXiv:1810.09111*.
2. Chong, Y. S., & Tay, Y. H. (2017, June). Abnormal event detection in videos using spatiotemporal autoencoder. In *International Symposium on Neural Networks* (pp. 189-196). Springer, Cham.

Questions and Discussion