Intelligent Abnormal Situation Awareness Platform (i-ASAP)

Biweekly Team Meeting
February 10, 2021

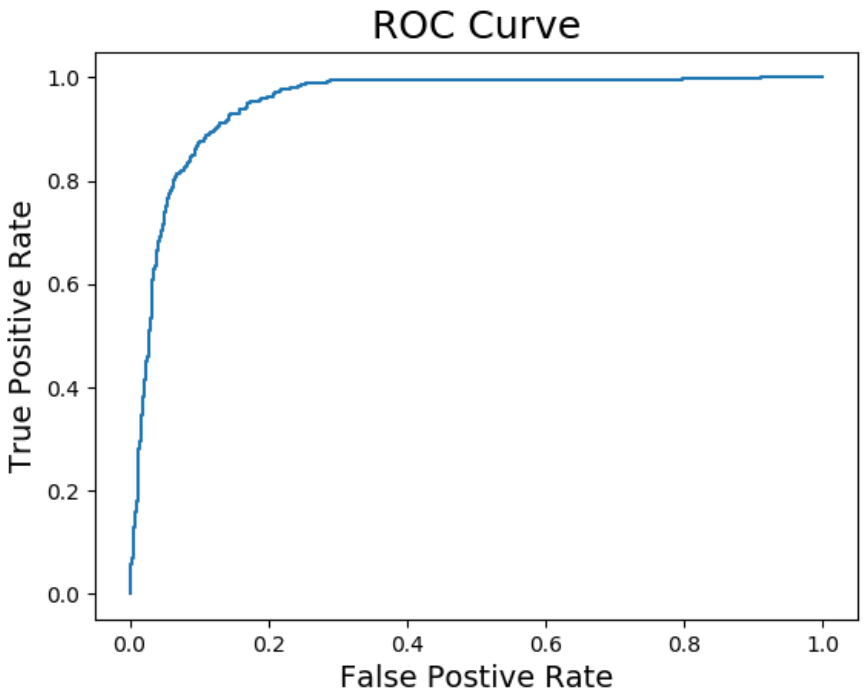
Audience
University of South Carolina, Columbia, SC

Performers
CFD Research Corporation, Huntsville, AL

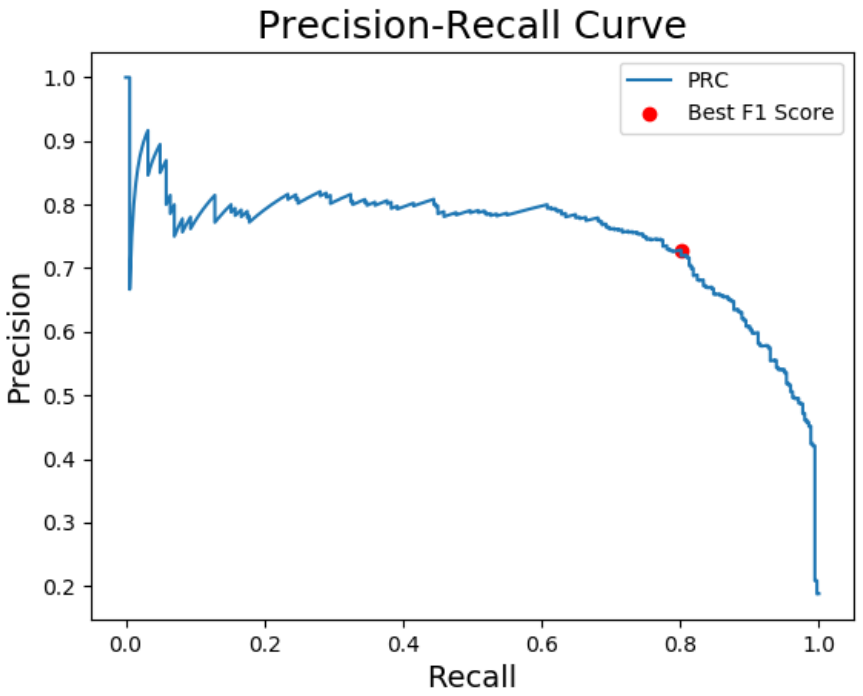
Progress

- Gained access to i-ASAP GitHub organization
- Trained Anomaly Detection model on UCSD Ped2 training dataset
- Tested Anomaly Detection model on UCSD Ped2 testing dataset
- Generated reconstruction error images

ROC and Precision-Recall Curves



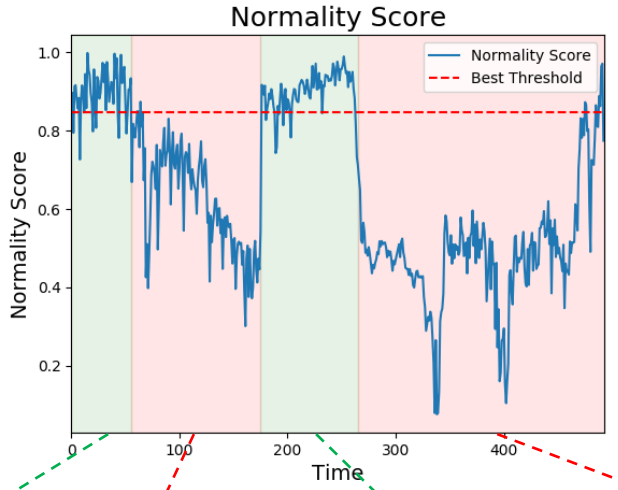
Area under Curve (AUC) = **0.9497**
(default metric used in repo)

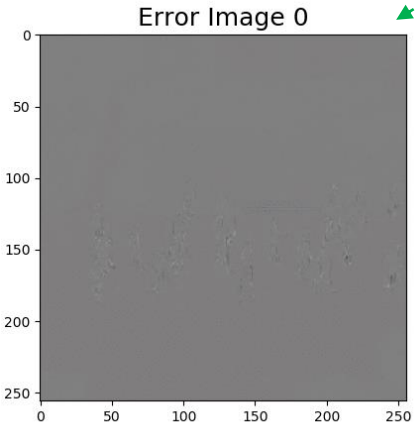


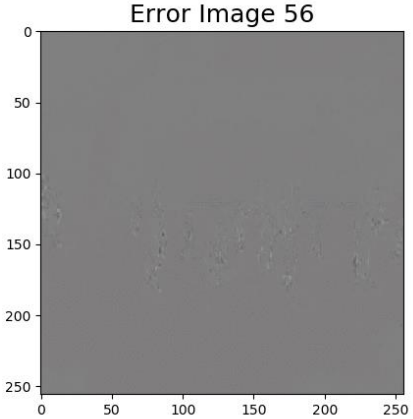
$$f_1 = 2\frac{PR}{P+R}$$

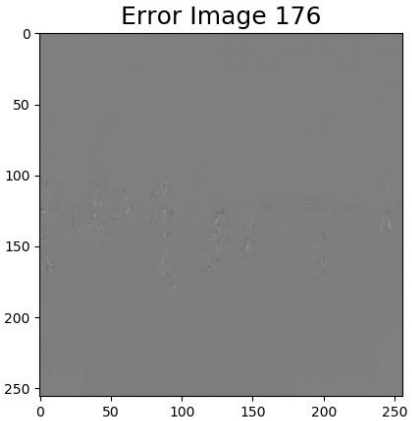
Best f_1 score = **0.7632**

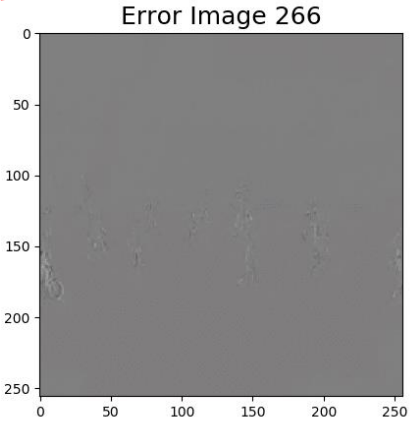
Normality Curve and Truth











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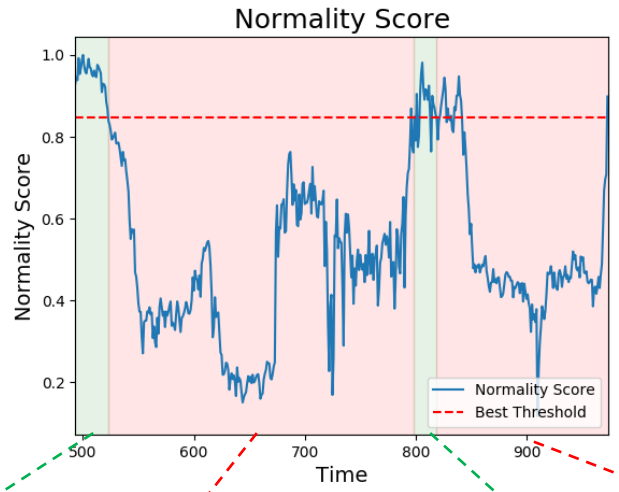

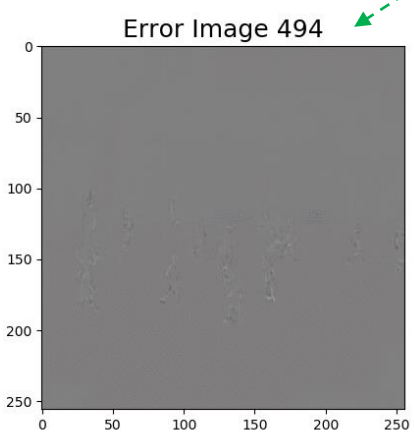

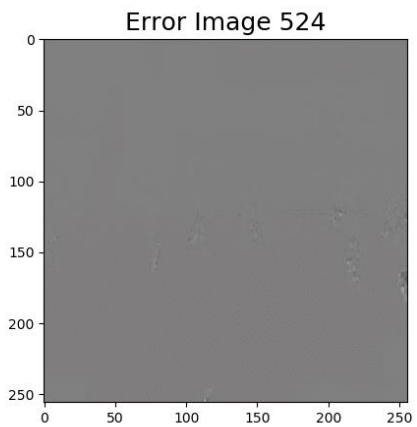

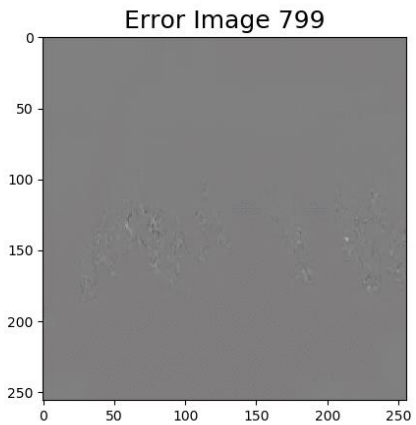

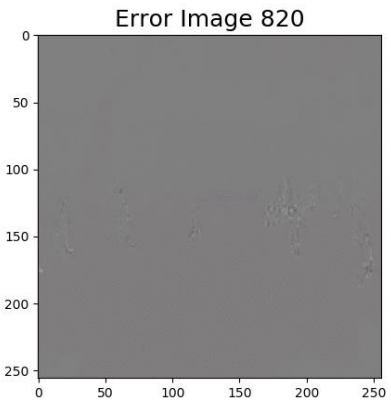

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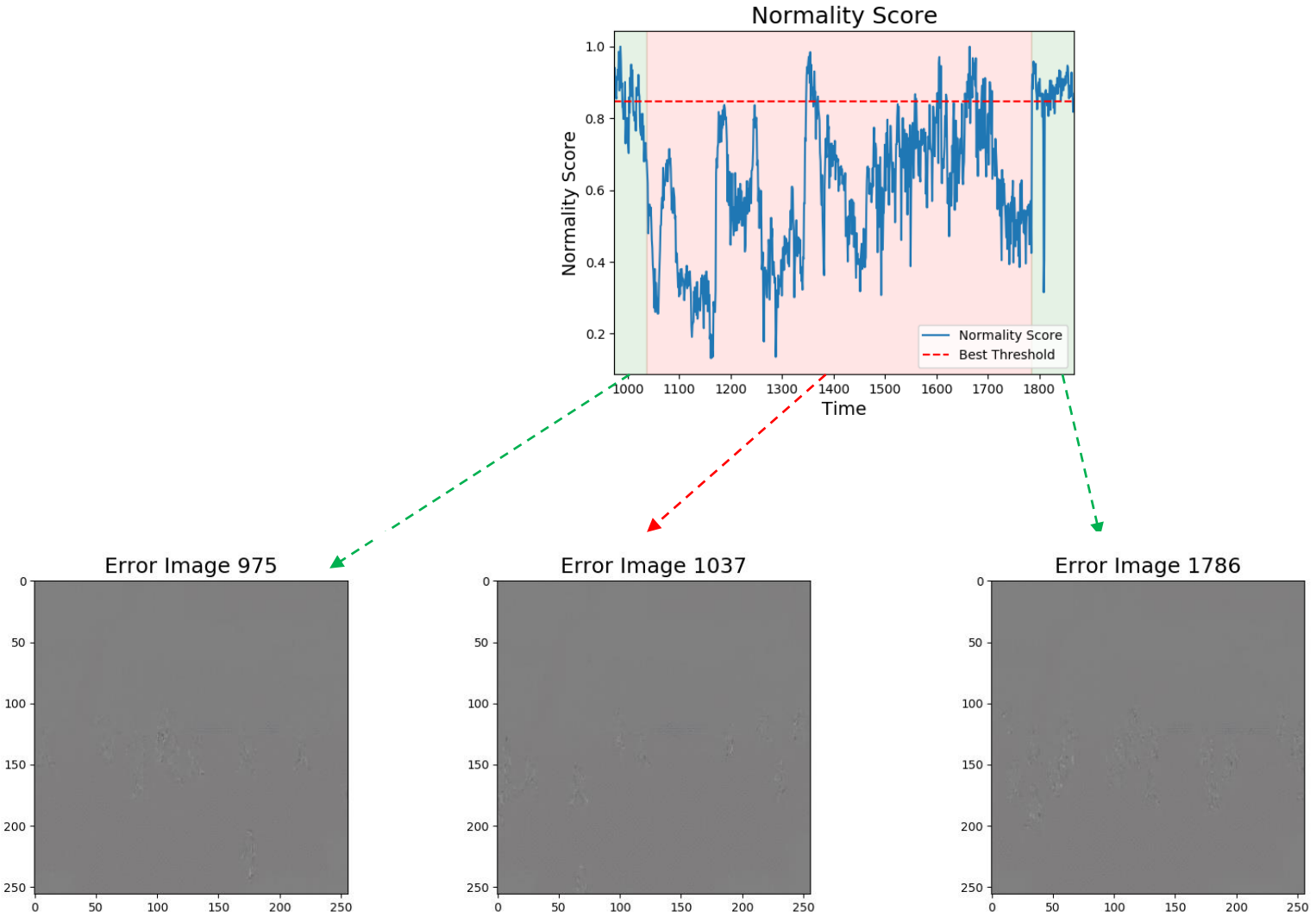

Next Steps

- Refine segmentation maps
  - Implement latent feature difference method
  - Compare results to basic reconstruction error method
  - Consider implementing sliding window PCA to extract 2D features that maximize temporal variance
- Develop object detection and tracking model
  - Unsupervised region proposals method
  - Blob detection
  - Deep learning-based detection models

Unsupervised

Yang, Y., Loquercio, A., Scaramuzza, D., & Soatto, S. (2019). Unsupervised moving object detection via contextual information separation. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (pp. 879-888).

Supervised + Transfer learning

Redmon, J., & Farhadi, A. (2018). Yolov3: An incremental improvement. *arXiv preprint arXiv:1804.02767*.

He, K., Gkioxari, G., Dollár, P., & Girshick, R. (2017). Mask r-cnn. In *Proceedings of the IEEE international conference on computer vision* (pp. 2961-2969).

Questions and Discussion