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Individual Activity Anomaly Estimation in Operating Rooms Based on Time-Sequential Prediction

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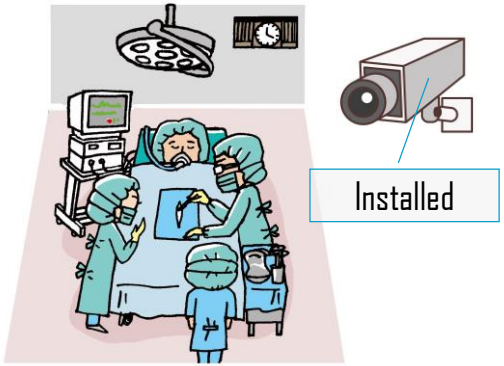
Background

Surveillance Camera



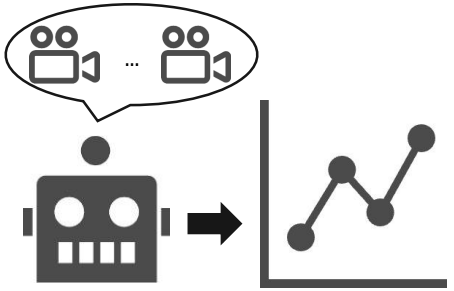
Operating Record

By Hand

Surveillance Video

In the busy situation, it's impossible to record everything properly.
There maybe features extracted from the videos.

Our Research



Automatically analysis using machine learning model from surveillance videos.

Problem

Surveillance Video

Pose Estimation and Tracking

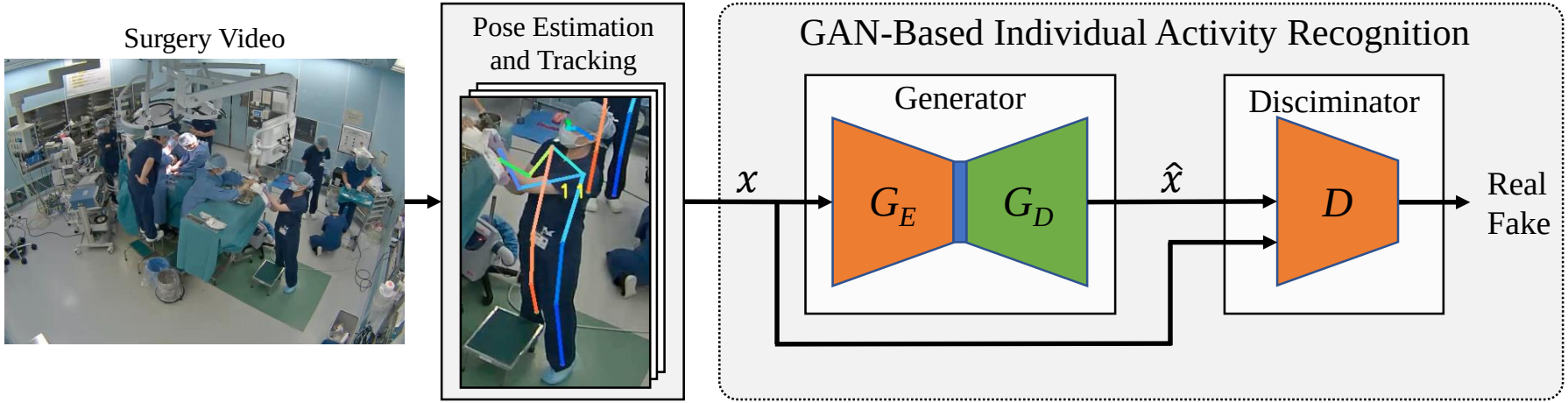
Activity 1

⋮

Activity n

Labeling Activities

Methods



Anomaly Score = Mean Squared Error of x and $\hat{x}$

Experiment

Bounding Box

Keypoints

300 frames
(10 seconds)

Model

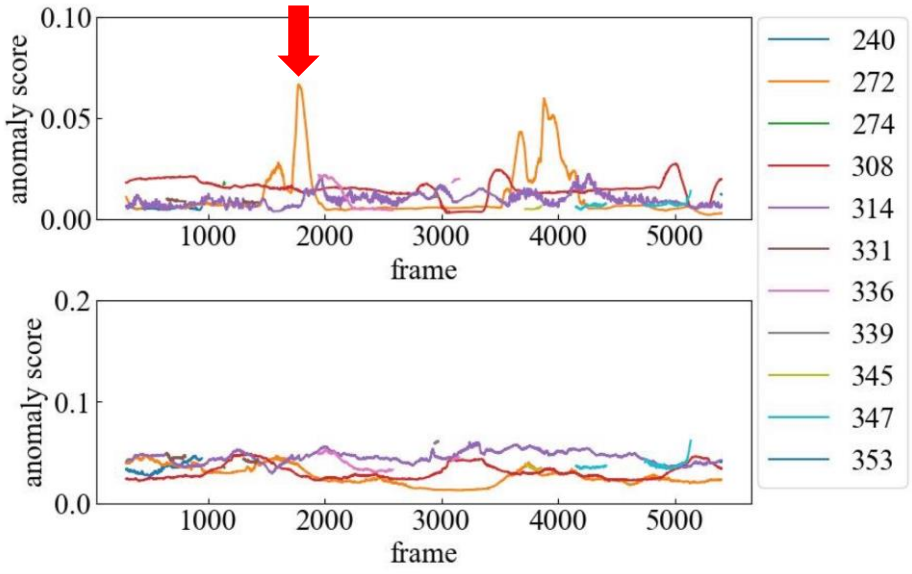
Model

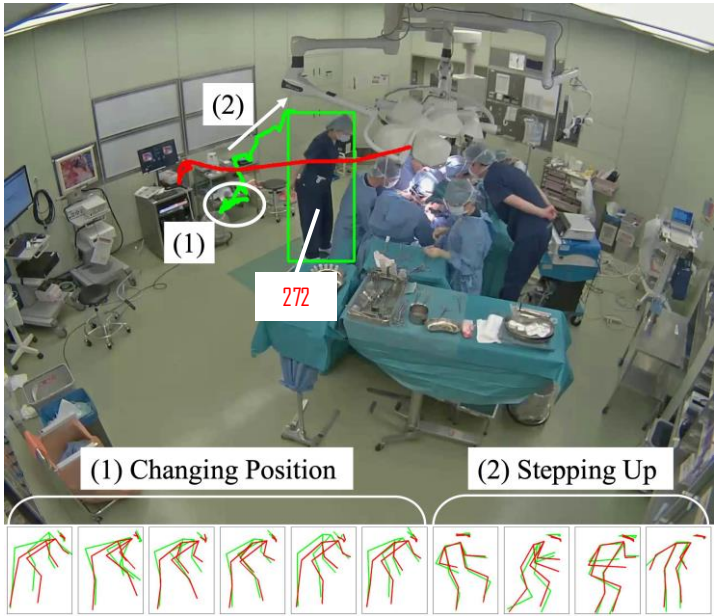
Datasets

Training dataset
3 minutes x 20
Smoothly situation

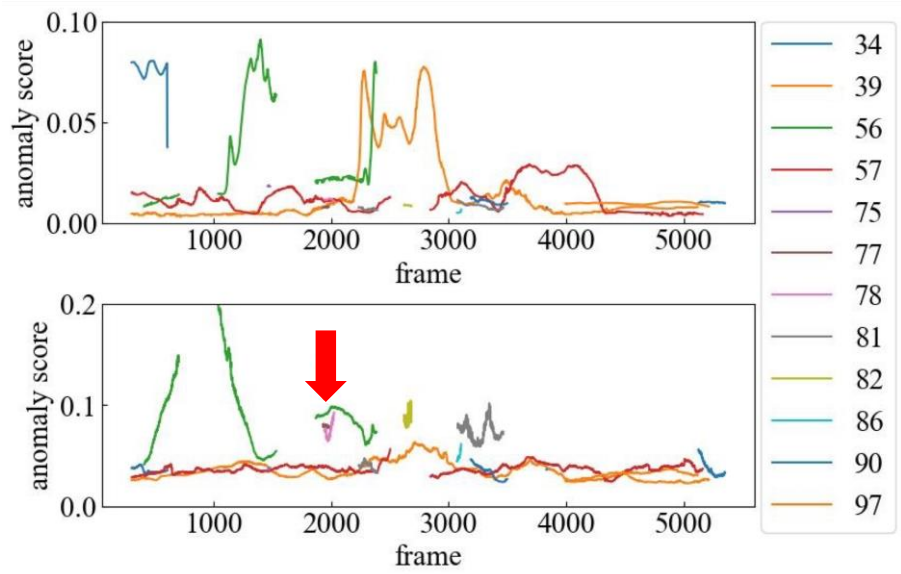
Test dataset
3 minutes x 20
Pre- or post- surgery
and suspended situation

Result – Training Dataset

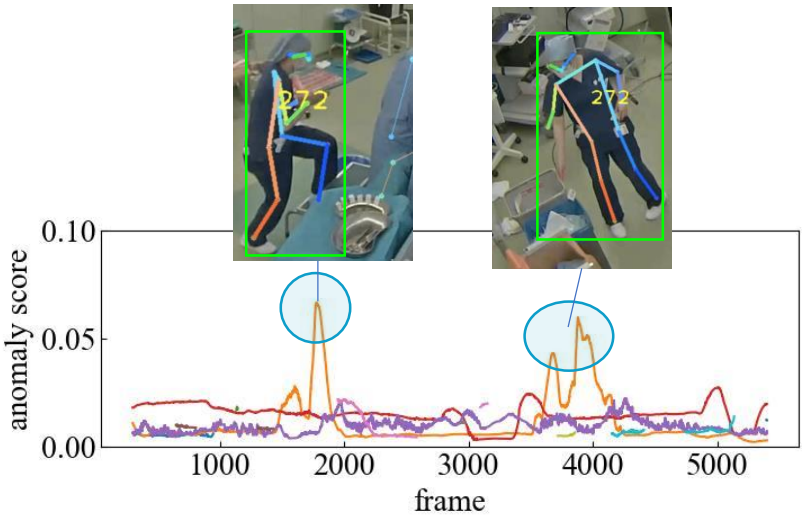




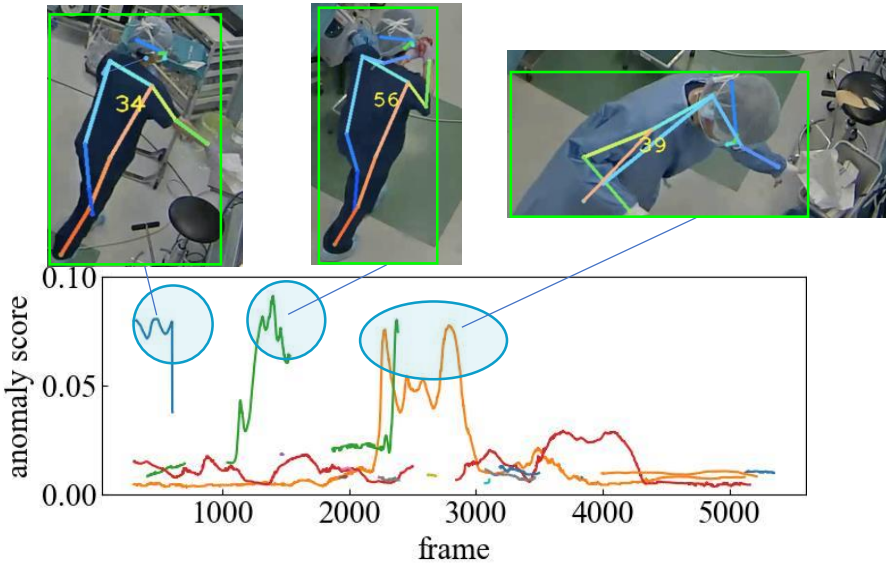
Result – Test Dataset



Discussion – Bounding Box



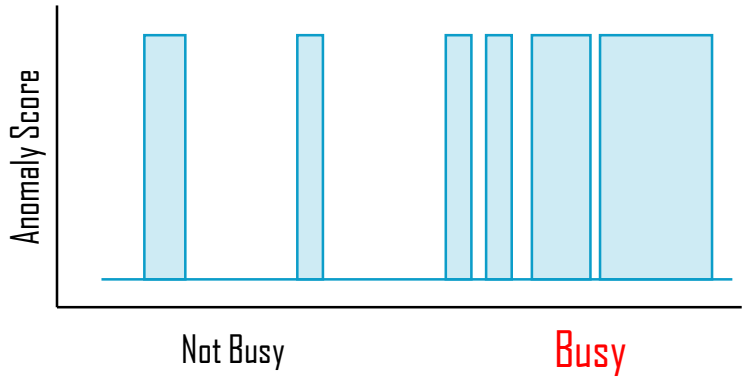
Training Dataset



Test Dataset

Discussion – Future Works

- Count the number of members who have high anomaly.
- Estimate how frequent high anomaly occurred.



Irregular events?

Conclusion

- Our research subject is automatically analysis using machine learning from surveillance videos.
- We created GAN based unsupervised model to estimate anomaly scores of individual activities.
- When the anomaly score is high, activity which is rare for the surgery is occurred.
- We will consider the busyness estimation to detect irregular events.