

Anomaly Detection

Koncepts

- main idea
 - unsupervised learning/ semi-supervised
 - pattern recognition
 - feature representation
 - to identify abnormal/infrequent/rare patterns or motions
- metrics
 - reconstruction error
 - prediction error
- obstacles
 - rare annotations
 - rarely available labeled data to train

Datasets

- UCSD Ped1/Ped2
 - anomalies
 - prohibited objects
 - abnormal movements
 - CUHK Avenue Dataset
 - anomalies
 - strange actions
 - unusual objects
 - ShanghaiTech
 - UCFCrime
 - anomalies
 - accidents
 - robbery
 - theft
 - Subway entry and exit
 - anomalies
 - moving in the wrong direction
 - loitering and so on
 - Train
 - anomalies
 - unusual movements
 - the Queen Mary University of London U-turn
 - anomalies
 - jaywalking
 - movement of a fire engine
 - LV
 - When-Where-What
 - main idea
 - egocentric videos for raffic anomaly detection
 - Detection of Traffic Anomaly (DoTA)
 - general infos
 - largest traffic anomaly dataset to-date and the first supporting traffic
 - 4,677 videos with 1280 × 720 resolution
 - richer temporal, spatial, and categorical annotations
 - seven participant categories
 - person, car, truck, bus, motorcycle, bicycle, and rider
 - following the BDD100K style
 - pipeline
 - When the anomalous event starts and ends
 - precursor: normal video preceding the anomaly
 - the anomaly window,
 - post-anomaly
 - Where the anomalous regions are in each video frame
 - What the anomaly type is
 - New effective metric
 - spatial-temporal area under curve (STAUC)
 - Table 2: Traffic anomaly categories in the DoTA dataset
 - 18 anomaly categories
 - each category is split to ego-involved and non-ego
- StreetAccident
 - Anomalies: last ten frames of each clip
- A3D
 - abnormal events are annotated with the start and end times
- DADA
 - for driver attention prediction

Motivations

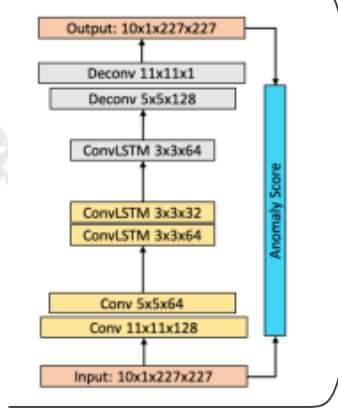
- detection, localization, and classification of on-road anomalies is necessary for proper reaction and event data recording
- challenging problem due to dynamic foreground and background, perspective projection, and complicated scenes
- future frame prediction is difficult

Models

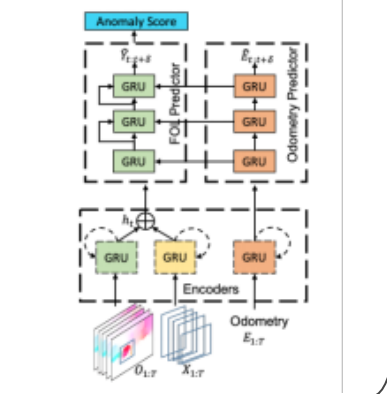
reconstruction Models

- linear approximations
 - PCA
- non-linear point-wise transform
- convolutional AutoEncoder (ConvAE)
 - Input Frames: 10x128x227
 - Encoder: Convolutional Layer, Pooling Layers
 - Reconstructed Frames: 10x128x227
 - Decoder: Unpooling Layers, Deconvolutional Layers
- Autoencoders (AEs)

ConvLSTMAE



models normal bounding box trajectories in traffic



convolutional Long-Short-Term-Memory (LSTM)

spatio-temporal predictive models

- AnoPred
- Adversarially trained AutoEncoders (AAE)
- deep generative models