Track 1: City-Scale Multi-Camera Vehicle Tracking

Introduction

- Goal is to match the identities of detected/tracked vehicles provided in their algorithmic-generated bounding boxes across cameras.
- Challenge lies in large intra-class variabilities (greater than inter-class variabilities).
- We propose Pyramid Granularity Attentive Model (PGAM) to effectively extract both coarse and fine-grained features, inspired from:
  - Region-Aware Deep Model (RADM), Multiple Granularities (MGN).
- Training Tricks / Strategies to retain fine-grained discriminality:
  - Random Erasing Augmentation, Center Loss, BNNeck.

Pyramid Granularity Attentive Model

- Multi-branch design in previous ReID works only works for well-cropped vehicles for ReID. Here we use a multi-scale model to better extract both coarse and fine-grained features.
- Given an input vehicle image, we use the last three residual blocks of ResNet to obtain image features, each with 1024 channels.
- Scale Multi-branch model to better extract both coarse and fine-grained features, inspired from:
  - Pyramid Granularity Attentive Model (PGAM), Multiple Granularities (MGN).

Experimental Results

- AIC'19 evaluation: $N_k = F_{L_{ID}}$ score 0.1634 (rank 17 out of 22 teams).

Track 2: City-Scale Multi-camera Vehicle ReID

Introduction

- • Goal is to match the identities of detected/tracked vehicles provided in their algorithmic-generated bounding boxes across cameras.
- Challenge lies in large intra-class variabilities (greater than inter-class variabilities).
- • We propose Pyramid Granularity Attentive Model (PGAM) to effectively extract both coarse and fine-grained features, inspired from:
  - Region-Aware Deep Model (RADM), Multiple Granularities (MGN).
- • Training Tricks / Strategies to retain fine-grained discriminality:
  - Random Erasing Augmentation, Center Loss, BNNeck.

Pyramid Granularity Attentive Model

- Multi-branch design in previous ReID works only works for well-cropped vehicles for ReID. Here we use a multi-scale model to better extract both coarse and fine-grained features.
- Given an input vehicle image, we use the last three residual blocks of ResNet to obtain image features, each with 1024 channels.
- Scale Multi-branch model to better extract both coarse and fine-grained features, inspired from:
  - Pyramid Granularity Attentive Model (PGAM), Multiple Granularities (MGN).

Experimental Results

- Metric: Top-K mAP (K=100) on CityFlow Re-ID dataset.

Track 3: Traffic Anomaly Detection

Introduction

- • High impact: make traffic systems smarter and safer in reducing response time.
- • Anomaly: crashes, emergency stops related to stalled vehicles.
- • Iowa Department of Transportation (DOT) dataset:
  - Large variabilities in weather conditions, snow, day/night, glare, camera vibrations, video transmission artifacts.
  - 100 training and 100 test videos, each 15 mins, 30 FPS, 800*410.
- • Training set labeling: anomaly (begin, end) time.
- With 0.7143 F1 score and 6.1057 RMSE, we achieved 0.6997 S3 score and ranked 100 training and 100 test videos, each 15 mins, 30 FPS, 800*410.
- • Rule out unsittable vehicle detections using classifier scores, road mask, and freeze frames.
- • Rule out unsittable vehicle detections using classifier scores, road mask, and freeze frames.

Experimental Results

- With 0.7143 F1 score and 6.1057 RMSE, we achieved 0.6997 S3 score and ranked 6th (out of 23 teams) in the final leaderboard. Example results shown below: