CSE 424 Project Presentation

Obstacle Pattern Recognition From Vehicle Perspective

Section: 01

Group Number: 23

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Literature Review

Paper: You Only Look Once : Unfield, Real-Time Object Detection

- The paper presents a unifield , real-time object detection system that achieves fast processing speeds and high generalization
- YOLO enables end-to-end training and achieves real-time speeds, processing up to 155 frames per second.
- It generalize top detection methods like DPM and R-CNN when tested on different domains, such as artwork.
- The model have difficulties localizing small objects and can produce localization errors.

Literature Review

Paper: Object Detection Using Convolutional Neural Networks

- To implement the object detection using CNN, TensorFlow Object detection API was used which is an open source framework for object detection models.
- Two state of the art models are compared for object detection
- SSD with MobileNetV1 has high speed detection but low accuracy
- Faster-RCNN with InceptionV2 has low speed but more accurate detection

Literature Review

Paper: Faster R-CNN: an Approach to Real-Time Object Detection

- This model merges RPN and Fast R-CNN thus it offers improved speed and accuracy
- Four classes, allocating 80% for training and 20% for testing
- The paper have showed good potential on identifying traffic signal on real time using cheap dashboard camera.
- The model does not work well when the images are not stable enough, when there are bumps on the road the accuracy decreases.

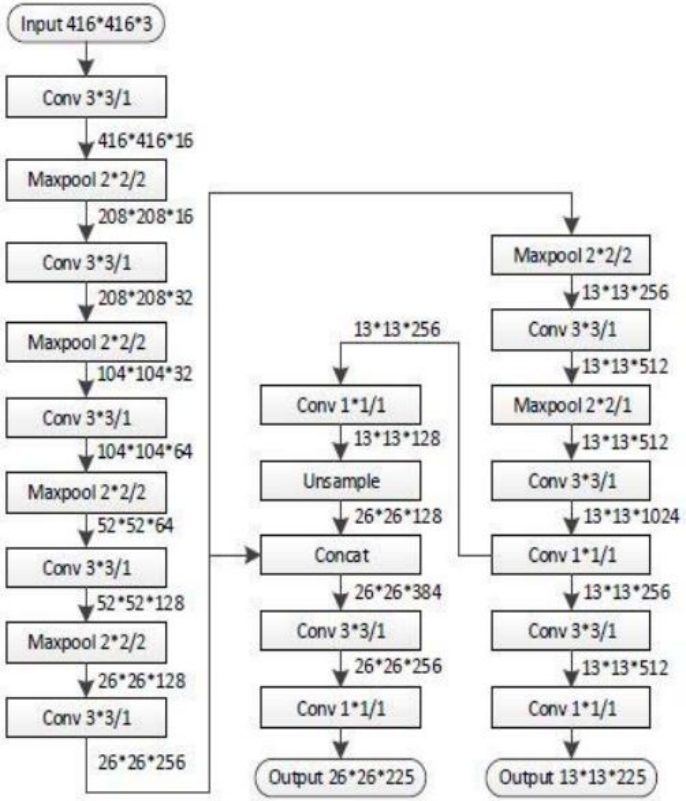
Literature Review

Paper: Object Detection and Recognition using one stage improved YOLOv3

- The primary concern for using this detector is speed more than the accuracy
- The running speed is significantly increased which is approximately 442% faster
- This paper does not extend object localization and recognition from static pictures to a video containing the dynamic sequence of images
- Provided the comparisons of different models

Model for Project

- **YOLOv3 Tiny (Modified YOLO)**
  - Reduced number of layers
  - Faster compared to other versions
  - Less computational requirements



Structure of YOLOv3 Tiny

Dataset Description

- **nuScenes dataset**
  - Developed by the nuTonomy team at MIT
  - 3D annotations of 23 classes
  - 1600 x 900 resulations
  - More than 50,000 images
  - Data collected from Boston and Singapore

Data Preprocessing

- Extracting 2D bounding boxes from corresponding 3D bounding boxes
- Splitting the dataset into 70% for training, 15% for validation and 15% for testing
- Default confidence score threshold is 25%
- Resolution and subdivision of the base model are 416 x 416 and 8 respectively

Thank You