BVRIT HYDERABAD College of Engineering for Women

Department of Information Technology

VEHICLE DETECTION USING YOLO ALGORITHM

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Contents

- Abstract
- Modules
- Architecture
- Implementation
- Results
- Timeline
- Conclusion
- References

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Abstract

- Vehicle detection in real-time is a challenging and important task. The existing real-time vehicle detection is less accurate and takes long time.
- Real-time systems require to detect and locate vehicles during criminal activities like theft of vehicle and road traffic violations with high accuracy.We use YOLO(You Only Look Once Algorithm) to detect vehicles effectively in real-time.

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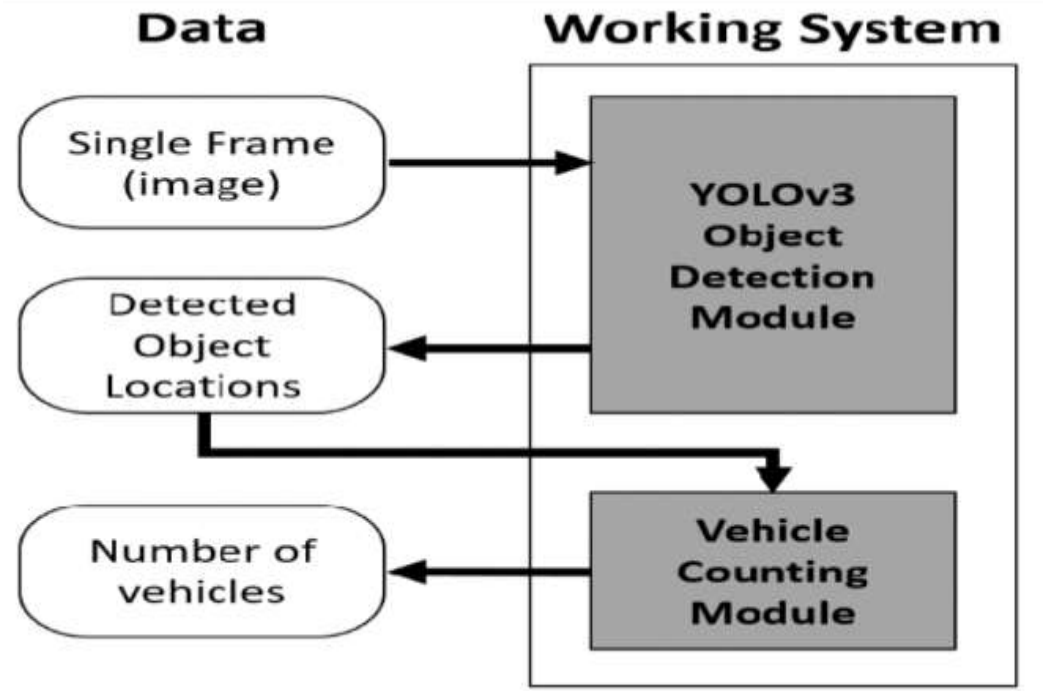
Modules

- Drawing detection boxes
  - Extracting bounding box coordinates
  - Draw a bounding box and label on the frame

- Box in previous frames
  - Identifying if the current box was present in previous frames

Architecture



Implementation

```
def drawDetectionBoxes(idxs, boxes, classIDs, confidences, frame):
        if len(idxs) > 0:
                for i in idxs.flatten():
                        # extract the bounding box coordinates
                        (x, y) = (boxes[i][0], boxes[i][1])
                        (w, h) = (boxes[i][2], boxes[i][3])

                        # draw a bounding box rectangle and label on the frame
                        color = [int(c) for c in COLORS[classIDs[i]]]
                        cv2.rectangle(frame, (x, y), (x + w, y + h), color, 2)
                        text = "{}: {:.4f}".format(LABELS[classIDs[i]],
                                confidences[i])
                        cv2.putText(frame, text, (x, y - 5),
                                cv2.FONT_HERSHEY_SIMPLEX, 0.5, color, 2)
                        cv2.circle(frame, (x + (w//2), y+ (h//2)), 2, (0, 0xFF, 0),
thickness=2)
```

```
def boxInPreviousFrames(previous_frame_detections, current_box, current_detections):
        centerX, centerY, width, height = current_box
        dist = np.inf
        for i in range(FRAMES_BEFORE_CURRENT):
                coordinate_list = list(previous_frame_detections[i].keys())
                if len(coordinate_list) == 0: # When there are no detections in the previous
frame
                        continue
                # Finding the distance to the closest point and the index
                temp_dist, index = spatial.KDTree(coordinate_list).query([(centerX, centerY)])
                if (temp_dist < dist):
                        dist = temp_dist
                        frame_num = i
                        coord = coordinate_list[index[0]]

        if (dist > (max(width, height)/2)):
                return False
        current_detections[(centerX, centerY)] = previous_frame_detections[frame_num][coord]
        return True
```

Results

Timeline

Dates	Duration	Tasks
28.9.2022 - 5.10.2022	1 week	Title finalization
6.10.2022 - 13.10.2022	1 week	Literature Survey
14.10.2022 - 20.10.2022	1 week	Abstract submission and PPT presentation
21.10.2022 - 4.11.2022	2 weeks	Architecture design
5.11.2022 - 12.11.2022	1 week	Collecting data regarding different kinds of vehicles
13.11.2022 - 1.12.2022	2.5 weeks	Implementation

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Conclusion

When the vehicles are in the frame, they are being detected and also being counted.This can be combined with survilleince cameras and can be used in real-time, to monitor the vechicles passing by, and their count can be helpful to set the time of traffic dynamically.

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References

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- Maity, M., Banerjee, S., & Sinha Chaudhuri, S.”Faster R-CNN and YOLO based Vehicle detection: A Survey. 2021” 5th International Conference on Computing Methodologies and Communication (ICCMC) 2021. doi:10.1109/iccmc51019.2021.9418274
- Peiyuan Jiang, Daji Ergu*, Fangyao Liu, Ying Cai, Bo Ma ,“A Review of Yolo Algorithm Developments”The 8th International Conference on Information Technology and Quantitative Management(2021)

Thank You