

Object detection

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1 Object Detection

1.1 Extracting Features

1. Read all the training images and their corresponding bounding boxes.
2. For each image, detect SURF feature points.
3. Across the strongest 200 SURF points obtained above, detect block features. Block features are basically simple square neighbourhood features. Block size is set to 11, which thereby generates the feature vector of size 121 (11*11).
4. The SURF points obtained are further classified as negative and positive points depending whether they are inside or outside of the bounding boxes in that respective image.
5. Based on positive and negative points their corresponding feature vectors are considered positive and negative training data for training neural network.

1.2 Training

1. Since we have data whose feature dimension is 121, the neural network is decided which has one hidden layer with 60 neurons.
2. Levenberg-Marquardt backpropagation algorithm is used.
3. Training data is further divided into 80% training data, 10% test data and 10% validation for the training of neural network.

1.3 Testing

1. For testing, again, SURF features are detected for every test image and similar procedure is applied.
2. Now using our neural net model, every feature of test image is classified whether it belongs to 'auto' region or not and then a convex hull is plotted across all the points which are identified in the 'auto' region.

1.4 Results

1. It is observed that, the strongest 200 points detected in the test are classified to the region with an accuracy of 52%.

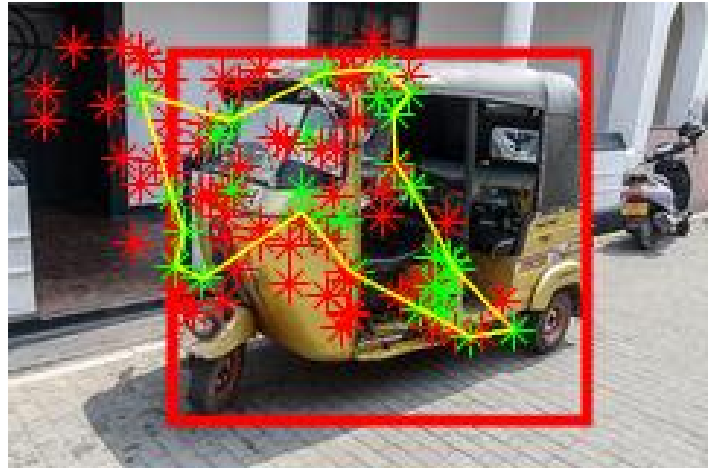


Figure 2: Sample output, green points denote the points predicted to be inside the 'auto' region and red points denote the points in the 'not auto' region. Red bounding box is the original bounding box and yellow boundary corresponds to the convex hull across the green points.

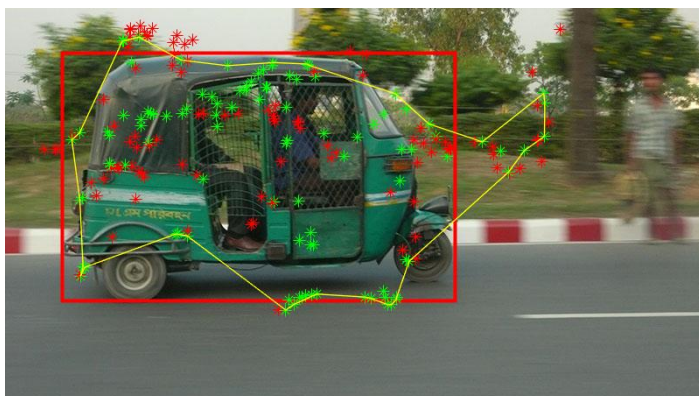


Figure 1: Sample output, green points denote the points predicted to be inside the 'auto' region and red points denote the points in the 'not auto' region. Red bounding box is the original bounding box and yellow boundary corresponds to the convex hull across the green points.



Figure 3: Sample output, green points denote the points predicted to be inside the 'auto' region and red points denote the points in the 'not auto' region. Red bounding box is the original bounding box and yellow boundary corresponds to the convex hull across the green points.